Book of Abstracts

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Transforming Food Systems for Responsible Production, Consumption and Social Wellbeing

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Growing Sustainably

ORAL Presentations

A Case for Strengthening Kenya's Climate Smart Agriculture County Policy Frameworks

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Introduction

Climate change is a global phenomenon that has immensely impacted agricultural production through alternating cycles of prolonged droughts, erratic and intense rainfall patterns, resulting in reduced crop productivity, increased pests and disease incidences and declining soil fertility. In Kenya, 75% of the agricultural output depends on rainfall, and due to its erratic patterns and insufficiency this has adversely affected smallholder farmers' welfare and livelihoods especially in the ASALs as they cannot afford the costly farm inputs and irrigation technologies and also struggle to find markets for their produce. . A paradigm shift in agricultural production is necessary and while various approaches to agroecology are continually being rolled out the gap in supportive policy frameworks is still significant.

Methodology

Through evidence-based policy research we identified innovative opportunities for policy backed implementation of regenerative agriculture principles within county-based climate smart agriculture governance structures that would support increased adoption of sustainable on-farm strategies and technologies. Evidence generated through this research is shared and evaluated through a multi-stakeholder process (MSP) with actors from public sector, private sector and civil society, weighing possible policy options, and working through the laid out policy development processes for inclusivity of the inputs of various constituencies through public engagement (communities of practice) before proceeding to county assembly stages for finalization of the process through amendment or development of new bills and relevant accompanying legislation. Alongside the policy processes the evidence generated is integrated in capacity building initiatives for producers and businesses to ensure sustainable uptake of the nascent technologies and approaches associated with regenerative agriculture.

Results & Discussion

County governments are taking proactive policy development measures to improve the resilience of their communities and increase the range of tools available to improve carbon sequestration (through agroforestry), restore soil health, increase resilience specific to the conditions of different agro-ecological zones. 5 Counties have established Climate Smart Agriculture multi-stakeholder platforms (CSA MSPs) whereby county specific policy actions are identified and the accompanying sensitization and capacity building processes initiated to ensure broad ownership and sustainable implementation of proposed policy measures.

Conclusion

Responsive and localized climate smart agriculture policies that emphasize circularity and place value on indigenous/traditional knowledge will lead to sustainable food systems since the success of regenerative agriculture is a long-term approach that requires patience and support through an enabling policy environment. The multi-sectoral and broad-based coalition building approach is a critical success factor for establishment of sustainable policy frameworks.

Keywords: Regenerative agriculture Climate change Climate smart agriculture Policy framework

Biography: Gideon Muli, Working as an agroecology technical assistant

Track: Abstracts for papers, posters and exhibition

Topic Areas: Institutional and policy drivers for agroecological transformations

A waste of time? Increasing on-farm labor through an agroecological transition in Malawi

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Introduction

Increasingly agriculturally-based livelihoods in Sub-Saharan Africa are characterized as unviable – given land and population pressure. While scholars and policymakers acknowledge the role that agriculture will continue to play for smallholder farmers, they privilege the potential of off-farm employment for rural development. Based on mixed-methods research in the Malawian context, we propose that this endorsement of non-agricultural activities may imply a trade-off for agricultural working times that is detrimental to household food security and income

Methodology

This is a mixed-methods study, with a control-intervention design, which included household farm surveys in northern and central Malawi (n=430) and semi-structured interviews (n=60). Surveys collected information on household characteristics, agricultural practices, agricultural working times, and off-farm employment. Semi-structured interviews were conducted with 60 households who had participated in an agroecological farming intervention within the past ten years. The interviews focused on farmers' perceptions of working conditions and working time, livelihood activities such as off-farm agricultural waged work and agricultural practices.

Results & Discussion

We found that farmers who had participated in an agroecological intervention had significantly reduced the probability of doing off-farm labor compared to the control group. Interviews with farmers revealed that agroecology changed the conditions for rural laborers through increasing crop performance and farm profitability, often within the first 1-2 years of using the agroecological practices. The changes to rural work meant that household and agricultural production costs previously met through agricultural labor on other farms were now met through their own farming. Reducing dependency on farmwork had second-level effects on farm production and profitability that was directly linked to labor availability and which reinforced a household's ability to avoid doing agricultural farmwork on other farms. For example, farmers expanded land area under production when their plot size had previously limited by lack of labor, fertilizer and seed. Farmers also re-ported spending more time monitoring crops, thereby reducing crop loss to these pests and diseases, and timed input application and other agricultural tasks according to crop needs, rather than the schedule of farmwork employment. More time was also spent on improving soil health, implementing soil and water conservation practices that accumulate over time.

Conclusion

The findings provide evidence that agroecology can increase agricultural productivity and improve rural livelihoods significantly. The paper also adds to existing evidence that labor, not land, constrains smallholder households' food security and income. We show how the particular social relations of production associated with agroecology are critical to these improvements and argue that agricultural development schemes should consider how their techniques and technologies shift the balance of on and off-farm work.

Adoption of Regenerative Practices for Vegetable Production in Ethiopia: Assessing the Process, Challenges and Opportunities

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Introduction

Conventional vegetable production systems promote wide applications of chemical fertilizer and synthetic pesticides to maximize crop yield. Various studies show that applications of such chemical inputs have reached an alarming rate and it has created eminent threat on the health of soil, plants, animals and humans. Therefore, a sustainable production system that promotes the adoption of Regenerative Agricultural (RA) technologies has paramount importance to ensure improved health for planet and people. This requires a system change and strategic interventions to realize a smooth transition towards a regenerative production system.

Methodology

The World Vegetable Center recently conduced a baseline study and introduced different regenerative vegetable production practices in central highlands of Ethiopia, and this paper examines the process, challenges and rates of adoption those practices. We have applied multiple regression analysis to identify the main factors that affect the rate and extent of adoption RAs using household level data from Ethiopia. We have also triangulated the evidences from focus group discussions and key informant interviews.

Results & Discussion

The findings from the baseline study of 430 households showed that there was limited awareness and scant application of regenerative technologies. The adoption of RAs is mainly determined by agronomic, socio-economic, institutional, financial, socio-cultural and market related factors. Two years after the implementation of the project in Woliso district, the number of farmers who adopted more than five RAs has increased by 53%. The most widely adopted practices include the use of vermi-compost, bio-slurry, crop rotation, conventional compost, neem extract for pest control, intercropping and improved crop varieties. On the other hand, the least adopted RAs constitute mulching, protected cultivation and application of biopesticide. The study shows a considerable gap between perception and adoption of RA technologies. The most important supply-side determinants for adopting a particular RA include the cost of adoption, accessibility of RA practices to farmers, scale of operation, the type of crop, relative availability of inorganic inputs (chemical and fertilizer), skills required for adoption, institutional support system. A multiple regression analysis on those determinants implies that age of a farmer, level of education and frequency of attending technical support events were found to be enablers of adoption of RAs. We found educated youth have significantly higher rate of RAs

uptake. However, the number of RAs adopted by a vegetable producing farmer and land holding size exhibit an inverse relationship: smallholders have got higher propensity to intensify RAs. The main barriers to adopt RAs include limited access to regenerative inputs and absence of a market system that differentiates vegetables produced in a regeneratively way.

Conclusion

To enhance the rate of adoption and make impact at scale, further research and development interventions should focus on push and pull factors of RA adoption and empower youth-based networks. In nutshell, farm and farmer characteristics are key determinants for RA uptake.

Keywords

Regenerative Practices, Vegetable Production, Adoption, Youth, Health, Planet, WorldVeg

Biography - Yidnekachew Zewde. Mr. Zewde is working for World Vegetable Center based in Addis Ababa Ethiopia. He is a senior socio-economist for the Veggies for Planet and People project (V4P&P). He also intensively involved in monitoring and evaluation of WorldVeg projects and programs.

Track

Abstracts for papers, posters and exhibition

Topic Areas

Production, productivity, and sustainability of agroecological systems, Scaling up agroecology best practices for food security, nutrition, and health, Institutional and policy drivers for agroecological transformations, Women and Youth in Agroecology

Aflatoxin as a factor in the decline of agricultural incomes and impacts on food security in Meru and Tharaka Nithi counties in the eastern region of Kenya.

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Introduction

The study setting was in Meru and Tharaka Nithi counties, located in the eastern zone of Kenya. The main objective of the study was to determine the role of aflatoxin in household food security and socio economic impact in the two agricultural rich rural counties.

Methodology

Study comprised of 488 (68%) households from Meru and 230 (32%) from Tharaka Nithi. A multi stage cluster sample method was used to select study households. Data was collected at household level by research assistants using a questionnaire and transferred immediately to smart phones and then transmitted to the server. Aflatoxin determination procedure was based on food samples (maize seeds, maize flour from household, and animal feed from farm staples) collected at household level and subjected to Enzyme linked immunosorbent assay (ELISA) methodology and concentrations measured in parts per billion (ppb).Data were analyzed using SPSS version 21.

Results & Discussion

Results revealed that 17% of the samples had aflatoxin contamination above safe margins of above 10ppb. A small percent of the samples (1%) had dangerously high level of aflatoxin (over 1000ppb). In Meru County, 290 (43%) households reported that they depended on their staple crops (maize) as their main source of food while 152 households (23%) depended on local markets. In Tharaka Nithi 171 (26%) of the such households depended on their farm grown staples while 57 households (9%) depended on local markets. Of the staple foods, maize was grown by 66% of households in Meru and 31% in Tharaka Nithi. On the economic impact of aflatoxin, 85.6% of the households in both counties reported that their maize grain was rejected at the market by brokers and county level cereal market because of high aflatoxin contamination posing serious economic challenges at household level. Knowledge of dangers associated with consumption of grain that was contaminated by aflatoxin was at 58.2%. Despite this knowledge that "moldy" grain could be contaminated by aflatoxin, 36% of the farmers in Meru and 19% in Tharaka Nithi fed their domestic animals with the moldy potentially aflatoxin infested grain and thereby indirectly subjecting household members to hazards of aflatoxin from animal products such as milk or eggs. Socio economic challenges were identified as major threats related to communities' choices of consuming as well as sale of aflatoxin contaminated grain.

Conclusion

Aflatoxin poisoning is a serious threat to health and social economic status of the two counties as well as neighbouring counties. Policies on food safety should go hand in hand with education and resources to affected com-munities. Aflatoxin contaminated grain and processed foods are bound to cross county and national boundaries endangering the well being of many in the population.

Agricultural Biotechnology in Transforming Food Systems for Responsible Production, Consumption and Social Wellbeing

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Introduction

Globally, the agricultural sector has a history of traversing through varying episodes of feeble and robust states and served as a dominant evolutionary force in improving the agriculture and food systems. This makes more sense in Africa where the majority of its population is engaged in agriculture and is a key economic player. East Africa is among the oldest in the history of agricultural practices.

Methodology

Biotechnology has various stages beginning with domestication of crops and animals followed by selection and breeding. Currently, agriculture in general is staggering in many African countries to fulfill the food and nu tritional security. Based on Global Food Crisis Reports, challenges like increasing population, climate change, economic shocks and instability are global hitches that are severe in East Africa and Middle East now days. Some of the emerging agricultural challenges cannot be addressed through conventional research techniques. However, biotechnology has the potential to transform food systems in several ways: first in improving crop yields and quality: By using genetic modification techniques, crops can be made more resistant to pests and diseases, leading to higher yields and improved food quality, second addressing food insecurity: Biotechnology can be used to develop crops that are drought resistant and have higher nutritional values, helping to address food insecurity in regions facing climate change, third reducing environmental impact: It can be used to produce crops that require less fertilizers and pesticides, reducing environmental harm caused by excessive use of these chemicals, forth promoting sustainability: By improving the efficiency of food production, biotechnology can help to conserve land, water, and other natural resources, promoting sustainability in the food

Results & Discussion

However, responsible use of biotechnology in food systems is crucial to ensure the technology is used for the benefit of society and the environment, rather than for commercial gain. It requires careful consideration of ethical, social, and environmental factors, as well as transparency and public engagement. Hence, biotechnology has become a proven alternative solution for some of the modern challenges. It is more precise, focused and reduces breeding time, reduces cost of production and has several applications in mass propagations and conservation of high value crops. The modern agricultural biotechnology techniques like genetic engineering are highly securitized and regulated for their environmental, food and feed biosafety. There are no technologies regulated like modern biotechnology except medicines.

Conclusion

Biotechnology helps to develop climate resilient, biotic and abiotic resistant crop and livestock species suitable for specific agro-ecology. As a result, biotechnology contributes in strengthening resilience and sustainability in food systems for environmental and social-economic development. In conclusion, agricultural biotechnology has the potential to play a transformative role in promoting responsible production, consumption, and social well-being in food systems. By harnessing the power of biotechnology, we can create more sustainable, resilient, and equitable food systems that benefit both people and the planet.

Agroecological Inherence of Coffee Agroecosystems and their Impact on Sustainable production

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Introduction

Rwanda is one of the most densely populated countries in Africa, with 13 679 599 inhabitants in a land area of 24,670 km^2. Agriculture, the backbone of Rwanda's economy, accounts for 31 % of the national GDP. Coffee sector has been listed as one of the priority industries for securing foreign capital in Rwanda's long-term devel-opment plan, representing primary income source for farmers in rural areas. Although coffee production has played an increasingly important role in Rwanda's economy, coffee farmers still face a lot of environmental, economic, social, and political challenges, which are directly affecting their livelihood and welfare. Little has been done regarding maintaining and improving inherent agroecological practices in coffee production while it can contribute to SDG's 1,2,4,5,6,8,12,13,14,15 , thereby improving the livelihoods and welfare of coffee farmers. Besides, an important outcome of agroecology is enhancing the resilience of their farming systems, which can be beneficial considering the felt effects of climate change. The agroecological perspective of producing coffee is introduced with the objective of analyzing the strengths and challenges of smallholder coffee farmers' livelihoods in Rusizi, Rwanda, with the aim to identify inherent agroecological local practices and look for pathways toward more sustainable ways of production.

Methodology

For measuring the level of farmers' understanding of agroecology principles, an adaptation of the SHARP tool developed by FAO was used. Questions on the familiarity with the concept of agroecology and the application of agroeoclogic practices that coffee producers are currently employing were included. A concept was created based on a content analysis methodology. This concept will set the ground from where agroecology should be approached. All the data was collected through physical copies, loaded into KoBo Toolbox® software, and analyzed using Excel® 2021 version 18.0 software

Results & Discussion

68 farmers participated in the survey, and 64.71% of them answered that they haven't heard about agroecol-ogy. However, a concept was built based on the answer received by the other 35.29 %, who could answer the question "Could you explain what it means to produce in an agroecological way?", resulting in the following global concept: **"Producing with an agroecological approach includes the utilization of different practices such as: agro-forestry, application of organic fertilizers and pesticides, intercropping, crop rotation, use of natural barriers, and terraces while avoiding burning the fields to principally control soil erosion and produce in a more natural way". – Coffee producing households, 2022.** According to the data obtained, crop rotation, agroforestry, mulching, partial application of organic fertilizer, and the use of locally adapted seeds and breeds were the practices that farmers are implementing the most on the farms, which can be considered as the strengths of the farmers. On the other hand, exclusive and partial application of organic pesticides, crop diversification, use of barriers and terraces, water saving practices were the least performed

Conclusion

Results will guide local experts on the development of new initiatives that will enhance the practice of local agroecological practices within coffee agroecosystems, providing special attention to the most urgent ones in the community.

Agroecological practices strengthen perceived ability to cope with climate change.

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Introduction

Agroecological practices provide effective means for climate change adaptation by improving the resilience of farming systems. Integrating agroecological practices into farming systems varies across geographies and production systems. Introducing new agroecological practices to any farming system can enhance the resilience of farming systems, but it also comes with positive and negative tradeoffs. For example, additional resources invested such as labour, time, and finances can be one of the driving factors for farmers to decide to integrate an additional agroecological practice. However, farmer decision-making processes are complex and sometimes driven by motivational factors rather than return on investment. We hypothesize that farmers' awareness about their ability to cope with climate change is correlated with the nature and number of agroecological practices followed by farmers.

Methodology

To assess the farmers' perception of their ability to cope with climate change and which agroecological practices they followed, we surveyed 329 farmers in the Lindi and Matwara regions of Tanzania. Survey questions were standardized in preliminary focused group discussions with farmers, extension workers, research staff, and other stakeholders. Individual interviews were conducted with the respondents chosen through systematic sampling irrespective of their farming practices, farm size, soil type, education, income, or other demographic factors. Correlations between agroecological practices, gender, and the farmers' perspectives on climate change were investigated using the FactoMineR package in R.

Results & Discussion

The share of female farmers' participation in the survey was 65.3%. Prevalent production systems in the region are organic by default (80.85). Rainfed agriculture is the primary type of farming in Lindi and Matwara. Thus, most farmers mentioned a change in rainfall patterns as the most challenging adverse climate change in past years, followed by more disease incidences, increased temperatures, and droughts. About two-thirds of farmers in the regions perceive that they cannot cope with climate change. Female farmers are more likely to perceive that they cannot cope with climate change (F; 66.5% / 58.2%). Intercropping, crop rotation, and mulching are the main agroecological practices for farmers in the regions, followed by crop diversification. Female farmers in Tanzania that feel like they cannot cope correlates most strongly with intercropping, exclusive application of organic pesticides and fertilizer, and crop diversification. Correlated to their perception of being able to handle adverse climate change effects is only the production of locally adapted seeds. Vice-versa, male farmers with a positive outlook correlate with sustainable rangeland management, rehabilitation of degraded grazing land, mulching, and agroforestry.

Conclusion

Farmers' perception of their ability to cope with climate change strongly correlates with the number of agroecological practices they follow. For additional agroecological practice followed by farmers, their perception to cope with climate improved by a factor of 1.44. This clearly signifies the importance of integrating agroecolog-ical practices into farming systems to enhance their ability to cope with climate change.

Alleviation of Salinity Stress by Arbuscular Mycorrhizal Inoculation of Mango (Mangifera indica L.) Seedlings grown in Low Nutrient Soil

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Introduction

Fruit production in SubSahara Africa is hampered by lack of superior seedlings. Salinity stress is also a ma-jor hindrance to crop productivity, yield and quality. As an attempt to address these challenges, this study was embarked upon to establish how arbuscular mycorrhizal inoculation affects root hyphae infection, growth parameters and leaf macronutrient concentration in mango seedlings raised under salinity stress in sterile low-nutrient soil media.

Methodology

Treatments composed of mycorrhizal and non-mycorrhizal treatments irrigated with moderate (4.9 DeciSiemens/m) Sodium Chloride solution. The study found out that mycorrhizal hyphal infection occurred only in inoculated plants with the non-saline stress treatment recording higher infection than the treatments subjected to salinity stress.

Results & Discussion

The study found out that mycorrhizal hyphal infection occurred only in inoculated plants with the non-saline stress treatment recording higher infection than the treatments subjected to salinity stress. Mycorrhizal treatments showed greater plant height, leaf number and chlorophyll content compared to non-mycorrhizal treatments. Mycorrhizal treatments accumulated higher leaf phosphorus, potassium and magnesium than uninoculated treatments under both non-saline and moderate salinity stress. Non-mycorrhizal plants subjected to salinity stress accumulated higher sodium levels than mycorrhizal plants

Conclusion

This research shows that a restriction in sodium absorption coupled with associated increase in phosphorus, potassium and magnesium uptake and maintenance of high chlorophyll in mycorrhizal plants aids in alleviation of salinity stress in passion fruit seedlings grown in low nutrient saline soils. Inoculating fruit seedlings with arbuscular mycorrhizal fungi helps to alleviate the adverse effects of global warming and climate change. Use of AM technology is hereby recommended as a routine practise in tropical fruit seedling production owing to its cheap cost.

Keywords

Arbuscular mycorrhiza fungi, salinity, phosphorus, sodium, nitrogen

Breaking the Cycle of Debt, Poverty, and Hunger to Build Resilient Agroecological Food Systems

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Introduction

Following the COVID-19 pandemic, the Russian invasion of Ukraine, and worsening climate and ecosystem breakdown, global food systems are in a perennial state of crisis. Structural flaws including import depen-dencies, speculation-prone commodity markets, and rigidities in production systems, leave millions of people highly vulnerable to hunger. Underlying these structural flaws lie macroeconomic imbalances. High levels of indebtedness in the world's poorest countries are contributing to an emerging debt crisis. In this report, we describe how the food crisis is driving and is driven by high levels of debt in the world's poorest countries; how broader macro-economic and fiscal pressures are further entrenching these problems; how current re-sponses are still ignoring transformative changes to food systems; and why comprehensive debt relief is critical to building resilient, agroecological food systems and ending hunger. Significance Following a decade of steadily rising debt levels, public finances in low-income countries have been strained by the COVID-19 pandemic and the economic disruptions ensuing from the Ukraine war – particularly sky-high import costs for food, fertilizer, and energy. Rapid interest rate hikes in wealthy countries have made matters worse. As a result, global public debt is at its highest levels in almost sixty years, with debt servicing costs rising 35% over 2022. About 60% of low-income and 30% of middle-income countries are now considered at high risk of (or already in) debt distress. In Eastern Africa, Ethiopia and Somalia have already requested debt treatment and face catastrophic levels of food insecurity. With African countries' debt servicing costs projected to rise further over the next 2 years, many countries could fall into destabilizing debt defaults. Some countries may be able to refinance or restructure their debts but face ongoing macroeconomic imbalances and perpetual strains on public finances. Without radical action, we could experience an explosion of hunger and poverty, as debts spiral out of control and the world's poorest countries struggle to meet the basic needs of their populations.

Methodology

Literature review; report development and review by trans-disciplinary panel of experts.

Results & Discussion

Global food and economic systems designed to suit the interests of powerful governments and creditors in the global North are one of the main reasons why low-income countries have accrued large debt stocks. Unsustain-able debt and unsustainable food systems are reinforcing one another through various mechanisms, including import dependencies, dollar dependencies, and climate vulnerability.

Conclusion

Food system reform, coupled with comprehensive debt relief and restructuring, could be truly transformative. Debt restructuring would provide the necessary fiscal space for countries to move away from export commodity agriculture and towards low-input, diversified, agroecological food production to meet local needs. This would unlock the ability of the world's poorest countries to cut dependencies on fossil fuels, fertilizer, and food imports, increase access to nutritious food, build resilience to climate shocks, reclaim power from corporations and creditors, put public finances on a sustainable footing, and create a new political economy in which food systems are finally geared to the interests of the global majority.

Cereal-legume-based cropping systems under conventional and organic management in Malawi: insights from a demonstration trial

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Introduction

Conventional farming involving cereals, legumes and tubers is dominant among smallholder farmers in Malawi. However, crop yields, quality and soil fertility from conventional systems have been far below optimal levels (MoAFS, 2012). Meanwhile, organic agriculture (OA) is perceived to address these challenges and promote bio-diversity conservation, but its effects on the cereal-legume-tuber-based cropping systems is little known. To bridge this gap, conventional and organic farming systems are being compared in demonstration trial at the Malawi LUANAR-NRC College, helping to provide data about which production system is more sustainable, i.e. productive, profitable, resource-conserving, and socially acceptable and environmentally sound.

Methodology

NRC is located in the medium altitude plateau agroecological zone of Malawi with a sub-tropical climate and well-drained latosol soils (Saka *et al.*, 2006). The demonstration trial was established during the 2018/2019 production season in a Randomized Complete Block design with four replicates. It involves predominant crops in the central region of Malawi namely: maize, groundnuts, soybean, and cassava grown in a four-year rotation. Under conventional, crops receive synthetic fertilizers at a rate of 92 kg N and 42 kg P per hectare and syn-thetic pesticides. Under organic, the approaches include application of compost, tithonia and other mulches, biopesticides, and other practices. Preliminary data collected include vegetative growth, pest incidence, yield components and yield, and soil chemical and physical parameters. Data were analyzed using Genstat statistical software 18th edition and subjected to Analysis of Variance (ANOVA) at a significance level of ($P < 0.05$, 0.01 and 0.001).

Results & Discussion

In both 2021 and 2022, maize grain yields for the two systems were similar. Maize grain yields significantly doubled ($P<0.001$) in 2022 compared to 2021 in both farming systems. Soybean yields in the organic system were significantly higher, by 75.4 %, than conventional in 2021 ($P<0.05$) while similar yields were obtained in 2022. The soybean yields tripled ($P<0.001$) between 2021 and 2022 for both systems. For groundnuts, the dry unshelled yields under organic was three times higher ($P=<0.05$) than conventional in 2021 while in 2022, the dry unshelled organic yield was lower by 21 % ($P<0.05$). The unshelled groundnut yield was higher in 2022 for both systems ($P<0.001$) compared to 2021. The higher yields across these three crops in 2022 compared to 2021 could be due to frequent dry spells during crop growth experienced in 2021. The higher yields in the organic systems for both years could be due to moisture conservation through mulching. Students have been trained on, e.g. good-quality compost production, nutrient management, pest and disease management, data collection, sample collection, and storage at the trials. Two field days have been held for farmers, agricultural extension staff and other key stakeholders and provides contextual data for policy makers

Co-creation of agroecology business assessment tools

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Introduction

It is of importance to assess transitioning from usual agriculture to Agroecology since it is a new practice in the agroecosystem. Our research was basically on developing an appropriate self assessment tool.

Methodology

Co-created basic assessment tools for processing, marketing and outlets were developed and tested among CCRP-FRN businesses in Teso Region Eastern Uganda.Agroecology businesses were understood in environmental, so-cial and economic contexts; reflections on the best performance indicators for every parameter in the Environ-mental, social and economic contexts were done.

Results & Discussion

Consequently, basic tools were refined to a new format that would best be understood for actors' self-assessment and guidance purposes.

Conclusion

The current version of the tool/ protocol may be used to guide performance of Agroecology and help in deter-mining levels of Agroecology business development for the purpose of improving access towards Agroecology markets.

Cocoa versus rubber tree landscapes: are tree-based commodity hotspots of soil biodiversity? Evidence from Côte d'Ivoire

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Introduction

Tree-based commodities, particularly cocoa and rubber are said to have a positive impact on soil health over time and thereby improve the abundance and diversity of soil organisms. To test this statement, a field survey was simultaneously undertaken to assess the impact of these two tree-based systems on the abundance (Density and biomass) and the diversity (Average number, Shannon, and Piélou index) of soil organisms in the south and the centre-west of Côte d'Ivoire.

Methodology

Rubber tree and cocoa landscapes were selected considering 7, 15 and 30 year-old plantations as compared adjacent forests, considered as reference systems. These time steps correspond to the main growth stages of a plant. These are the production start-up stage, the maximum growth stage and the ageing stage. Earthworms were collected using 25 cm x 25 cm x 30 cm soil monolith collected at 60 plots considering two layers that is 0–10 cm (Topsoil) and 10–30 cm (Subsoil) and preserved in a 4% formaldehyde solution for further identification at the specific level.

Results & Discussion

The results revealed a change in earthworm communities at plantation establishment. In the topsoil, the den-sity of earthworms increased between the forests (53.60 ind.m^{-2}) and the rubber plantations (212.27 ind.m^{-2}). However, it did not change significantly with the age of the rubber plantations in both strata. Also, earthworm diversity increased significantly in the topsoil of the rubber plantations, through the mean number of species (3.80 ± 0.51 to 7.53 ± 0.39 species) and the Shannon index (1.49 ± 0.18 to 2.33 ± 0.11), while biomass remained unchanged. Nevertheless, a decrease of earthworm diversity with age in the rubber plantation was observed. In cocoa landscapes, earthworm density and diversity were not affected by chronosequence (forest, cocoa 7 years, cocoa 15 years and cocoa 30 years). Only earthworm biomass decreased along the chronosequence in the topsoil (6.12 to 13.82 g.m^{-2}). In the 10–30 cm stratum, earthworm biomass increased in old cocoa farms.

Conclusion

These results revealed that rubber plantations, as a monocultural system, create a climate that would favour the appearance of exotic species such as *Pontoscolex corethrurus*. The cocoa plantations are established in an agroforestry system. The diversity of trees in this system could explain the maintenance of earthworm density and diversity along the chronosequence. The contribution of these results to highlighting the role of tree-based commodities in the growth and development of earthworm populations and thus in mitigating biodiversity loss is discussed.

Controlling bacterial wilt (soil born disease) in Solanaceae family using native microbes.

Ms. Florence Ddumba [1]

1. Kulika Uganda

Introduction

Solanaceae is big family of crops with economic importance both for small scale farmers and commercial farmers (tomatoes, eggplants, iris potatoes, bitter barriers and others). This Bacterial wilt is caused by the group of soilborne bacteria in the Ralstonia solanacearum species complex. It is an economically significant disease of solanaceous crops mentioned above. The most current effective way of controlling has been soil solarization and sterilization with many challenges mostly on large scale production. Microbes can either be collected from natural areas such as forests or they can be made using the forest silage methods.

Methodology

Materials

- 20kg decomposing leaves collected within the farm or from the forest (of microbes)
- 40kg rice bran\maize bran (food for microbes)
- 12ltrs molasses/5kg brown sugar (energy for microbes)

Minimum quantities to use

- 10kg decomposing leaves
- 20kg rice bran or maize bran
- 6ltrs molasses/2.5kg brown sugar

Procedure

- Mix the leaves with bran
- Sprinkle a mixture of water and molasses to a moisture content of 40-45%
- Compact the content in a burrow up to ¾. the burrow should be airtight
- Tighten the burrow and leave to ferment for 30 days.

What happens in burrow/Drum or trench with Native Microbes

- Some microbe will grow with the existing oxygen (O2) aerobic and will die when O2 is exhausted
- Some microbes will grow without O2 anaerobic
- Some microbes will grow in both conditions with and without O2- Facultative
- The anaerobic and facultative microbes will continue to reproduce.

After a period of 30days the native microbes will be ready for use. In case you don't have a drum/ a burrow you can dig a shallow trench.

- Dig a shallow square trench of about 20cm deep and 40cm on each side.
- Put in a thin layer of crushed biochar (charcoal) on the bottom of the trench.

- Then add a layer of dry leaves, about 10cm thick, and spread a little bran onto these leaves.
- Make a mixture of 1 part molasses or sugar to 10 parts water and sprinkle this on. Continue making layers until you have a small pile.
- 6. Cover this with an old sack to help keep the moisture in. This creates an environment for microbes to multiply.
- Keep the mixture moist but not wet. In about one month you should be able to use.

Results & Discussion

We started using native microbes at Kulika training Centre since 2019 when our soil was invaded with that disease. We knew about the powers of biofertilizers and among the list native microbes was the best.
We are very happy with our findings we have already shared with some nearby farmers around the Centre but our plan is disseminating to other farmers within and outside the country. This remedy is environmentally friendly, socially acceptable and economically available as its cost of production is low. Farmers both urban and rural can utilize the technology including those growing on large scale.

Conclusion

Microbes are very important for improving soil fertility thus controlling pests and diseases in crops.

Determinants of producing important food crops by agro-pastoralist farmers in the dryland areas of West Pokot County.

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1. *University of Eldoret*

Introduction

In Kenya, crop production plays an important role in the country's economic development, supporting about 35% of the country's gross domestic product. In spite of the pertinent role of crop production as a major source of livelihood supporting food, nutrition, and income securities for the rural population, limited information ex-ists on the determinants of crop production for agro-pastoralist in dryland areas. The main land use and source of livelihood are livestock and crop production. In the lowland dryland areas farmer practice agro-pastoralism, whereas in the high-altitude areas, farmers do mixed farming (Awino, Ochieng, and Vera, 2014; Wairore 2015; Wernersson, 2013). The main food crops produced in the county include; maize, finger millet, sorghum, and beans, and in small quantities potatoes, onions sweet potatoes, green grams, peas, and bananas (CIDP, 2013). In this regard, this study was conducted to assess the socioeconomic factors influencing the production of impor-tant food crops by agro-pastoralist farmers in the drylands area of West Pokot Count

Methodology

West Pokot County is located in North-West Kenya and borders Uganda country. It covers an estimated area of 9,169.4 km2 with four constituencies, 13 divisions, 61 locations, and 222 sub-locations (IEBC, 2019). The County has varied altitudes contributing to differences in climatic and agroecological zones. It receives a bimodal rain-fall with an annual average rainfall of 600 mm in the lowlands and up to 2000 mm in the highlands (NDMA, 2018). The household survey was conducted on 394 farmers from a sample size of 116,182 using the Barett et al (2011) equation, a sample size of 503 was interviewed. Four focus group discussions in each of the four sub-counties were done to verify the survey information with purposively selected farmers who are well-informed and have a good understanding of the local knowledge and context. The quantitative data was collected using a questionnaire that was fit into the open data tool kit (KoboCollect), using smartphones. The binary logistic re-gression method was used to model the determinants influencing the production of the most popular important food crops in the drylands. The data were analyzed using descriptive and binary logistic regression models at a 5% level of significance for each of the identified important food crops. The variables used in the model were checked for multicollinearity using tolerance values and variance inflation factor (VIF) of >0.25 and <5 respec-tively. Hosmer Lemeshow test was used to test the goodness-of-fit of the model, whereas Nagelkerke R2 was used to estimate the amount of variation explained by the independent variables. The results were presented in tables and figures.

Results & Discussion

Farmers in the drylands are producing an assorted over 11 different types of food crops comprising cereals, legumes, root, fruit, and vegetable crops. Out of this, maize (98.5%), beans (73.6%), sorghum (37.5%), and finger millet (32.2%) were the most popular food crops produced by the majority of the farmers. Crop diversity is an important aspect of the agroecological transition that ensures farmers' resilience and ensures food security and nutrition while conserving, protecting, and enhancing natural resources (FAO, 2020). Similar results of crop diversification have been reported in Eastern Kenya by Nguluu et al (2014). In an editorial review on crop diversification, Alletto et al (2022) concluded that a cropping system with a high level of agrobiodiversity is an

essential pillar of agroecological transition, following the literature evidence on improved farm productivity, environmental performance as well the resilience of cropping and farming systems. There was significant heterogeneity in the farmers' sociodemographic, socio-economic, institutional, and farm factors. The binary regression analysis showed that the production of maize as an important food crop was significantly influenced ($\chi 2$ (25) = 893.15, $p<0.001$) by age, sale of livestock products, ability to save money, seed quantity, cropping system, and yield, with the overall pseudo-R-squared test, Nagelkerke's R2 explaining 78.6%of the variation. Conversely, bean production was significantly ($\chi 2(25) = 359.17$, $p<0.001$) influenced by the sub-county, ability to access credit, decision on money use, salary, sale of crop production, sale of livestock, cropping system, use of inorganic fertilizer and yield. On the other hand, sorghum was significantly ($\chi 2(25) = 154.521$, $p<0.001$) influenced by the sale of crop production, sale of livestock, sale of livestock products, membership to a farmer association, cropping season, cropping system, use of organic fertilizer and seed quantity used. Further-more, the size of household, level of education, membership to farmer association, ability to access credit, sale of livestock, acreage planted, cropping season, cropping system, and seed quantity millet significantly ($\chi 2(25) =103.987$, $p<0.001$) influenced the finger millet production in the drylands. Similar results have been pointed out by Ninh L.K., (2021) in showing that seed, education level, fertilizer application, farm labor, and farm size have significant impacts on the output of rice farming households. In other studies, the role of education in strengthening farmer knowledge, thereby improving farming practices that results to crop productivity had been demonstrated by Paltasingh & Goyari, (2018). These factors promote agroecological transition by positively influencing farm efficiency, synergy, recycling, diversity, human and social values, culture and food traditions as well as circular and solidarity economy in the drylands.

Conclusion

The study concludes that;

1. Age and education level are sociodemographic components influencing farmer's knowledge and experiences thus affecting decisions on the type of food crop produced.
2. Salary, sale of livestock and their products, and ability to save money, are socioeconomic activities that influenced farmers' decisions on food crops to produce.
3. Farmer's institutional factors increased the farmers' social network, learning and sharing, creating an opportunity to access agronomic information, credit services and seed material that supported decisions on the production of these crops.
4. Cropping season, cropping system, availability of inputs, crop yields, and farm productivity played a significant role in determining the choice of the food crop in the drylands areas of West Pokot.

Differential responses of Bactrocera dorsalis and its parasitoids to headspaces of different varieties of tree-attached mango fruits and the associated chemical profiles

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Introduction

The Oriental fruit fly *Bactrocera dorsalis* (Hendel) is a notorious pest that infests fruits and vegetables world-wide, causing significant economic losses. Conventional methods of controlling this pest rely on synthetic chem-ical insecticides, which are neither sustainable nor effective in the long term. Integrated Pest Management (IPM) techniques, including parasitoids such as the exotic endoparasitoids *Fopius arisanus* and *Diachasmimor-pha longicaudata*, which have better foraging abilities, have been deployed to manage the pest. However, the knowledge of the semiochemicals that mediate their behaviour relative to their host *in situ* tree-attached man-goes is lacking.

Methodology

In this study, we aimed to investigate the responses of *B. dorsalis*, *F. arisanus*, and *D. longicaudata* to mango volatiles (Kent, Apple and Haden), as well as the performance of *B. dorsalis* in the three mango varieties. First, we used a dual-choice olfactometer to compare the responses of the fruit fly and the two parasitoids to headspaces of different treatments (non-infested physiologically mature unripe and ripe mangoes, man-goes with ovipositing *B. dorsalis*, the day-7 and day-9 post-oviposition mangoes). Secondly, we collected the headspace of the mango treatments using dynamic headspace trapping, elucidated their chemical profiles using gas chromatography-mass spectrometry (GC-MS) and lastly assessed the performance of the fruit fly in mango varieties by harvesting infested mangoes for puparia recovery.

Results & Discussion

The results showed that *Bactrocera dorsalis* was more attracted to the mango volatiles (up to 93% of respon-sive insects) compared to clean air while *F. arisanus* was more attracted to mangoes with ovipositing fruit flies (68-76%). *Diachasmimorpha longicaudata* was more attracted to day-9 post-oviposited mangoes (64-72%) com-pared to clean air. The headspace volatiles revealed various classes of semiochemicals with both qualitative and quantitative differences. The major classes of the identified compounds were esters (33.8% of the total number), sesquiterpenes (16.4%), and monoterpenes (15.4%). Most compounds release rates, especially of ter-penes, were relatively higher in fruit fly-infested mangoes compared to those of non-infested. The number of puparia recovered varied according to the mango varieties. Apple mango registered 81.7% of the total puparia recovered, while none was recovered from Kent. The study's novelty lies in the investigation of the responses of the fruit fly and its parasitoids to mango volatiles *in situ*, which has not been previously documented. The study shows that the responses of the fruit fly and parasitoids are highly impacted by the odour cues of the mango varieties, and their physiological and infestation status.

Conclusion

The increased attraction of B. dorsalis to infested tree-attached mangoes is of significance and demands advocat-ing for the removal and destruction of infested mangoes as part of the IPM strategy. The study also highlights the susceptibility and tolerance of different mango varieties to B. dorsalis, with the Kent variety showing promise in countering the menace of the fruit fly. A follow-up study is recommended to reveal whether the olfactory con-vergences observed are based on shared olfactomes which is important when developing baits that are selective to the fruit fly and not its parasitoids.

Digital Training Enhances Organic Smallholder Farming Practices In Africa

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Introduction

Knowledge on agroecological and organic agricultural practices has previously been identified as one of the missing links to enable a large proportion of farmers in sub-Saharan Africa to transition to competitive and more sustainable agriculture. While a lot of knowledge exists, the fragmentation amongst esp. smallholder farmers is a major issue in ef-fectively and efficiently disseminating it to farmers. Traditional training and farmer field schools hold high potential; however, this potential is inhibited by the high costs involved in reaching large numbers of farmers. In this context digital training is an innovative approach to improve access to organic farming knowledge to smallholder farmers in Africa and beyond. Through existing technologies such as smartphones, telephones, TV, or radio, larger numbers of farmers can be reached at lower costs per learner, to inform and educate them about alternative, sustainable farming practices.

Methodology

The Research Institute of Organic Agriculture (FiBL) has been testing several technologies for digital farmer training; amongst them, SMS-based and app-based training, Interactive Voice Response (IVR), Raspberry Pi and OTG USB sticks. Training content was developed together with Biovision Africa Trust (BvAT), the Rwanda Organic Agriculture Movement (ROAM), Association of Professional Farmer Organizations (AOPP, Mali), Fédération Nationale pour l'Agriculture Biologique (FENAB, Senegal) and technology partners in Kenya, Rwanda, and Mali. To assess the user-friendliness, the engagement of learners and the impact of digital training on farming prac-tices and the farmers' livelihoods, a mixed-methods approach was applied.

Results & Discussion

Through their broad experience, FiBL, BvAT and ROAM have built up great knowledge around digital training for African smallholder farmers, its development, use and dissemination. There is great potential in using existing technologies and facilitating farmers' access to knowledge. In this session, we will share the lessons learned and explore the specific use cases for each of the technologies tested.

Conclusion

The main learnings can be summarized as follow:

- Digital training can improve agricultural practices, yields, income, and quality of life.
- How well a technology is accepted depends mainly on local conditions, prior knowledge, experience, and preferences. For example, SMS training worked very well in Kenya, while few farmers participated in Rwanda.
- Content development is relatively expensive compared to disseminating the content.
- Different technologies should be combined according to learners' knowledge level, interests, country context and resources for content development and dissemination. We will in the future test an approach of using SMS trainings to choose the most engaged learners who would then be invited to app-based trainings?
- Visual elements like videos or illustrations can enhance the quality of in-person training sessions.
- Training content should be linked to markets (and market access) to ensure farmers have clear incentives for the uptake of organic/agroecological farming practices

While already single training activities can improve farmers' livelihoods, the sustainability of the efforts should always be a core focus of each project. To ensure the sustainability of the digital training efforts, local partners should be empowered to be able to carry out digital training beyond the duration of on-going projects.

Do organic farming initiatives in sub saharan africa improve the sustainability of smallholder farmers? Evidence from five case studies in Ghana and Kenya

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Introduction

Organic agriculture (OA) is often regarded as a sustainable agricultural pathway for smallholder farmers in Sub-Saharan Africa, and an increasing number of initiatives promoting OA were initiated over the last decades. However, holistic empirical evidence on the effects of such initiatives on the sustainability of smallholder farm-ers is still scanty.

Methodology

We analyzed the effects of five initiatives promoting OA on farm-level sustainability. We selected farmers exposed to the initiatives (n = 678) and control farms (n = 957) in five different case studies, two implemented in Ghana and three in Kenya. The overall rationale behind selecting the case studies was to cover the relevant agro-ecological (i.e. humid and semi-arid), agronomic (i.e. predominantly arable and predominantly perennial systems), and commercial contexts (i.e. non-certified production for household consumption and local markets, and certified production for export markets) in which OA is implemented in Sub Saharan Africa. To evaluate the sustainability effects of the selected initiatives and their interventions in a holistic, credible, and transparent manner, we applied the *SMART-Farm* Tool (Schader et al., 2016), a farm-level multi-criteria assessment tool that evaluates to what extent the environmental, social, economic, and governance sustainability goals formulated in the FAO-SAFA Guidelines are addressed by farmers.

Results & Discussion

We found that the initiatives had limited effects on reducing farmers reliance on chemical inputs use (pesticides and synthetic fertilizers) and uptake of organic or agro-ecological practices. Nevertheless, the results show that the initiatives were able to trigger significant (*p-value < 0.05)* positive effects mainly for the environmental sustainability goals. In contrast, the goals within the economic, social and good governance sustainability dimensions were rarely affected. Although significant, the magnitude of effects was often relatively small. The inability of the initiatives to trigger change for most indicators and among the majority of targeted farmers can explain this. Moreover, certified initiatives had more frequently a positive sustainability effect compared to non-certified initiatives.

Conclusion

The overall limited influence on sustainability suggests that the impact pathway organic initiatives commonly rely on (i.e. knowledge sharing leads to adoption and associated sustainability benefits) is jeopardized by a complex set of factors. This, in turn, suggests that to successfully induce the adoption of organic practices and unlock positive environmental and socio-economic effects, initiatives must complement knowledge-sharing activities with other support measures.

For example, farmers must be supported to overcome the motivational, financial, and other resource barriers explaining the OA implementation gap. Additionally, taking a farm-level approach (instead of a crop level one) could represent a way to broaden the impacts of the interventions. Never-theless, for such impacts to occur additional measures such as the development of local organic markets would be required.

Keywords
Sustainability assessment, impact evaluation, smallholder farming systems, organic agriculture.

The need for a moratorium on factory farming in Africa

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Agriculture has been documented as the main driver of biodiversity loss in addition to being a major contributor to climate change and pollution. As such, it is imperative we address the emissions associated with our food systems, which account for 34% of the global anthropogenic greenhouse gas emissions. Individually, livestock farming is responsible for a significant 14.5%, which is emanated through several ways including digestive processes, pesticides and fertilizer uses, and conversion of land for animal feed production which displaces biomass carbon.

Every year more than 80 billion animals are farmed (excluding billions of farmed fish), mostly in factory farms - production systems that are characterized by high production efficiency and the true cost of production is not reflected in the final product as public health and environmental costs (climate change, biodiversity loss, soil degradation and water contamination) are left out. In fact, factory farms remain the largest global source of methane and nitrous oxide, two particularly potent GHGs.

Although the global north bears the primary responsibility for the historical buildup of climate gases and has high per capita emissions, the rapidly increasing demand for animal sourced foods in Africa (e.g., 30% increase in meat consumption by 2030) poses a threat to traditional food systems in the region. Unlike factory farm grain-fed systems, Africa's local systems have high level of integration between crop farming and livestock, making them sustainable. They are built on the principles of nutrient circularity at farm level and agroecology. For instance, animal feeds in these farms mostly come from naturally or planted pastures, that are produced with limited soil amendment, fertilizer, and pesticide use.

Access to humane and sustainably reared livestock will play a key role in ensuring food security, particularly within Low- and Middle-Income Countries, by providing food, employment, and income.

Based on these arguments, Africa needs to be conscious of the impacts emanating from factory farming in global north and initiate urgent measures in developing regulations that would prevent proliferation of factory farms inside the continent. African nations must be deliberate enough in redirecting any support including financial allocation to humane and sustainable farming and discourage advent of cruel and unstainable factory farming.

Keywords: Climate change; GHG emissions; Africa traditional food systems; factory farms.

Evaluation of potential repellent plants for developing vegetable push-pull cropping system against cabbage aphids (Brevicoryne brassicae) in smallholder kale production systems

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Introduction

Agriculture contributes to many African economies, and the horticulture sub-sector plays significant role in achieving food and nutritional security and poverty alleviation through income generation. Horticultural crops generate higher profits than staple crops per unit of land thus improving livelihoods of households in both urban and rural areas. Furthermore, vegetables such as kales are an essential source of micronutrients and dietary minerals/fibre, and their consumption reduces the burden of malnutrition to the poor and marginalised, particularly women and children. Despite the importance of vegetables, their production is crippled by both biotic and abiotic constraints. Biotic constraints include both pests and diseases that hamper production and encourage indiscriminate use of chemical pesticides, which is not sustainable owing to the cryptic behaviour of some pests, development of resistance, harmful effects on environment and humans, and lack of resources for continuous supply, especially by smallholder farmers. All these call for development of innovative sustainable solutions. Agroecological approaches including cereal push-pull cropping systems have been shown to have great impact in reducing stemborer damage in maize, improving soil fertility and conserving biodiversity in maize production systems. No such cropping systems have been developed for high value vegetable crops like kales hence this study aims at identifying suitable companion plants and through agronomic designs, craft a cropping system strategy for the management of aphids, a major production constraint in kales.

Methodology

Four arm olfactometer was used to test behavioral response of cabbage aphid, Brevicoryne brassicae on volatiles emitted by eight potential plants including rosemary, molasses, mint, coriander, spinach, spring onion, desmodium and oregano.

Results & Discussion

The results showed that cabbage aphids were substantially repelled by volatiles from rosemary herb, suggesting protection of kales if intercropped together with Rosmarinus officinalis.

Conclusion

These findings form a strong basis for intercropping kales with rosemary plant for sustainable protection against cabbage aphid in vegetable cropping systems. However, field trials are warranted to validate these results under field conditions prior to their deployment.

Keywords: Polycropping system, kale, aphids, rosemary, Kenya

Biography: Bretor Mutua, Ms. Mutua is an MSc student registered at South Eastern Kenya University, seconded to icipe where she is carrying out her research work on agroecological approaches for vegetable production under the tutelage of Dr. Daniel Mutyambai.

Track: Abstracts for papers, posters and exhibition

Topic Areas: Production, productivity, and sustainability of agroecological systems

Market approaches for women and youth transitioning from conventional to regenerative agricultural vegetable production in Kenya and Ethiopia

Ralph Roothaert , Leah Mwaura and Gemechis Jaleta

Despite impressive economic growth in Ethiopia and Kenya in recent years, poverty rates remain high with relatively more women than men affected by poverty, while unemployment is high among youth. Demand for vegetables is high in big cities which creates employment and income generating opportunities for women and youth in the sub-sector. Veggies 4 Planet & People (V4P&P) is an initiative that was established in 2020 to empower women and youth in vegetable production and marketing using generative agricultural (RA) technologies. It responds to high demand for safe to eat traditional African vegetables among urban consumers in Nairobi, Kisumu and Addis Ababa. Women and youth are constrained in terms of access to land, capital, and information, while women also face constraints of time and mobility. V4P&P addresses these constraints by focusing on vegetables that do not need much land, reduction of inputs costs, education and training, avoidance of labor peaks, and development and strengthening of 200 vegetable business networks (VBN) that build on capacities and complementarities among members. VBNs include producers, as well as input suppliers, information providers, financial services, traders, transporters, wholesalers, processers, and retailers. Participatory appraisals and learning events revealed challenges in the vegetables value chains, such as poor availability and high cost of quality vegetables seeds, production constraints related to pests and diseases and water availability, a mismatch between supply and demand of vegetables, lack of central processing or aggregation centers that can generate business models, and a lack of trust among value chain actors. V4P&P is addressing these challenges and has trained 160 business coaches who in turn train and mentor 5,488 VBN members on RA and quality seed production, create market linkages for organic products, and nurture relationships within the VBNs. There has been a remarkable acceptance of RA technologies among VBN members in both countries, while on-farm experimentation shows significant yield increases and reduced pests and disease incidences for plots managed under RA (see other abstracts from V4P&P submitted to this conference). There have been successful strong market linkages created with help of county governments in Kenya and woreda governments in Ethiopia, often specifically targeting organic vegetables. Sales data collected by VBN coaches from individual members showed a revenue of USD 47,722 from 412 households over a period ranging from 1 to 2.5 months, indicating a total revenue for all VBN members of about USD 2.4 million for a growing season of 6 months. Policy recommendations arising from the work indicate a need to create an enabling environment for farmer produced seed and local seed trade in Kenya; and development of policies and legislation to enable commercial trade of biopesticides in Ethiopia.

Key words: traditional African vegetables, vegetable business networks, income, employment

Innovative Agroecology and Agrobiodiversity Training Course (AATC) for undergraduate students

Prof. Richard Onwonga - University of Nairobi; Dr. Janeth Chepkemoi - University of Nairobi; Mr. Noel Templer - International Center for Tropical Agriculture - CIAT

The Agroecology and Agrobiodiversity Training Course (AATC) develops an in-depth understanding of the principles and practices of Agroecology and Agrobiodiversity (AA), and their applications in the context of practitioners, researchers and policymakers in the agriculture sector (OA). It seeks to strategically contribute to the value system of AA and OA in the agricultural policy and practice in Kenya with the aim of creating a paradigm and mind shift in university students. In the year 2022, about 40 students from Kenyan universities (University of Nairobi (12), JKUAT (7), University of Eldoret (8), University of Kabianga (7), Kenyatta University (1), Egerton University (1), Kibabii University (2), and Maseno University (1) and one each from Uganda Martys university and Makerere university (Uganda). The theme of AATC was : Food crisis, climate change and sustainability: do we have alternative solutions? The aim of AATC was to create change agents who would contribute to innovative sustainable development of agri-food systems to enhance livelihoods, food security and environmental integrity.

Methodology

The AATC employed a four (4) -step approach: i) e-learning ii) classroom sessions iii) field excursion iv) report development and public presentation. This undertaking relied on mixed methods of knowledge delivery i.e. individual reflections, literature reviews, classroom setting (presentation, discussions), field exposure, and knowledge exchanges (with farmers, practitioners, academia/specialists) and policy makers.

Results & Discussion

1. E-learning: In this phase, the students were introduced to the concepts of AA, food systems, climate change, and sustainability. Through reading materials, animated movies, and videos provided, students were able to contextualize threats and vulnerabilities faced by food systems due to climate change and the loss of biodiversity.

2. Class setting and Organic practitioners' visit: During this phase, the students buiding on the knowledge gained in phase one were further exposed on the principles and practices of agrobiodiversity and agroecology through participatory sessions. The sessions also integrated policy processes and how to approach agroecosystem health assessments. Visits to organic practitioners: producers, traders, and certification agencies.

3. Field excursions and data collection: This phase involved practical and experiential learning of different agroecological and agrobiodiversity principles and practices under the guidance of selected practitioners in the agroecology and agroecology value chain for practicals on the preparation of organic fertilizers and organic pest and disease control measures, and other techniques in AA.

4. Feedback and Workshop: It brought together various stakeholders, in the food system supply chain sector, for result sharing on the agroecosystem assessments and experiential learning. It was a learning experience for the students on reporting research finding, dissemination and interaction with stakeholders.

Conclusion

Through a transdisciplinary training approach, students from different food chain sectors, were exposed to the principles and practices of AA and their application in real in real life situations. The students demonstrated a mental shift towards a food system approach. In the students' setting, understanding deeply why farming had to be done sustainably had often lacked the grounding with facts and contextualization. In the world of policy and decision-makers, for instance organic agriculture/Agroecology feeding the world should be backed by facts - and this could only be collated by discussing and revisiting their source. Organic growth of ideas from alumni following participation in "eye-opening" sessions was an impetus for continued engagement and scaling.

Keywords

Agroecology; Agrobiodiversity; Sustainable development; Organic agriculture; Food systems; Transdisciplinary approach

Biography - Richard Onwonga

Prof. Richard Onwonga, holds: a PhD in Natural resource Management and Currently an associate professor at the University of Nairobi. Has wide research and publication experience on application of agroecological techniques to enhance agricultural productivity under varied environments. Trains/mentors and supervises students on agroecology and agrobiodiversity for sustainable agrifood systems.

Track: Abstracts for papers, posters and exhibition

Student Id (optional): 4RICHARD_ONWONGA_IAATC_EAAC__1_.pdf

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Infonet-Biovision: An Online Farmer Information Platform for Promoting Sustainable Development and Organic Agriculture in Africa

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Introduction

This presentation showcases Infonet-Biovision, an online platform that promotes ecological technologies and organic agriculture in Africa. Initiated in 2005 by Biovision Foundation in Zurich, Infonet provides scientifically validated information related to plant, animal, human, and environmental health. Infonet-Biovision's goal is to contribute to the improvement of the health and livelihoods of smallholder farming families in countries in Africa whilst at the same time conserving the environment, biodiversity and natural resources. Implemented in conjunction with the Biovision Farmer Communication Programme (FCP), which includes The Organic Farmer and Mkulima Mbunifu Magazines, The Organic Farmer Radio, and Farmer Communication Outreach, Infonet offers trainers, students, extension workers, and farmers quick access to up-to-date and locally relevant agricultural information that contributes to sustainable agriculture and rural development. Methodology

Infonet complements these projects that are focused on Kenya and Tanzania by providing synergy and extending content areas that are of interest to KCOA (Knowledge Center for Organic Agriculture) multipliers in Continental Africa. It collaborates with other partners and IT applications to integrate Infonet content into existing programmes and applications, bridging the digital divide between users and researchers by translating and making hard-tocomprehend information more user-friendly. The content development is based on baseline studies, usability studies, regular evaluations, and user feedback.

Results & Discussion

Infonet is poised to become one of the knowledge platforms of KCOA and will provide vital information to the EOA country implementing partners (CIPs) on the continent. Infonet had 364,983 users in 2022 in 446,911sessions. Of these 185,939 (50.84%) were from Africa. Top 5 African countries are Kenya 106,810 (57.21%), Nigeria 23,576 (12.63%), South Africa 11,536 (6.18%), Uganda 10,827 (5.80%) and Tanzania 6,916 (3.70%)

Infonet has several unique features that make it a valuable resource for promoting ecological and sustainable agriculture. These features include a wide variety of themes, a focus on ecological methods applicable in organic farming, free web access, and the ability to download an offline version for use in areas without internet access. The Infonet-Biovision database contains 325 datasheets on different topics grouped into 4H thematic areas (plant, human, animal and environmental health). 130 datasheets are under the plant health section providing information on major crops, fruits, vegetables (both exotic and indigenous) and medicinal plants, processing and cultural practices. Information in a single datasheet covers crop husbandry, crop specific pests and diseases management.

There are 44 datasheets under human health covering issues from healthy food and nutrition to hygiene and sanitation. The animal health section contains 60 datasheets addressing animal husbandry, welfare, health and disease prevention and sustainable management, presenting animal species on individual datasheets and a chapter on animal diseases. The 91 datasheets under the environmental health section cover information on pertinent topics such as soil, water and land-management. There are 45 datasheets on indigenous trees, agroforestry as well as food processing and value addition. In addition to the information on these four health (4H) areas, Infonet provides over 1,000 pest modules (crop-specific pest and disease information). The platform gives access to over 200 issues of The Organic Farmer (TOF) Magazine published since its inception in 2005 and over 100 issues of Mkulima Mbunifu Magazine (MkM is a Swahili Magazine) which has been published since 2011. They can be accessed via keywords and the pdfs are searchable through full text search. Finally, Infonet-Biovision provides access to several complimentary publications and manuals from partner institutions. Infonet also has an active partnership network for disseminating and applying content, as well as receiving feedback. Conclusion

To make the content more accessible to KCOA Hubs and other regions, Infonet is implementing geo tags and country layers and has integrated a translation tool for easy translation of datasheets into other languages. These efforts will enhance the platform's usefulness and appeal as a farmer information hub for promoting ecological sustainable agriculture and related topics.

Keywords

knowledge-intensive information, extension, information dissemination, free web access, farmer information hub, ecological technologies, organic agriculture, animal health, plant health, human health, environmental health.

From Agroecology to Organic Farming: a review of best practices and Lessons learnt in Madagascar

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Key words: GSDM, Agroecology, rice, erosion, Striga asiatica, compost, vermicompost, biopesticides, advocacy

Introduction

Madagascar is one of the African countries that is a major consumer of rice with rice produced mainly in the irrigated lowlands, but the surfaces available in this production system are saturated and no longer cope with population growth. For this reason, production of food crops, particularly that of rice, must be intensified in the hills with steep slopes. This review concerns not only good practices on rice but also those of other crops in the Malagasy food system.

Repetitive bush fires and slash and burn cultivation in forest areas lead to a sharp reduction in cover crops and forest covers and are the cause of extreme climatic events and the drying up of springs. The poverty rate in rural areas, particularly in the Great South and South East of the Country, makes the fight against deforestation difficult.

In the context of this poverty, the production systems can no longer be made using fossil inputs and must then move towards good agricultural practices and biopesticides.

Methodology

The former "Groupement Semis Direct de Madagascar" (GSDM) has changed its name to "GSDM, Professionels de l'Agroecologie" following the change of its statutes and is now recognized as a national reference in Agroecology. The review of the articles presented in this publication was made mainly on the publications in GSDM "Journal de l'Agroécologie", in its official reports and in its project reports. The publications of this Journal are peer reviewed while the official reports of GSDM are validated by its Board of Directors. Best practices and lessons learnt published are from project reports implemented by GSDM or his members or from partners organizations. Most of the results reported are good practices tending towards organic farming rather than organic farming as such.

The main objective of this article is to review research results and lessons learned in Agroecology and in particular good agricultural practices in matters of restoration of soil fertility and organic matter management (composts, vermicompost, basket compost, liquid compost and biopesticides, etc.) to move towards organic farming, in particular for market gardening around large cities which still use high doses of chemical products. The article also reviews the results of research on the restoration of degraded soils, the fight against bioaggressors of concern in Madagascar.

In connection with the high prevalence of food insecurity and malnutrition in some regions of the Country, almost all projects are involved in this area. A review of the data in this area will also be presented in this article.

Results and Discussions

In terms of restoration of degraded soils, the results of long-term trials (since 1998) and lessons learned from farmers supported by GSDM projects have demonstrated the effectiveness of systems based on climbing legumes in association with maize, in rotation with rice associated with Cajanus cajan under Conservation Agriculture. No-till systems yield on average 3 times more than tilled systems, and the yields of the tilled plots even with cover crops decrease each year between the reviewed period from 2015 to 2021 while the no tilled plots with cover crops are more stable over time. These results confirm the decline of soil carbon in the plowed plots even in the presence of cover crops.

The rice husk-based biochar has been also tested by the CEFFEL center as an alternative to the use of chemical fertilizers. The biochar resulting from an artisanal pyrolysis technique has given good results in trials on tomato yield, but this technique has not yet been up scaled in the dissemination.

The use of liquid compost with biocidal plants such as neem, agave, Crotalaria, comfrey, Lantana camara etc. helps protect market garden crops against the main pests and diseases but does not provide sufficient protection against the caterpillars (Helicoverpa armigera) that destroy the pods of legumes, which poses a problem in particular in seed production of most of legumes used as cover crops (cowpea, mucuna, Tephrosia sp, Cajan cajan).

The article will also review the possibilities offered for food security and the high rate of malnutrition. Food security and malnutrition have always been concerns in certain regions of the Country. Opportunities include orange-fleshed sweet potato varieties and the basket compost technique for cassava both of them providing good yield in a short time with crops widely grown by poor small farmers. Sweet potatoes with orange flesh rich in beta-carotene, non-photoperiodic and with a short cycle have known a strong adoption in the Country allowing to produce practically all the year around as long as there is humidity. The basket compost technique makes it possible to produce high yield of cassava or yam and makes it possible to prepare planting holes enriched with organic matter for the establishment of cash crops (cloves, coffee, vanilla, etc.).

Scaling these technical innovations has always been a challenge. Because there is a long way to go for a paradigm shift with poor small farmers. GSDM's experiences with schools have resulted in what we call "reverse education" where students influence parents. Advocacy at national and donor level is also essential.

Conclusions

Due to the predominance of small producers in the agricultural sector and the exorbitant prices of fertilizers and chemicals, good agricultural practices and the use of biopesticides have prospects for small farmers.

Given the experiences acquired over time by GSDM, its members and its partners, agroecological techniques are currently available and are already applied by farmers in restoring soil fertility and in the fight against bio aggressors without the use of chemical fertilizers or chemicals. Currently in the Vakinankaratra farmers are embarking on the production of rainfed rice on tanety with only farmyard manure added with 20% vermicompost with acceptable results. Tomato growers use liquid compost with the addition of biocidal plants. The cassava crops on basket are scaled all over the humid zones with a cover of arachis to later receive a cash crop.

Dynamics of translating Agroecology principles to farm production, productivity and resilience in Uganda.

Ms. Claire Atukunda [1], *Mr. Silver Tumwa* [1], *Ms. Agnes Kirabo* [1], *Ms. Freda Orochi Laura* [1]

1. Food Rights Alliance

Introduction

Industrialization of agriculture has disconnected food systems and disregarded people's immediate needs, food rights, and social justice. Food prices have increased and food systems have failed to provide bio-economic security and livelihoods. This has prompted diverse paradigms on how to change agriculture. Agro-ecologists explicitly include all food-related issues in their frameworks making it a holistic paradigm that adequately re-connects agriculture, the environment, food, and people to recover livelihoods. However, the current policy landscape in Africa is captured by capitalists and industrial enthusiasts. A review of agriculture and food-related policies in the East African region confirms this. The private sector is regarded as the driver of these policies under the guise of agriculture commercialization. In Uganda, for instance, although different policies and plans have been developed and implemented for over a decade, agricultural production and productivity have failed to increase. Agriculture Policies and the related instruments like the Plan for Modernization of Agri-culture, Agricultural Sector Strategic Plans 1 and 2, National Development Plan I, and the National Development Plan II all aimed at increasing production and productivity as a priority for improving the livelihoods of Ugan-dans.

Although the Government of Uganda remains committed to these policy paradigms, they have not been able to sustain the livelihoods of the food producers and consumers in the region and promote the sustainability of the country's fragile ecosystems. The significance of this paper is to provide a review of the effect of agro-industrialization on food systems and provide an understanding of how Agroecology can be used as a strategy to promote production, productivity, resilience, and sustainability within farming systems. This was achieved through a systematic review of agriculture and food-related policies from within Sub-Sahara Africa. Results show that if agro-industrialization is not restricted, over a billion people still will continue to spend over 60% of their income majority being smallholder farmers who entirely depend on agriculture. Agroecology provides a holistic solution to these challenges. However, the enabling environment for Agroecology has remained weak in the region. In addition, whereas research has been conducted globally, there is still limited context-specific data on the social economic values of Agroecology in the region to provide evidence for policy reforms. Keywords: *Agroecology, food systems, policy*

Methodology

A systematic review of agriculture and food-related policies and practices in the region was carried out to understand the influence of Agroecology as a strategy for promoting production, productivity, resilience, and sustainability within farming systems.

Results & Discussion

Agroecology is gaining ground within the debate on how to address systematic social and environmental prob-lems in agriculture. However, it remains marginalized in agricultural research and is thus seen as small-holder-centric (Isgren and Ness, 2017). Findings also show that the Majority of the Agriculture Policy and policy instru-ments integrate and recognize Agroecology and broadly state it in their Mandate i.e. Uganda National Agricul-ture Research Organizations'(NARO) act 2005 states the mandate of the national research organization is "to

innovate for sustainable transformation" and to realize this NARO conducts research in all aspects of agricul-ture including; crops, livestock, fish forestry and cross-cutting areas (NARO, 2021). Therefore the remaining gap is policy implementation hence strong emphasis should be put on the execution of policies. Uganda for instance has a fertilizer policy and subsidy program however, organic inputs are not listed. It is important to advocate for the inclusion of organic since only synthetic fertilizers have been listed and distributed to farmers (MAAIF, 2016) Other findings show formidable efforts by none state Agro ecology promoters i.e. PELUM in holding regional organic seed fairs, has stimulated the Growing desire for organically produced foods among the middle income in urban areas (National Organic movement of Uganda, 2022) However, Often time's Organic conformity assess-ment certification process is expensive and hence prohibitive (Farm Africa, 2020) therefore sufficient quantities of organically grown foods cannot be found on national the market. Agroecology in the 1990s was more pro-tected as compared to the present situation. According to Caporali, (2015), agriculture is no longer sustainable, Agriculture GDP has been declining (Fiala and Apell, 2017). Industrialization has set in demoralized smallholder farmers who are into organic farming. Wildlife displacing as forests and other conserved areas get cleared to set up industries. As a result, indigenous foods have been lost and the poor are still finding it a challenge to catch up with the modern methods of farming (Ocimati, 2020). As much as agro-industrialization increases agriculture commercialization which in turn increases income among rural farmers and improves livelihoods,(Akinola et al., 2020) it is vital to remember that biodiversity conservation is key to protecting the diversity of indigenous foods. For example, setting up policies that inte-grate diversity conservation into industrialization will not only protect wildlife but also improve food systems sustainability (Kuokkanen et al., 2017) According to Sultan, et al., (2016) agro-industrialization has not only affected food systems but also water has been affected, water life is facing challenges for survival as chemicals from industries as well as fertilizers and farm chemicals from nearby farms erode water bodies. This has affected food systems negatively and thus calls for Agroecological protection to promote resilience during climatic changes among communities (Béné, 2020). Additionally, agricultural Modernization trumps the pro-poor, smallholder farmers hence the poor and rural communities are not being prioritized in the government's search for quick results (Isgren, 2016) as a result, social movements propose agroecology promotion as a solution to modern crises such as climate change, mal-nutrition, contrasting the dominant industrial agriculture model based on external inputs(Kerr, 2018). The aim is to transform agriculture to build locally relevant food systems that strengthen the economic viability of rural areas based on short marketing chains, both fair and safe food production (Nicholls and Altieri, 2018). This involves supporting diverse forms of smallholder food production and family farming, farmers and rural communities' food sovereignty, local knowledge, social justice, local identity and culture, and indigenous rights for seeds and breeds (Benjamin et al., 2015). This can be achieved through a revival of the traditional farm-ing system and the creation of Agroecology lighthouses from which the Agroecology principles and practices radiate out to communities and these strategies should be complemented with policies and solidarity market arrangements (Silici, 2014). Other actions that need to be done include; consolidating the evidence base to support Agroecology through multidimensional analysis that provides comparable measures not just of the crop but other non-commodity outputs such as feed availability for livestock, mulching crops, provision of ecosystem services, contribution to income and resilience of farming households, (Friedland,2021) and promoting a fundamental shift in culture and paradigm in the evaluation of what is productive and efficient not just by farmers but by the whole society as well as proper documentation systems to guide the future (D'Annolfo et al., 2017).

Recommendations

Based on the above results, it is recommended that governments and policy-making bodies should prioritize local food system protection by promoting Agroecology. For example, East African Community (EAC) should continue pursuing efforts to harmonize its agriculture policies and raise the declining performance of the agriculture sector.

To achieve sustainable farm production organic inputs and fertilizers should be urgently included in government input subsidy policies. There is a need to investigate further the reasons for the increased penetration of chemical and synthetic agri-culture despite all the desire for healthy foods, and diets and propose pathways to include and scale the adoption of Agroecology practice and principles.

Conclusion

The highest population in SSA depends on agriculture for both economic food and nutrition security. As the population rises, food demand is set to rise and thus industrialization is on the rise to cover the gap. It is vital that as much as industrialization provides income security, it comes with its negative effects on food systems like greenhouse emissions, deforestation, pollution, and wildlife displacement hence policies should be put in place to protect Agroecology as a way of strengthening food systems, promoting resilience during climatic changes and sustainability.

Keywords

Agroecology, food systems, production systems, resilience. policies.

Economics of Agroecology

Ms. Innocent Faith [1], *Mr. David Kersting* [1]

1. GIZ KE

Introduction

The Covid-19 pandemic as well as the global market disruption induced by the Russia – Ukraine conflict have demonstrated the vulnerability of food systems around the globe. This is exacerbated by underlying long-term trends such as climate change and the degradation of natural resources such as land, water and biodiversity. The need to transform food systems into a more resilient, ecologically friendly and at the same economically viable has become more apparent than ever before. Agroecology therefore is currently at the center of po-litical debate. Nature-based solutions and circular economy approaches provide potential pathways to guide the transformation but their acceptance by mainstream agricultural policy and practice is often hampered by doubts regarding their economic viability.

Methodology

Against this background, GIZ's ProSilience project in Western Kenya has critically assessed through various studies the sustainable soil management approaches and practices with regard their economic viability at production level and beyond, long-term benefits and bottlenecks of agroecological farm practices.

Results & Discussion

The evidence generated outlines the economic potentials and bottlenecks of agroecological farm practices such as composting, biological nitrogen fixation and no-till mechanization for zero tillage deliberately highlighting the perspective of women and youth. This way, the ProSilience contributes to answering questions that farmers as well as policy-makers often struggle with.

Conclusion

1. Does it make economic sense to venture into agroecological practices?
2. What are the challenges in access to markets for agroecological products?
3. What are the main drivers of the adoption of agroecological practices?

Keywords

Agroecology, economic potentials, business cases, circularity, bottlenecks, sustainable soil management

Effect of corncob biochar on selected soil chemical properties and performance of maize

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Introduction

A study was conducted to investigate the effect of corncob biochar or its combination with farmyard manure compost or NPK fertilizer on selected soil chemical properties and maize growth and yield on a ferralitic soil in Central Uganda.

Methodology

A field experiment was carried out with biochar treatment at 10 tons/ha or co-applied with FYM compost at 10 tons/ha and NPK fertilizer. The test crop was maize variety DH 04. It involved six treatments(Control, Biochar, FYM compost, NPK, Biochar+ FYM compost and Biochar+ NPK) within a period of two seasons and used Complete Randomized Block (CBD) experimental design.

Results & Discussion

In season 1, the soil pH was 5.2 at the control and 5.78 after biochar application. Solely applied corncob biochar increased the soil pH by 0.58 units compared with the control. In season 2, the pH ranged between 5.2 at control to 6.05 solely applied biochar. The solely applied biochar increased the soil pH by 0.85 units compared with the control. Biochar combined with farmyard manure compost recorded a soil pH of 5.97 while solely applied biochar recorded a soil pH of 6.05, a difference of 0.08 units. During season one, the soil organic carbon differed significantly ($P < 0.01$) after the treatment application. The SOC varied from 1.58% at the control to 1.91 % at solely applied biochar treatment. In the second season, the SOC ranged between 1.5% at the control to 1.98% at biochar treatment. This means that biochar addition increased the SOC by 0.48 units. Biochar combined with farmyard manure compost recorded a SOC of 2.31 while solely applied biochar recorded a SOC of 1.98.
During the first season, the maize yield ranged from 4625 to 9475kg/ha. There was a significant ($P<0.01$) difference among the recorded average total weights within the treatments. Biochar combined with NPK treatment recorded the highest average total weight of 9475kgs while the control recorded the least average total weight of 4625kgs. During the second cropping season, the maize yield differed significantly ($P<0.001$) ranging from 3325 to 8550kgs/ha. Biochar combined with NPK treatment recorded the highest average total weight of 8550kgs while the control recorded the least weight of 3325kgs. The maize yield registered an increment in the two cropping seasons. This can be attributed to biochar's im-provement of base cation retention in the rooting zone (Palansooriya *et al.,* 2019). Biochar also acts as a soil conditioner which improves water holding capacity and enhances soil nutrient retention (Mensah *et al.,* 2018).

Conclusion

This study demonstrated that solely applied corncob biochar or in combination with farmyard manure compost or NPK avails the potential to enhance soil pH, soil organic carbon, available phosphorus, soil Nitrogen and exchangeable bases (K^+, Mg^{2+}, Ca^{2+} and Na^{2+}). Moreover, it improves the growth and yield of maize crop. These findings indicate that solely applied corncob biochar or in combination with farmyard manure compost or NPK can be used to improve maize yield which contributes to food security enhancement in the wake of climate change.

Effect of Different Coverings and Propagation Media on Germination and Emergence of African Eggplant (Solanum aethiopicum)

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Introduction

This study was necessary because African eggplant (*Solanum aethiopicum* L.), one of the most popular fruit vegetables in tropical Africa, is used widely. The long time it takes for African eggplant to emerge has an impact on seedling growth, planting time, and plant establishment. Reducing the time before emergence enhances plant establishment, prompt fruit delivery to the market, and advances the sustainable development objectives of achieving zero hunger and overall wellbeing.

Methodology

The purpose of the study was to ascertain the impact of various covers (black and transparent polythene) and germination media (top soil, top soil-coco peat mixture, and coco peat-sand mixture) on the rate of germina-tion and emergence of African eggplant. Two African eggplant varieties were used in the experiment (Oforiwa and Kpando). Germination %, mean germination rate, mean daily germination, mean germination time, and emergence speed index were among the data on seedling emergence that were gathered for each cultivar. The experiment was laid out in a 3*3*2 factorial arrangement in a completely randomized design. Mean separation was done at 5% level of significance.

Results & Discussion

Coverings and germination media had a substantial (p 0.05) interaction effect. The media including topsoil and cocopeat had the highest germination percentage (96%), followed by the control (no covering). For the cultivar Oforiwa, the interaction between the cultivar, media, and covering was significant (p 0.05). The highest emer-gence speed index was found in cocopeat media with a black covering and topsoil (4.65). The uncovered and topsoil + cocopeat media recorded the highest mean daily germination, with the interactive impact of covering and media also being significant (P0.05) under mean daily germination (6.85).

Conclusion

Significant improvements were made to the seed germination qualities in terms of percentage seed germination, percentage emergence, mean germination time, time to 50% emergence, emergence speed index, and germi-nation index. The duration to emergence of African eggplant seeds was dramatically reduced with increased seedling growth when black covers, topsoil, and cocopeat media were used. This helps to ascertain timelines to carry out planting, field maintenance practices to achieve proper plant establishment. Moreover, it is easier to reach target market in time as well as create mutual trust.

Effect of field margin vegetation on natural pest regulation in Dolichos bean (Lablab purpureus L.)

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Introduction

Dolichos bean, *Lablab purpureus,* is an important legume crop grown for human consumption (green and dry seed) and whole plant is used as fodder for cattle (Soetan and Fafunso 2010). The crop has potential to support food security in Africa due to its ability to tolerate drought and salinity (Minde, Venkataramana, & Matemu, 2021). However, its role in a sustainable agricultural system and particularly pest management is less under-stood (Cullis and Kunert 2017). The crop experiences pest infestation by up to 55 species of insects and mites (Govindan, 1974). Aphids are among the most severe invertebrate pests that cause high economic losses (Abate *et al.* 2000; Thejaswi *et al*. 2007; Nahashon *et al*. 2016). Non-crop vegetation around farmlands have been documented to harbor diverse invertebrate taxa composed of pests and beneficial insects (natural enemies, pollinators and nutrient-cyclers) that are valuable in enhancing biological ecosystem services (Balmer et al., 2013). Both populations are usually supported by crops and field margin vegetation but little is known on the importance of field margins in supporting natural enemies of insect pests in tropical agriculture (Bianchi, Booij, & Tscharntke, 2006).

Methodology

The study documented the bean aphid natural enemy populations and potential contributions to enhanced insect pest regulation on Dolichos bean in smallholder farms. Field experiments were conducted during May-December 2019 and March -November 2020 crop growing seasons. Each experiment was laid out in a ran-domized complete block design (RCBD) with eight replications per location. Dolichos monocrop and maize-dolichos intercrop were established on plots measuring 10 m x 10 m with or without 2m planted field margin vegetation perimeter strip. Equal mixed ratio by weight planted field margins comprised of four plant species (*Chenopodium album*, *Bidens pilosa*, *Galinsoga parviflora* and *Tagetes minuta*). Aphid natural enemy populations were collected using sticky cards, pan traps and sentinel plants placed at 5m away from the planted field margin strip and into the crop. Trap placement was at done at three growth stages of the lablab bean crop (seedling vegetative and podding).

Results & Discussion

A total of 2029 insects from 10 families were recorded. Presence of plant-rich field margins increased the abun-dance of natural enemies by (9.5 %) and supported higher populations of Braconidae (parasitoids) and damsel bugs (predators). The maize-dolichos intercrop had 15.5% lower abundance of natural enemies than dolichos monocrop. Higher grain yield was recorded in plots with field margin vegetation (300 kg ha^{-1}) compared to plots without field margin vegetation (210 kg ha^{-1}). For DNA barcoded parasitoids emerged from *Aphis fabae* infested sentinel plants, three primary parasitoids were identified; *Aphidius* sp., *Aphidius colemani*, *Lysiphle-bus fabarum* and *Lysiphlebus* sp. Sentinel plants deployed in high elevation significantly ($P<0.001$) recorded more parasitoids, These results demonstrate that presence of plant-rich field margins contributes to enhanced ecological conservation of natural enemies and biological pest regulation services.

Conclusion

Inclusion of field margin vegetation around farmlands leads to enhanced conservation of invertebrate taxa diversity and abundance, an important functional mechanism of integrated natural pest regulation. However, it is crucial to study the biology of the diverse vegetation and interactions with pests and natural enemies for an optimized ecologically sound biological pest regulation.

Effects of Agroforestry Practices on Insect Abundance and Diversity in Dodoma the Semi-Arid Area, Tanzania

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Introduction

By analyzing the diversity and abundance of insects as bioindicator species in the semi-arid region, this study set out to understand the impact of agroforestry agricultural techniques on the conservation of biodiversity. It specifically evaluated the diversity and richness of insect species across regions that were forested with trees only, areas that were forested with crops (agroforestry farms), and non-forested bush and shrubland areas.

Methodology

In the study area, insects were captured using pitfall traps. Each location had two transects, each with five pitfall trap spots and ten traps.

Results & Discussion

With regard to these, shrubland had the lowest abundance (mean=9.0754.71) and afforested land had the highest (mean=16.288.76). Shrubland displayed the highest diversity (Shannon Weiner, H'= 1.86 and Gini Simpson, D=0.75), whereas agroforestry recoded the lowest value of species diversity (Shannon Weiner, H'=1.51, Simpson, D=0.58). However, this variation was statistically insignificant (Kruskal-Wallis test, H=0.6858, p=0.86). A permutation test revealed that the three sites and agroforestry had different levels of species diversity. The highest level of species richness was found in shrubland (Margalef index=5.30), while the lowest level was found in agroforestry (D=4.18). Agroforestry and shrubland were shown to have different patterns of individual dis-tribution for a given species (Margallef, p=0.05). The distribution of the various species was more even in the bushland (Evenness=0.21) and less even in the agroforestry (Evenness=0.16) and afforested site (Evenness=0.14). The observed difference in evenness between agroforestry (Evenness=0.16 and bushland (Evenness=0.21) and between agroforestry (Evenness=0.16) and shrubland (Evenness=0.18) was statistically significant (P0.05). The agroforestry region has a larger abundance but a lower diversity of insect species, according to the results.

Conclusion

Agroforestry areas have fewer species than shrubland and bushland habitats, which are older and more untainted. This may be due to the destruction of insect habitat during the creation of the area as well as the ecosystem's newness. Based on the findings, more research is required to determine how age and different agroforestry components affect the diversity and abundance of insect species in the semi-arid region.

Effects of Regenerative Soil amendment Practices on Yields of Leafy vegetables in Kenya

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Introduction

Inappropriate farming activities by smallholder farmers such as over dependency on inorganic fertilizers and over application of nutrients to increase crop yields without carrying out soil and crop demands is a threat to ground and surface water. Similarly, under application leads to low crop yields. Inappropriate use of inorganic fertilizers and pesticides without observing the required needs have resulted to loss of beneficial insects and mi-croorganisms and reduced soil and water quality in Kenya. These poor farming methods coupled with climate change have resulted to food and nutrition insecurity. Besides, leafy vegetable production has been constrained by inadequate knowledge on production and fertilizer requirement. Regenerative agriculture provides alterna-tive ways to curb such adverse effects of the farmer practices and climate change. The aim of this study that was conducted among smallholder farmers organized in Farmer Field Schools in 2022 in four counties (Kakamega, Bungoma, Nakuru and Uasin Gishu), was to evaluate the effects of regenerative agriculture practices on yield of commonly grown leafy vegetables (kales, cowpea, black night shade and spider plant).

Methodology

The treatments (manure 10t/ha, bokashi 6t/ha, DAP 100Kg/ha, NPK 100Kg/ha, DAP 50Kg/ha+ manure 5t/ha) for various crops were evaluated independently in a randomized complete block design. The data collected were subjected to analysis of variance using Genstat software 16th edition and means separated using the least sig-nificant difference at P≤0.05.

Results & Discussion

Initial soil sampled results for all the fields indicated that the soils pH were acidic for Uasin Gishu (5.25), Kakamega (5.69), Bungoma (5.16) and Nakuru (5.38) counties. Similarly, all the soils lacked organic carbon with ranges of 0.71-0.78%. Uasin Gishu field had Nitrogen percentage of 0.33%, while for the remaining sites it ranged from 0.18-0.22% against the critical levels of 0.3-0.5%. Results showed that in Bungoma County, black nightshade subjected to DAP+Manure treatment resulted to significantly the highest leaf yield (33,968Kg/ha) as compared to sole manure (22,356Kg/ha) and biochar application (15,625Kg/ha). In cowpea leaf production, application of DAP fertilizer and broadcasted manure increased yield by 148% and 101%, respectively. Leaf yield of spider plant treated with compost manure (33,750 Kg/ha) significantly (P≤0.05) outperformed broadcasted manure (25,000Kg/ha) which in turn out yielded DAP+Manure (20,000 Kg/ha) and precise manure (20,505Kg/ha), however, there was no significant (P≤0.05) difference in compost manure and DAP (27,500Kg/ha) treated plants. Similarly, in Kakamega County, application of DAP+Manure in black nightshade production, resulted to significantly (P≤0.05) the highest yield as compared to DAP (45,833Kg/ha) and manure (55,139 Kg/ha) treated plots, which were statistically similar. In Nakuru County, application of *bokashi* in black nightshade resulted to significantly (P≤0.05) the highest yields as compared to no fertilizer application, however, no significant (P≤0.05) difference was observed in farmyard manure and NPK treated plots. In Uasin Gishu, application of evergrow organic fertilizer, manure and DAP, significantly (P≤0.05) increased black night shade yield by 157%, 114% and 85%, respectively. Similar trends were also observed in leaf yields of kales, whereby, kales treated with manure significantly (P≤0.05) outperformed other fertilizer applications in Bungoma and Nakuru Counties. In Uasin Gishu County, kales subjected to DAP treatment resulted to significantly the highest yields, however, there was no significant (P≤0.05) difference with those subjected to manure and evergrow.

Conclusion

The results of these studies indicate that adoption of regenerative soil amendment practices such as use of manure, *bokashi,* DAP+Manure can substantially increase leaf yields of leafy vegetables.

Keywords

Regenerative, manure, *bokashi*, evergrow, DAP, NPK, leaf yield

Effects of selected concentrations of Bidens pilosa on the production and productivity of the black soldier fly (Hermetiaillucens) larvae

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Introduction

BSF (*Hermetia illucens*) are small harmless insects belonging to the sub family of Hermetiinae. They are native to the American continent but has now spread to the rest of the world. These insects have been found to possess the potential in providing promising solutions to the modern agriculture's growing problems. Much as it is a good alternative to the use of silver fish as protein animal feed however it's feeding had remained a threat to food security since most farmers were feeding it on maize bran and left over human foods. This had limited it's adoption by local farmers living in a developing country like Uganda whose citizens struggle to get what they eat. According to Paz *et at.,* 2015, BSFL are saprophogous at the larval stage and therefore have the ability to feed on various products including vegetables. Meanwhile *Bidens pilosa* is a notorious weed which when fermented provided an alternative feed to the saprophytic BSF larvae. However the effect different concentrations *Bidens pilosa* had on the production and productivity of BSF larvae remained questionable thus hence the call for the study.

Methodology

The study was carried out in Mpigi district, Nkozi sub county in Central Uganda. The study employed a complete randomised research design which involved an intensive analysis of research variables. Different ratios of feeds and water were used, that is 3kgs of feed substrate mixed with 3litres of water (1:1), 3kgs of feed substrate mixed with 6litres of water (1:2) and 6kgs of substrate mixed with 3litres of water (2:1) as treatments R1, R3 and R2 respectively. The study used used a sample size of 100 BSF larvae from every treatment for every week. The larvae were randomly selected for data collection. The growth parameters were measured each week on the selected larvae, the yield parameter measurements were collected at the end of the four weeks.

Results & Discussion

There was a high significant ($P<0.05$) difference in the growth parameters (larvae length and larvae circumfer-ence) in the treatments R3 and R1 compared to the R2 treatments. The highest average larvae length and larvae circumference was observed in R3 followed by R1 and then R2 which had the least larvae length. This was so because feed substrate that was originally solid was converted to liquid slurry before ingestion. A high signif-icant ($P<0.05$) effect was observed in the larvae mass weight for the different feeding ratios where R3 showed the highest mass weight.

Conclusion

The study found out that a ratio with more water than the feed substrate is more effective for attraction and breeding of the BSF larvae. It was concluded that the selected concentration of *Bidens pilosa* had an effect on the production and productivity of the BSF larvae and therefore the amount of water added to *Bidens pilosa* as a feed substrate should be considered so as to maximize profits. This study provides base line information for future development of Bidens pilosa as a feed substrate to BSF larvae.

Keywords

Bidens pilosa; *Hermetia illucens*; BSF larvae; concentration; Production; Productivity

Elements of agroecological pest and disease management

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Introduction

The development of large-scale monocropped agrisystems has facilitated increased problems with pests and diseases, perpetuating the reliance of farmers on synthetic pesticides. The economic success of synthetic inputs has, however, been achieved at a high cost to the environment through the loss of biodiversity, depletion of soil quality, greenhouse gas emissions, and disrupting the ecosystem services that can otherwise help mitigate losses caused by pests and diseases. The Food and Agriculture Organization, for example, has published the 10 elements of agroecology as a framework for the transformation of agriculture. Agroecology combines ecological and social concepts and principles to develop sustainable food and agricultural systems by harnessing nature based solutions that are tailored to farmers' needs. Plant-based biopesticides, for example, offer an alternative to synthetic pesticides that are less harmful to the environment and nonpersistent, yet effective at managing pests and have a long tradition of use among farmers so are more socially acceptable.

Methodology

We provide a critical assessment of how nature-based approaches to pest and disease management comply with the 10 elements of agroecology and show how they integrate with other ecosystem services through farmer participatory research. Optimised methods for using botanical pesticides have been developed where field trials working with farmers have evaluated the use of locally available pesticidal plants to control a range of pests on maize and legume crops, including fall armyworm, foliage beetle and pod borers. Research to evaluate potential non-target impacts, particularly on arthropod predators and parasitoids, in different cropping systems using botanicals in comparison to synthetics and untreated controls has been carried out to highlight the merits of conservation biological control.

Results & Discussion

The 10 agroecology elements (diversity, co-creation and sharing of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular economy) can all be addressed from the entry point of ecological pest and disease management. We have organised the elements in a framework that may help realize more environmentally and socially sustainable crop protection and a transition to agroecological farming practices, and will present this framework for further comment. Yields obtained using botanicals are often comparable to yields when using synthetic pesticides. For example, in trials to evaluate botanicals to control fall armyworm attacking maize, we have found untreated crop yields of 2000 kg/ha, whereas botanical treatments to infested maize with *Azadirachta indica*, *Cymbopogon citratus* and *Lippia javanica* produce yields of 5000 to 6000 kg/ha. Our results also show that botanicals have much less impact on numbers of beneficial arthropod species compared to synthetic pesticides. Our research results also show the importance of farmers maintaining field margin vegetation around crops to provide alternative food and harbourage for natural enemies, where the presence of field margin vegetation can significantly increase crop yields through increased predation pressure.

Conclusion

We conclude that the adoption of nature-based solutions for pest management addresses all 10 elements of agroecology and provides an entry point to promote sustainable farming practices among farmers more widely.

Emerging messages on viability of agroecological practices in Africa

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1. *CIFOR-ICRAF*

Introduction

African farmers face multiple challenges and agroecology has been proposed as contributing to solutions. However, the **viability of agroecological practices for African farmers** has been questioned. We are conducting a study across 8 countries to understand the economic, social and environmental viability of agroecological prac-tices for small holders. The work is in progress we have good evidence to support some important key messages.

Methodology

11 case studies in 8 countries (Tunisia, Senegal, Burkina Faso, Ethiopia, Kenya, Tanzania, Malawi and Madagascar) were selected. A common methodological framework was developed and locally adapted that involves data collection using key informants, formal surveys, focus groups and in depth investigations. Analysis is at both case-study level and across studies.

Results & Discussion

Data analysis and interpretation is in process but emerging messages are:

- Agroecological practices are used widely.
- Agroecological practices used are diverse.
- Practices are used in many combinations.
- Agroecological practices used have multiple origins.
- Farmers can use practices despite unsupportive regimes .
- Nearly all farmers we surveyed use some agroecological practices.
- Different farm types use different combinations of agroecological practices.
- Farmers use AE practices for a wide variety of reasons.
- Tradeoffs are made by farmers between advantages and disadvantages of agroecology.
- Labour is not always a barrier to use of agroecological practices.
- Assessing viability of agroecological practices is complex.
- There are at least three contrasted narratives of agroecology in Africa.

Conclusion

Our findings from a large and diverse set of farmers across Africa indicate that agroecological practices are not fringe alternatives to conventional or mainstream practices but are often deeply embedded in a wide range of African farming systems. These practices are 'viable' from the perspective of farmers but there are multiple views on what these mean for transition and evolution of a agricultural systems.

Keywords

agroecology, viability, case-study

Enhancing Crop Yields and Biodiversity Conservation with Agroecological Approaches: Evidence from Kenya

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Introduction

Food systems are at a breaking point due to climate change which results in extreme weather events, changes in precipitation patterns, and rising temperatures, all these consequently leading to crop failures and food shortages. Intensive farming practices under conven-tional farming also cause soil degradation, reducing soil fertility and impacting food security negatively. Biodi-versity loss is also a concern due to land use changes and other factors. Addressing these challenges requires an integrated approach involving all food system actors and leveraging scientific and technological innovations. This study aimed to evaluate the impact of cropping system diversification and holistic farm management to ad-dress the challenges mentioned above, improve pest and disease resilience, and enhance agricultural systems' sustainability.

Methodology

The study was conducted in on-station and laboratory experiments from 2019 to 2022 at two sites in Murang'a County, Kenya, using cabbage and legumes, generally grown as sole crops by farmers in the area. The per-formance of farmers' practice (sole crop) in terms of insect pest management was tested against a holistic ap-proach, including intercropping or border-cropping with companion crops (e.g., coriander, chilli, onion, and marigold) in addition to sticky traps and homemade improved botanicals. The homemade botanical is a plant extract made from *Tagetes minuta*, *Lantana Camara*, *Allium sativum*, *Capsicum frutescens*, and Neem powder (*Azadirachta indica*) in the ratio of 4:4:2:2:1, respectively. The plant extract was also tested in a greenhouse experiment to improve efficiency. Data collected during the on-station experiment were the incidence of pests, beneficial insects, and crop yield

Results & Discussion

The results showed that cabbage intercropped with coriander and treated with botanicals significantly reduced pest incidence (e.g., lowest aphid population), increased beneficial insects (e.g., highest Colemani population), and improved yield (40 Mg per hectare) compared to sole cropping (23 Mg per hectare). French beans inter-cropped with coriander and treated with sticky traps also significantly reduced pest incidence, increased ben-eficial insect population, and improved yield compared to sole cropping. In contrast, using botanicals or sticky traps without intercropping reduced beneficial insect populations. At the same time, using companion crops shorter than the main crops' height or with shorter growth cycles was ineffective in reducing pest incidence.

Conclusion

The study finds that incorporating companion crops into cropping systems, along with botanicals, is an effec-tive way to achieve sustainable agriculture, especially those under organic management. Thus, it can help to improve food security, conserve biodiversity, stop soil degradation, and improve cropping systems' resilience against the effects of climate change. However, there will be the need to explore the integration of other com-panion crops and pest control practices, replication of such trials in different agroecological zones, and partic-ipatory capacity building of farmers on various agroecological approaches that can enhance the resilience of cropping systems since the approaches are knowledge intensive.

Evaluating the effect of different organic manures on the performance of black eye cowpea variety

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Introduction

Cowpea (*Vignaunguiculata*,L.Walp) is one of the key legume food crops produced worldwide for its grains, fresh green seeds, fresh leaves and pods which are consumed as fresh cooked vegetable. The research study, to evaluate the effect of bio-manures on the growth and yield performance of black eye cowpea variety was in central Uganda.Specifically, the study examined the growth, and yield parameters of black eye cowpea variety in relation to application of (chicken manure, pig manure, cow dung control treatment. It was hypothesized that bio-manure application has a significant effect the growth and yield performance of black eye cowpea variety.

Methodology

The treatments were laid in complete randomized block design (CRBD) in a 0.0004ha size, replicated four times. The plots were blended with 5 kgs of bio-manure except the control plot. The plants were planted at the spacing of 50×20cm. 5kgs of each manure type was applied. Observations were done on 4000 plants/ha selected from 100000plants/ha total number of plants in the 16 plots. The data was collected on plant height, number of leaves, leaf length, number of branches, and the grain weight and wet bio mass of cowpea.The data collected was analyzed with GENSTAT(VSN,version14,2012)for(ANOVA).

Results & Discussion

Results indicated that cowpea under chicken manure had the highest mean of plant height 21.3cm and 21.82cm in season one and two respectively, wet bio mass of 5995kg/ha and 4745kg/ha in season one and two respec-tively, number of branches of 7.58 and 7.1 in season one and two respectively and number of leaves of 38.7 and 38.3 in season one and two respectively. compared to cowpea treated with pig manure and then cow dung and the least was under the control. The highest mean of grain weight under pig manure with 612.75kg/ha and 587.75kg/ha in season one and two compared to chicken manure, cow dung manure and the least was from con-trol treatment. The ANOVA results indicated that there were highly significant differences on the plant height of cowpea black eyed variety among treatments at ($p<0.001$). The cowpea treated with chicken manure and pig manure performed better than those with cow dung and those without (control), therefore the recommenda-tion is that famers to fetch high yields they should use chicken manure and plant early in time during the first rains and also crops to pick the Nitrogen flash for their vegetative growth.

Conclusion

The cowpea treated with chicken manure and pig manure performed better than those with cow dung and those without (control). Recommendation is that farmers to fetch high yields they should use chicken manure and pig manure and plant early in time during the first rains and also crops to pick the Nitrogen flash for their vegetative growth.

Keywords

Chicken manure, pig manure, cow dung manure, and control treatment.

Farm resilience assessment using FAO's adapted SHARP+ tool in Busia County, Kenya

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Introduction

The challenging effects of climate change on agri-food systems, particularly for smallholder farmers in low- and middle-income countries, have made it necessary to assess and understand farmers' climate resilience. Well-informed decision-making can facilitate the design of context-specific agroecological interventions that address farming systems' vulnerability and increase resilience. The Nutrition in City Ecosystems (NICE) is an SDC-funded project focusing on improving food security and nutrition in secondary cities in low-income countries. The project conducted a resilience assessment of smallholder farmers in one of the project locations, Busia, Kenya using FAO's Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP+) tool.

Methodology

To understand farmers' agroecological practices relating to input reduction, biodiversity, synergies with live-stock, and soil health, additional questions were integrated into the SHARP+ tool. Purposive sampling was applied to meet the projects' criteria such as women's inclusion. A statistical analysis was conducted to score each indicator's resilience level (on a scale from 0 to 10). Further, a simple regression analysis was performed to determine the relationship between assessed resilience scores and farmers' self-perceived adequacy of im-plemented agroecological practices.

Results & Discussion

One-hundred fifty-six farmers (68% female; 32% male) from urban-, peri-urban, and rural locations of Busia County were interviewed between 6th – 10th December 2021. With a mean of 5.06/10 (SD = 1.01), our analy-sis indicates a medium resilience of the sampled farmers. This represents farmers' awareness of the gaps in resilience yet farmers are equipped with some capacity to cope and transform their farming activities when challenges occur. Yet, a lack of access to information, know-how, and resources restricts the capacity to re-spond adequately to shocks (e.g., climate, pests, or market-induced shocks). A significantly positive correlation was found between farmers' self-perceived adequacy level of implemented agroecological practices and the as-sessed resilience ($\beta = 0.204$, $p < 0.001$). This indicates that improvements in the current level of implemented agroecological practices would result in increased resilience in the context of climate change adaptation.

Conclusion

The resilience assessment of Busia's food system will inform the NICE project to design agroecological interven-tions that improve food security and nutrition. Since farming is the major source of livelihood for most Kenyan households, the majority of whom are smallholders, it is pivotal to strengthen the smallholders' resilience. The identified areas of lower resilience in the farming systems of Busia would be focus areas for agroecology-based interventions in the NICE project. Implementing agroecology-based practices on a plot- and community level can contribute to farmers' transitions from high vulnerability to shocks toward resilience. Further, our research has demonstrated the adaptability of the SHARP+ tool in the Kenyan context, with positive signs for applying the adapted SHARP+ tool in other contexts as well.

Keywords: Resilience, SHARP, Busia County, Agroecology, Smallholder farmers, NICE project

Farmer participatory piloting of agro-ecological approaches for sustainable production of traditional African vegetables in Smallholder farms in Kenya

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Introduction

Soaring global demand for food has led to the intensification and misuse of agro-chemicals in crop produc-tion with adverse impacts on human as well as environmental health. The regenerative agriculture and agro-ecological approaches can provide sustainable solutions for this overreliance on agro-chemical inputs in crop production. The goal of this farmer participatory research was to contribute to the knowledge base that would guide key processes of reducing use of harmful agro-chemical inputs and safeguard the health of the vegetable producers and consumers, soils, and the environment.

Methodology

Hence, we conducted farmers participatory research to determine if agroecological approaches are sustainable in production of traditional African vegetables (TAVs) in smallholder farms in Kenya. Four vegetables (Ama-ranth, African nightshade, collard greens, and pumpkin) were included in the trials. Thirteen farmers (each as a replicate) were allocated with a particular TAV, and each replicate consisted of two treatments (conven-tional/farmers' practice and agro-ecological approach). Agro-ecological approaches include (i) cover crops, crop rotation, application of compost and animal manures, (ii) beneficial microbes for soil and plant health, and (iii) border crops or mixed crops to boost the pollinators and natural enemies. The vegetables were grown side by side on plots measuring 6 x 12 m each. Quantitative data (marketable harvest, and pest and disease inci-dences) were collected over a period of three months. Qualitative data were also collected where the farmers participated in Focus Group Discussions (FGD) at the end of the season.

Results & Discussion

Harvest data showed that the marketable produce from plots applied with agro-ecological approaches was significantly higher for all target vegetables (pumpkin p=0.0003, amaranth p=0.0019, collards p=0.0016, and nightshade p=0.0056) than in farmers' practice plots. Unmarketable produce was however not significantly different between the two plots for all vegetables (pumpkin p=0.0774, amaranth p=0.7972, collards p=0.2188, and nightshade p=0.2139). Results on disease incidence for all vegetables showed that agro-ecological approaches to vegetable production were effective in reducing them significantly (pumpkin p=<0.0001, amaranth p=0.0114, collards p=<0.0001, nightshade p=0.0249). The agroecological approaches were also effective in reducing the insect infestation significantly on collards p=<0.0001 and vegetable pumpkin p=0.0002, but not on amaranth p= 0.6824 and nightshade p= 0.4783. Feedback from FGDs showed that farmers found the tested agro-ecological practices effective compared to the conventional practices for crop production, as well as for soil and plant health.

Conclusion

Further participatory trials are on-going to validate the results across additional crop seasons. The findings are expected to generate recommendations and boost scaling of agro-ecological approaches in smallholder vegetable production systems in Kenya.

Farmer-centred interventions : a key approach for agroecological transition in Meru and Laikipia

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Introduction

Cereal Growers Association (CGA) is a Kenyan national farmer organization with more than 250 000 members. Fert, one of CGA's partners, is a French agri-agency operating in 9 countries. CGA and Fert have partnered in Laikipia and Meru Counties since 2019. Climate change has harshly affected these Counties, with many farmers having not harvested crops for the past 5 seasons. The partnership seeks to improve farmers' condition through agroecology, targeting food security, sustained revenue and enhanced resilience towards climate change.
In the context of climate change and low soil fertility, there is a need to develop and/or cascade innovative farming systems and practices that match farmers' concerns. Farmers, through CGA, regret a disconnect between them and agricultural research outputs in Kenya. Thus, they are eager to test practices that will be not only technically but also economically advantageous for them and in their farming environment.

Methodology

CGA and Fert, in partnership with Meru University of Sciences and Technology and African Plant Nutrition Institute, have established, since 2021, 4 farmer-led trials, whose topics have been decided by farmer leaders to make sure they fulfil their needs: tithonia as biofertilizer, types and modalities of mulching (Grevillea vs grass, full vs partial mulch), N-response curve and maize transplanting. The trials host many visits from farmers from various counties. To scale up agroecology practices (AEP), demonstration plots are set up to showcase trial and farmer-led innovative technologies to adapt to climate change. Demos are hosted by farmer advisors who are trained on agroecology and cascade the knowledge learnt to many farmers. They also provide them with bio-inputs and trees (fruit and useful trees such as Grevillea, Tithonia, Tephrosia, …) or vegetable seedlings. Four agroecology learning sites have also been established to showcase and train extension officers, farmer advisors and farmers on different practices such as different types of composting, production of biopesticides, etc

Results & Discussion

- Over 500 farmers are sensitized on mulching strategies and farm diversification. Adoption is hampered by competition between mulch and animal feed for crop residues and the current insufficiency of alter-native mulching materials, Hence the need for useful trees nurseries
- 6000 avocado seedlings planted or sold from group tree nurseries. 8 (indigenous) vegetable nurseries ensure provision of vegetables for consumption or sale to 160 households
- 3 nurseries and 4 seed multiplication sites will provide at least 220 farmers with useful trees or crops : Grevilia, Tithonia (biofertilizer) or Tephrosia Vogelli (biopesticide)
- 18 farmer advisors trained. They support 500 farmers in their respective groups for adoption of bio-inputs, mulching and other agroecological practices
- After a convincing demonstration on native Meru bean variety and local Dolichos Lablab showing im-proved resistance to pest, diseases and drought, seeds will be multiplied to fulfil the need of 50 farmers

Conclusion

Proactive farmer-led research and innovation is essential to develop and promote practices and systems that are relevant, useful and implementable by farmers. To enhance spreading and adoption of AEP, a combination of different approaches is needed involving peer-to-peer learning and partnerships with different stakeholders.

Keywords

climate change, agroecology, farmer-led research, bio-inputs, farming systems, farmer-advisor, tree-nursery

From organic farming to agroecological farming, what challenges do organic farmers face in central Uganda?

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Introduction

Based on environmental protection and providing healthy and safe foods to the population, organic agricultural production is considered an opportunity to create new agri-food systems for agricultural production. Agroecological farming is considered sustainable agriculture which focuses on ecological production for agrobiodiver-sity protection and food sovereignty through using multiple and diverse crops or animals, relying on biological processes for building soil fertility and controlling pests and diseases, etc. Does organic agricultural production entail agroecological farming? This paper explores the challenges faced by organic farmers in agroecological practices through agroecological principles.

Methodology

The study was carried out in Central in Central Uganda mainly in 5 districts: Wakiso, Masaka, Bukomansimbi, Ssembabule, and Kyotera. These districts belonged to the agroecological zone called Mukono Zonal Agricultural Research and Development Institute (ZARDI). The multiple-stage stratified sampling procedure was used to select 310 organic farmers by proportional random sampling in the 8 counties. The visit to the farm is essential for gathering fieldwork material that is generated through qualitative interpretive methods like interviews and participant observation. Descriptive analysis was used to summarize socio-economic and demographic characteristics of the respondents, agroecological variables, and the Pearson correlation coefficient as a measure of the significant relationship between agroecological variables.

Results & Discussion

The study focuses on organic farming analysis through an agroecological approach that emphasizes four agroecology principles: diversity, synergies, recycling, and resilience. The finds highlighted that the majority (52,9%) of organic farmers respondents have more than 3 crops adapted to local and changing climatic conditions and 58.71% of organic farming has Medium integration (animals are mostly fed with feed produced on the farm and grazing, their manure is used as fertilizer). The seeds and animal genetic resources are self-produced or exchanged, although some specific seeds are purchased from the market by 51.61% of organic farming. The re-sult revealed that the local environment can suffer from climatic shocks, but the system has a good capacity to adapt to climate change in 40.65% of organic farming. In organic farming that participates in this research, 50%of the soil is covered with residues or cover crops, with the majority at 61.61%. Most residues and by-products are recycled, with a little waste discharged or burned in 37.1 % of organic farming. In organic farming, 34.52%of organic farming have one type of equipment for water harvesting or saving (e.g., drip irrigation, tanks). Ac-cording to the findings, 47.74% of organic farmers' income is declining, production varies from year to year (with constant inputs), and income and production mostly recover after shocks or perturbations. The correla-tion test revealed that the diversity crops affect positively diversity activities, products and services ($r = +0.523$, $p<0.01$), the diversity animals affect positively crop-livestock integration ($r = +0.674$, $p<0.01$), and the water har-vesting and saving influence positively the environmental resilience and capacity to adapt to climate change ($r = +0.546$, $p<0.01$).

Conclusion

This empirical research addressed the agroecological principles implemented by organic farmers in Central Uganda. It focuses on diversity, synergies, recycling, and resilience, which are the agroecological principles that contribute to producing healthy and safe food for society and building resilient and sustainable local food systems through agrobiodiversity protection, food sovereignty, adaptation to climate change, and participation in the green economy.

Keywords: organic farming, agroecological approaches, organic farmers, agroecology, Uganda

Growth Performance of Spleen Amaranth (Amaranthus Dubius) Under Different Manure Types and Biological Stresses

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1. *The University of Dodoma, Department of Biology*

Introduction

At a time when the world's population is rapidly increasing, there is an increased need for food security. In an attempt to alleviate and prevent problems such as malnutrition, which is caused by a scarcity of food nutri-ents, improved agricultural practices particularly for vegetables like spleen amaranth (*A. dubius)* are necessary. Spleen amaranth (*A.dubius)* is widely used by local communities in East Africa for nutritional purposes. How-ever, the contribution of different manures and how biological stress affects growth performance have received less attention. The objective of this study was to assess the influence of different types of manure and other bio-logical stresses on the growth and yield of spleen amaranth (*A.dubius).* Biological stresses included weeds, pests, and distance from the bush, which was categorized into far (3 m), near (2.5 m), and very near (1 m).

Methodology

This study adopted a complete random block design (CRBD) with four treatments: cow dung (CD), poultry ma-nure (PM), rabbit manure (RM), and no manure (NM), which were replicated three times. The data were col-lected on selected amaranth growth parameters, including leaf length (cm), leaf width (cm), plant height (cm), and number of leaves. Furthermore, the number of infested leaves as well as the types of pests and weeds found in the experimental plots were recorded across treatments.

Results & Discussion

The results show that poultry manure had positive significant influence on the growth of the *A.dubius* than other manure types. Moreover, very near distance from the bush affected the production of *A. dubius* compared to near and far distance.

Conclusion

The application of organic manures and integrated pest management (IPM) approaches will help to improve agricultural productivity and increasing food security.

Keywords

Amaranths, soil fertility, pest infestation, weed invasion

Habitat structural management options within small-scale organic maize farming to enhance biocontrol of expected climate-driven arthropod pest upsurge

Dr. Erick Nickson Otieno [1] *1. National Museums of kenya*

Introduction

Small-scale farms are disproportionately more vulnerable to crop losses caused by increasing varieties and abundance of arthropod pests occasioned by climate change. This is aggravated by escalating costs of farm inputs particularly pesticides, and which majority of small-scale farmers are unable to afford in the right quality, quantity or time. The resulting inconsistencies in use, timing and quality assurance in the application of such pesticides often leads to perennial crop yield-gaps, long-term pest resistance besides environmental contamination, and ultimately unsustainable farming. As a form of low-impact agriculture, organic farming that involves non-use of chemical methods of managing crops, pests, soil and weeds while also using habitat management to promote pest biocontrol, offers the most environmentally safe and affordable strategy for sustainable crop production, particularly for small-scale farmers. This study was carried out to: 1) compare assemblage responses of predatory and herbivorous arthropods to farm structural configurations between organic and conventional small-scale maize-fields; 2) use 13C and 15N stable isotope analyses to examine how maize-bean inter-cropping affects consumption of maize and beans pest by predatory arthropods; 3) evaluate how organic farming prac-tice and intercropping interact with field structural features to promote pest biocontrol; 4) infer potential for combining organic farming with intercropping as a viable strategy for farm-level adaptation against the already apparent climate change-driven pest upsurges. The study is significant in providing an evidence basis for organic farming as a viable and sustainable avenue for climate-smart maize production in a cleaner, healthier environment.

Methodology

Sampling was conducted across 9 organic and 7 conventional small-scale maize farms in western Kenya. Arthropods, divided into herbivores (pests) and predatory arthropods were collected using pitfall traps and sweep-nets to assess assemblage responses to farming system (organic or conventional), mono-cropping vs inter-cropping with beans, and how these were influenced by field structural configurations including maize-cover and hedgerow characteristics. Stable isotopes of 13C and 15N were used to test feeding linkages between preda-tory and pest arthropods. Linear mixed models were used in evaluating how farming, cropping and habitat features determine interrelations amongst the various variables.

Results & Discussion

Overall arthropod abundance was higher for organic farms, although conventional farms had higher herbivore abundance. Maize cover proportion corresponded to higher arthropod abundance and species richness. Preda-tory arthropod abundance increased in organic systems, with hedgerow volume, maize cover and indigenous hedgerows, while their diversity increased with intercropping. Higher maize cover proportion corresponded to higher abundances of herbivorous arthropods especially in monoculture maize. Maize pests were mainly consumed by ants, wasps and earwigs, beans pests mainly consumed by predatory beetles and wasps, especially under intercropping but spiders proportionately consumed pests from both crops

Conclusion

The results demonstrate that integrated low-impact agronomic practices incorporating organic systems, crop diversification and substantial hedgerows, can be important in boosting higher predatory arthropod popula-tions to potentially enhance top-down regulation of arthropod herbivory across maize-fields. These findings are applicable in farmer field extension advisory towards cost-effective habitat management rather than agro-chemical measures for boosting regulation of arthropod pest on maize farms.

Keywords: Organic, habitat management, pest biocontrol, stable isotopes, maize, sustainability

High-Pressure Processing of African Indigenous Vegetables For Food Security

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Introduction

Even though African indigenous vegetables (AIVs) have always been a staple food crop, their promotion in terms of production and marketing is a recent phenomenon. This is because they are primarily considered as food for rural and poor households. The term that best describes them is 'forgotten food'. This refers to crops and livestock commodities that are neglected or underutilized by researchers, farmers, and consumers. These crops are displaced by increasingly uniform diets fueled by mass-produced processed ingredients from the 'BIG FOUR,' wheat, maize, rice, and soybean. Nevertheless, these underutilized crop species can be used to solve the many food challenges in the continent, such as hidden hunger, food and nutritional security, and income generation for the rural poor people. However, these foods continue to be used in traditional ceremonies because of their attitude of conservation. Hence, new varieties are hardly developed, and knowledge of their genetic makeup and the agronomic require-ment for production and utilization has not been sufficiently developed to merit commercial interests. Largely, underutilized crops are affected by cultural preferences, traditional practices, and forces of nature. These fac-tors have subjected them to being overlooked by policymakers, researchers, and extension agents. Their neglect has made governments to rarely allocate resources for their promotion and development. However, the market for these products has recently developed and awareness rose with regard to their con-sumption. For instance, supermarkets in Nairobi have been selling AIVs since 2000, albeit in small quantities. These recent developments indicate that AIVs are now being included in the diets of both urban and rural pop-ulations and that demand for them is increasing.

Methodology

The food products should be packaged in a flexible packaging. The packages are loaded into a high pressure chamber. The vessel is sealed and the vessel filled with pressure transmitting agent. The high pressure is usually carried out with water as a hydraulic fluid to facilitate the operation and compatibility with food materials. The basis for applying high pressure to foods is to compress the water surrounding the food. At room temperature the volume of water decreases with an increase in pressure. Because liquid compression results in a small volume change high-pressure vessels using water do not present the same operating hazards as vessels using compressed gases. Once the desired pressure is reached the pump or piston is stopped the valves are closed and the pressure can be maintained without further energy input. After holding the product for the desired time at the target pressure the vessel is decompressed by releasing the pressure-transmitting fluid. For most applications, products are held for 3-5 min at 600 MPa. Approximately 5-6 cycles per hour.(G. Yordanov & G.V. Angelova 2010)

Results & Discussion

High pressure processing of foods involves subjecting fruit and vegetable products to pressures from 400MPa to 600MPa for a period of 1-5 minutes. These high pressures used in high pressure processing equipment kill most harmful microorganisms such as Salmonella spp, Escherichia coli and Listeria monocytogenes. Since high hydrostatic pressure acts quickly and evenly, neither size of a products container plays a role in the effectiveness of HPP. The first commercial product to be used with HPP was guacamole. High pressure processing provides a unique opportunity for food processors a new generation value added food products having superior quality and shelf life.

For different various foods researchers found that in RTE meat, a pressure treated at 600MPa at 200C for 180 seconds, there were no changes in in sensory quality, no difference in consumer acceptability, a 4 log reduction in Listeria monocytogenes in inoculated product and the refrigerated shelf life was extended(31). HPP has potential as a phyto sanitary treatment to control quarantine insect pests in fresh or minimal processed fruits and vegetables to extend their shelf life . Pressure inactivation of yeast and moulds has been reported in citrus juices. Juices pasteurized at 400 MPa for 10 minutes at 400C did not spoil during 2-3 months of storage. The high pressure treatment effectively reduced the bacterial micro flora of fresh goat milk and cheese and significantly extended the refrigeration storage life. No survivjng Escherichia coli was detected in cheese after 60 days of storage (2-40C) in inoculation studies after treatment at 400-500MPa for 5-10 min(32)

Conclusion

High pressure technology proposes a great potential to develop new "minimally" treated foods with high nutri-tional and sensory quality, novel texture and with an increased shelf-life. The novelty of HPP technology and high equipment costs are barriers to its commercialization but increased consumer demand for fresher-tasting foods containing fewer preservatives drives an increase in this segment. HPP can preserve food products without heat treatment or chemical preservatives, and its ability to ensure safety and significantly extended refrigerated shelf life has opened new market opportunities, particularly in the area of "natural" preservative-free food products.

Keywords

Keywords: African Indigenous Vegetables, High Pressure Processing, Food security, Ethiopia

Household Agro Enterprise Incomes And Soil and Water Conservation Technologies in Chepareria Ward, Kenya: The Moderating Effect of Social Capital.

Dr. Fred Wamalwa [1], *Prof. Wilson Ng'etich* [2], *Dr. Ruth Njoroge* [2], *Dr. Syphyline Kebeney* [2], *Mr. Bonface Alkamoi* [2], *Mr. Harrison Churu* [2]

1. Catholic University of Eastren Africa, 2. University of Eldoret

Introduction

Globally, the hope of rebuilding degraded arid and semi-arid lands (ASALs) is increasingly encouraging. Failed food systems, however, have aggravated the problem of environmental degradation. Consequently, agroecological approaches offer opportunities to reverse the situation. Agroecological principles have become important factors that contribute to the rehabilitation and development of ASAL areas. Hence, associated aspects including diversity, circular economy, knowledge sharing, and responsible governance are imperative for the creation of sustainable dryland rehabilitation efforts. Thus, concepts of social capital and economic diversification have increasingly become contributing factors towards the amelioration of drylands degradation. Through diversification of rural agroenterprises and linking social capital, groups of poor people are able to diversify incomes, access support, resources, and information from development organizations. This study aimed at investigat-ing the intervening effect of social capital on the relationship between household agroenterprises and soil and water conservation (SWC) activities in Chapareria ward, West Pokot County.

Methodology

Based on the cross sectional survey design, quantitative data was collected from 200 randomly selected households using questionnaire on Open Data Kit application and focused group discussion (FGD) techniques. Qualitative data was collected across three FGDs of 10 members each who were purposefully selected from the surveyed farmers. Quantifiable data was converted into SPSS data sets for analysis while qualitative data was processed through discourse and narrative approaches.

Results & Discussion

Descriptive statistics show that annual households engage in a variety of agroenterprises involving crop and livestock activities. The main household crop income earners included grains (maize and beans), vegetables (cabbage, onions, tomatoes, pumpkins, and kales), and perennial crops (bananas, sugar cane, pineapples, mangoes, and avocado) with an annual average household income of Kenya Shillings (KES) 15,593. Livestock enterprises included cattle, sheep and goats, donkeys and poultry, with an average household annual income of KES 30,076. Further, results show that proportions of households engaged in Soil Water Conservation (SWC) activ-ities included terracing (85%); agroforestry/ tree planting (81%); stone/soil bund (50%); and sand dams (41%). Social capital in terms of household proportions through membership was 82.5% in self-help groups(SHGs); 41% belonged to SHGs with networking activities; and 36% participated in rural extension programmes. In-significant effects of agroenterprise household income(X) [b = 0.695, SE = .449, z=1.547, p>.05] and significant social capital (Z) [b = 1.179, SE = .539, z=2.188, p<.05] effects on SWC activities were found. Regression estimates further showed the relationship between household agroenterprise income and SWC activities was dependent on social capital since interaction between X and Z was significant (b = .197, SE = .637, z=0.309, p<.05) on SWC activities.

.

Conclusion

The study concludes the relationship between economic diversification represented by enterprises of crop and livestock incomes and natural resource governance in form of SWC activities is dependent on social capital components of household membership in SHGs, participation in SHG networking groups, and involvement in rural extension programmes. In policy terms, we recommend the strengthening of household active membership in SHGs; reinforcement of households' participation in SHG network groups; and endorsement of more rural extension institution programmes in the area for sustained dryland rehabilitation efforts by both national and ASAL county governments in Kenya.

Keywords

AgroEcological Enterprises, Agro forestry, ASALs, Self Help Groups, Terracing, Kenya.

How to upgrade Participatory Guarantee Systems to foster organic sector development in Kenya?

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Introduction

As an alternative certification scheme, Participatory Guarantee Systems (PGS) certify organic smallholder groups to supply the local market and empower farmers as part of a more solidary economy. The PGS con-cept relies on agroecological principles and foresees contextuality, horizontality and a sound multi-stakeholder approach as basis. PGS initiatives are present worldwide with underlying principles formalized by the IFOAM – Organics International. In Kenya, there are currently 14 PGS initiatives with diverse characteristics. As part of a master thesis, 5 PGS initiatives were assessed in order to obtain insights in their performance in the social, environmental, political and economic realm—and derive conclusions to what extent PGS is a useful concept to drive organic value chain and sector development at the local and national level. PGS is a promising approach towards more sustainable food systems in contexts where small-scale farming prevails. The PGS concept provides important flexibility and freedom for social innovations to adapt to varying needs and realities. Yet, to be effective and efficient in helping to promote organic market and sector devel-opment, PGS initiatives strongly rely on good capacities and skills, which exist and are further strengthened through good PGS implementation. This study helps to understand how potential support measures can help leverage 'PGS capacities' as a means to promote organic sector development through empowered organically certified smallholder groups.

Methodology

The empirical research was conducted in cooperation with the Kenya Organic Agriculture Network (KOAN) and the Research Institute of Organic Agriculture (FiBL). It entailed field visits, individual interviews as well as Focus Group Discussion with farmers and traders.

Results & Discussion

PGS-certified farmers benefit from the PGS affiliation in particular through group-related market access, peer-learning and improved agricultural practices. Nevertheless, supply and demand situation is not satisfactory for farmers and traders. With respect to the traders it became clear that their role within the PGS is not clearly defined and thus engagement in PGS is rather low. Reasons for this situation can be seen in low levels of con-ceptual awareness and a weak involvement in PGS processes.

Conclusion

For farmers, the PGS affiliation has shown especially positive impacts in the social sphere, as PGS initiatives contribute to the strengthening of local communities while promoting organic agricultural practices amongst local consumers and producers. Yet, improved market access is often hampered because of missing partner-ships with sound associated traders. Traders currently tend to lack interest, awareness and the necessity to commit to the system. Consequently, as a means to better align PGS development with growing organic mar-keting opportunities, PGS support measures should embrace a well-facilitated holistic 'capacity development approach' that strongly involves traders as strategic partners to guide and shape PGS development—at the level of individual groups and the wider sector level.

Impacts and Drivers to Wonder Multistorey Gardens for Crop Production among Urban Households: Evidence from Nairobi City, Kenya

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1. International Centre of Insect Physiology and Ecocology (icipe), 2. National Institute for Agricultural Research Studies (INERA)

Introduction

Urban population growth is one of the most significant changes in the world with 55% of world population and 43% of African population living in urban areas. This population is being forecasted to increase to 68% in 2050 (UN, 2018). Use of efficient technologies for increased crop production and food security in an environmentally sustainable manner is critical in developing countries amidst rapid urbanization and population increase. The potential of crop production to enhance nutrition and food security among urban households using innovative farming technologies that utilize little space and inputs was addressed in this study by examining the extent to which wonder multistorey garden (WMSG) technology impacts welfare among urban households.

Methodology

Nairobi being one of the fastest growing and highly urbanized cities in Africa (Ren et al., 2020), was selected as a good representative of many other urban areas experiencing high urbanization, population growth, increased migration, food insecurity and the emergence of alternative livelihoods besides employment in sub-Saharan Africa.We collected household-level survey data from adopters (n = 116) and non-adopters (n = 31) of WMSG technology in Nairobi city. We described the socio-demographic profiles of adopters and assessed factors that determine the adoption of WMSG technology using logistic regression model.

Results & Discussion

The study identified land size and use, land tenure, monthly earnings, access and source of agricultural information as determinants of WMSG technology adoption. The use of WMSG technology plays a positive role in the welfare of urban households, with 62.1% of adopters falling in the category of food secure households. WMSG technology impacted positively on nutrition, food availability, and reduced poverty. The urban house-holds adopting WMSG system for crop production have improved welfare in terms of food, employment and job creation. Adopters were less food insecure and are able to get safe, and nutrition to sustain their liveli-hoods. Approximately 68.1% of adopters of WMSG technology acknowledged they have never encountered any food insecurity.

Conclusion

The adoption of innovative farming technologies has positive effect on the life of the adopters by improving their incomes and consumption expenditures thereby making them food secure and poverty lessening. Therefore, investing in innovative farming technologies that promote urban crop cultivation should be continued and priority should also be on finding other feasible urban micro-projects to complement efficient smallholder crop production and significantly reduce urban food insecurity and poverty.

Keywords

Innovative crop production, , Urban food production, Wonder multistorey gardens, organic certification, Participatory Guarantee Systems

Increasing productivity and reducing poverty through regenerative agriculture and circular economy

Ms. Chiara Baiocco [1]

1. Hand in Hand

Introduction

Hand in Hand Eastern Africa trains and supports men women and youth succeed as entrepreneurs, lifting their families out of poverty. 80% of our members are women. With support from the IKEA Foundation, Hand in Hand will train 1,600 smallholder farmers in regenerative and circular practices to increase productivity and reduce poverty – in a three year project that concludes in September 2023. 70% of Hand in Hand's members in Eastern Africa are smallholder farmers, which is why we have developed a new, innovative approach that supports sustainable food production and improves farmers' resilience. This approach, which incorporates regenerative agriculture and circular economy techniques, actively seeks to re-generate the soil, restoring the environmental landscapes our members rely upon to earn a living. We are delivering a six-month regenerative agriculture and circular economy training programme for farmers who have previously completed one of Hand in Hand's core entrepreneurship programmes. Training is embed-ded in communities through the use of shared demonstration farms, and is supported by 'lead farmers' who provide mentoring for their peers. A select group of farmers are also being trained as 'advocacy champions', which enables them to a) facilitate the creation of community landscape management plans and b) advocate for policies that support regenerative farming practices at both a local and national level – creating and scaling an environment that supports the further uptake of regenerative agriculture and circular practices. Central to our model is: A women-first approach: We give women farmers the training and support they need to succeed as agri-entrepreneurs, as well as supporting them to them to access credit and find new markets for their produce. Community-led design: We put women and their communities at the heart of farm and landscape design, sup-porting them to manage communal waterways, forests, wetlands and grazing areas. Creating a platform for knowledge sharing and advocacy: We give farmers the tools to share their knowledge, and make the business case for regenerative agriculture to local decision makers. Making the business case: Our success relies on farmers improving their incomes - by reducing costs and through improved soil boosting yields year-on-year.

Methodology

Impact will be measured using the UNFAO's Tool for Agroecology Performance Evaluation (TAPE) which measures the extent farms are using regenerative practices, as well as changes in soil health. Crop yield will be measured by calculating farms' Total Factor Productivity. Monthly farm revenue and cost will be collected through interviews with sampled farmers.

Results & Discussion

As the project is still being evaluated results we will be presenting interim results only -based on anecdotal evidence from farmers and programme leads.

Conclusion

As well as restored landscape resulting from the adoption of regenerative and circular practices and increased integration into new and existing circular value chains we expect to see: Improved farm productivity and efficiency for women and their communities; income uplift for women and their communities; increased financial resilience and an increase in women's decision making power.

Keywords

women, food security, communities, NGO

Informal seed exchange and own Seed production by farmers are the key pillars of Tanzanian Agriculture

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Introduction

Availability and quality of seeds largely determine crop productivity but also affect the quality of the final product. Functioning seed systems are imperative for food security, income, nutrition, and resilience to climate change. There is a growing concern that the commercial seed sector alone is not outreaching the farmers in marginalized geographies.

Methodology

Thus a study was conducted 1) to evaluate the share of formal and Informal (Farmer-managed) seed systems in providing the seed for crop production in the Lindi and Mtwara regions of Tanzania and 2) to determine how the current policies are leveraging the seed availability in these areas. A total of 329 farmers were selected through systematic sampling irrespective of their farming practices, farm size, soil type, education, income, or other demographic factors to evaluate the seed procurement practices. For all crops cultivated in the given area, a closed-ended question was posted with an open end option to add additional sources. Later a situational analysis study was done on seed regulation to find the alignment of the current status of seed exchange and seed production for comparing the alignment or mismatch with present seed regulations of Tanzania (Seed act 2003 and Plant Breeders Right Act 2012).

Results & Discussion

The **major crops**, the own seed production for Rice, Sorghum, Mung bean, Cowpea and pigeon pea, is 76.29%, 84%, 68.64%, 74.77%, 72.3% and 72.3%, respectively. For Rice, farmers only buy 4.12% seed from the local market and 1.03% from traders. For other major crops, the biggest market share is for Mung bean (5.08%), followed by Sorgum (4%), Cowpea (3.74%) and pigeon pea (2.8 %), respectively. The rest of the seed is exchanged among the farmers. **For neglected and underutilized crops,** the market share for these crops is less than 3%, and the rest of the seed is obtained through farmer exchange. **For vegetable cultivation**, a bigger percentage of farmers buy seeds. For example, for Amaranth, 12.50% of the farmers buy seed, 8.33% for African eggplants, 7.69% for pumpkins and 4.17% for sweet potatoes.

Conclusion

In summary, the seed source in Lindi and Mtwara of Tanzania regions are clearly farmer-driven, with less than 10% share of commercial seed sources (local markets and traders). However, the seed regulation of Tanzania focuses largely on certified seeds (Plant Breeders Right Act 2012). The Seed Act 2003 only allows the marketing of certified seeds and quality-declared seeds but prohibits the sale and exchange of the seed from any other source. The Plant Breeders Right Act 2012 grants an exclusive right of seed production and marketing of registered varieties to breeders and prohibits farmers' reproduction without paying royalties to the breeder. With this stark divergence between the existing seed systems and the regulation of seeds, a policy alignment with the ground situation is urgently needed. The alinement of seed regulations with farmers' practices will improve the quality of seed production and the accessibility to locally adapted seeds.

Integrated Approaches to Supporting Sustainable Livelihoods: Asset- Based and Agency-Based Approaches, Landscape Level Communities of Practice and Citizen Science

Ms. Lisa Fuchs [1]

1. *CIFOR-ICRAF*

Introduction

Following the 13 HLPE principles (2019, agroecology champions doing things differently. Acknowledging the importance of the processes engaged to support sustainable livelihoods and systems, differ-ent integrated approaches that CIFOR-ICRAF implements in Kenya in collaboration with various partners will be presented, including:

Methodology

1] Focus on ICRAF's work on asset-based and agency-focused approaches

How we use asset-based and agency-focused approaches that ICRAF's ABCD team has been developing, implementing and researching through various projects in western Kenya to foster and support sustainable livelihoods, including in the 'ABCD in Regreening' project supported by Biovision Foundation. Additional information: Integrated ABCD website: https://cifor-icraf.org/abcd

Results & Discussion

2] Focus on the CGIAR Agroecology Initiative's work in Kenya

How we work with landscape-level 'communities of place' to foster sustainable food system transition in two Agroecological Living Landscapes (ALLs in Kiambu and Makueni Counties in the CGIAR Agroecology Initiative. Additional information: The second newsletter of the CGIAR Agroecology Initiative: https://mailchi.mp/295483b8f978/news-from-the-cgiar-initiative-on-agroecology?e=35ab2002a9

Conclusion

3] Focus on the One Million Million Voices citizen science initiative. How we explore the opportunities provided by citizen science to generate co-learning and exchange about agroecological practices at a global scale to support agroecological transitions through the SDC- funded One Million Voices project. Additional information: One Million Voices project website: https://glfx.globallandscapesforum.org/topics/21467/page/one-million-voices220ba736-2caa-497d-8225-53724e1867a4

Integrated Weed Management in Conservation Agricultural Systems

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Introduction

Weeds cause a significant economic impact more harmful than insects and fungi. An integrated weed management approach is more effective than a single control. Decades of herbicide use as a single weed control method have caused the rise of herbicide-resistant weeds. Weeds are more difficult to manage in Conservation Agriculture (CA) than in conventional agriculture. In Uganda farmers only adopted crop rotation and minimum tillage. Leaving out mulching as a soil cover practice. Therefore, Weed management is perceived by smallholder farmers, extension workers and researchers as one of the main limiting factors for the widespread adoption of CA Hence, knowledge on integrated weed management in conservation agriculture is needed as farmers adopt reduced tillage and soil cover practices

Methodology

Weed management practices were evaluated using a split-plot experimental design with two main plot tillage practices (T_1=Conventional tillage with animal drawn moldboard plough, and T_2=Minimum tillage with G5 animal drawn ripper (Magoye)). The subplot treatments had five soil cover Practices (SC 1= Mulched Maize, SC2=Control no mulch, SC3= Two lines of soybean in between one line of maize, SC4= One line of soybean in between one line of maize, SC5= Pure soybean). The trials were established for 4 rainy seasons on a sandy loam texture (ferrosols) in Lira, Uganda. Maize crop acted as the test crop and soybean provided soil cover (inter-crop). Data on weed density and diversity collected using a wooden square of 100 x 100cm, placed randomly in each plot and weeds enumerated. Diversity Index "H" and "D" were computed. ANOVA was used for analysis.

Results & Discussion

The diversity of weed species was high in plots treated with T_2 under minimum tillage, 2019B (Shannon Weiner diversity index H= 2.1, Simpsons index D=6.2), 2020A (H= 1.8, D=4.9) compared to T_1 under conventional tillage, 2019B (H= 1.78, D=4.25) and, 2020A (H= 1.78, D=4.67). However, the weed density (N) was higher in T_1 compared to T_2, 2019B (N=207.6/ m^2 V's N=127.3/ m^2), 2020A (N=156.2/ m^2 V's 69.9/ m^2). Tillage practice had significant differences in 2019A, 2020A ($P<0.005$) and no significant difference in 2020B and 2020A($P>0.05$). The effect of the five soil cover practices had a significant difference only in 2020B and no significant difference in 2019A, 2020B and 2021A seasons.

Conclusion

It's important to note that the weed diversity and density depended not just on the amount of rainfall per month, but most importantly on the number of rainy days per month. The higher the number of rainy days per month the higher the weed density and diversity. The number of rainy days per month decreased along the 2019A, 2020A, 2020B and 2021A seasons, hence greatly influencing the weed density and diversity in these seasons. Use of Mulching suppressed weed density but led to high weed diversity, soil cover through intercropping soybean in maize significantly influenced weed density, but did not significantly influence weed diversity. Broad leaved weeds constituted 60% in 2019B, but increased to 80% by the end of the trial in 2021A

InterACT: Promoting Exponential Change To Agroecology

Ms. Liesl Hattingh [1], *Ms. Sumeeta Gawande* [2], *Ms. Suzanne Neave* [3], *Ms. Claire Baker* [4]

1. InterACT, 2. SESA, 3. CABI, 4. Toothpick Project

Introduction

In 2021 a diverse group of people and organisations, all of whom work in-person with farmers across the globe to support their implementation of agroecology, gathered and shared their experiences. From their lived experiences and needs as grassroots practitioners, a solution was proposed to accelerate the global transition to agroecology. **InterACT is a new way to move the rate of conversion to agroecology from incremental to exponential through Interactive Agriculture Connections for Transformation (InterACT).** InterACT will be an interactive, multi-directional solution that is both Web-based and people-based, focusing on Transition Catalysts. A Transition Catalyst is an organisation or a person who – like many conference participants is deeply connected to farmers, is grounded in the local context, and helps farmers access resources in knowledge, finance, or policy.

Methodology

InterACT is the outcome of a global call for practitioners in food systems to come together and jointly formulate new approaches to accelerating change in the face of the polycrisis facing our world one exacerbated by the climate crisis and with particular impact on the energy-water-food nexus. Conference participants will be invited to engage in an exchange session to provide feedback on the solution concept and contribute to its further development, ahead of piloting in East Africa.

Results & Discussion

With Agroecology and regenerative agriculture gaining traction, we are seeing duplicative efforts to categorise and aggregate ideas, resulting in wasted resources. These efforts also tend to be siloed as either knowledge sharing, policy efforts, or finance promotions. Rather than recreate any of these, InterACT serves as the interstitial space to provide support and strength to these efforts. The platform reduces redundancies, increases focus and saves time. The outcome is a dynamic space that elevates the voices of Transition Catalysts to the ears of policy makers and funders, allowing for cohesive goal setting and knowledge-sharing, while supporting a network of resilient change makers on the ground. InterACT will connect Transition Catalysts with available resources in knowledge, finance, and policy, using a Web-based digital tool and supportive in-person regional representatives, which will enable those resources to reach more farmers, faster and more efficiently.At the same time, InterACT will relay critical information from Transition Catalysts (and farmers) to those working in knowledge, finance and policy in order to make knowledge, finance and policy more relevant to farmers and more effective for achieving agroecology.

Conclusion

InterACT is built on the dual premise that agroecology is the best solution to Food For All, For Ever, and that the most cost- and time-effective way of increasing the pace and scale of conversion is to grow the capacity of Transition Catalysts already operating in this space. This also creates a supported space for new entrants. InterACT is poised to launch in East Africa in 2023. The 1st Eastern Africa Agroecology Conference provides an important engagement opportunity to test our onboarding process and gain additional insights from potential users.

Keywords

agroecology, regenerative, research; transition, catalyst, agriculture, East Africa, food systems

Intensified agroecological-based cropping systems to enhance food security, environmental safety, and income of smallholder vegetable producers in East Africa

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Introduction

Agriculture is the backbone of many African economies, and the role of the horticulture sub-sector in achieving food and nutritional security and poverty alleviation through income generation is well recognized. Horticultural crops generate higher profits than staple crops per unit of land thus improving livelihoods of households in both urban and rural areas. Furthermore, vegetables are an essential source of micronutrients and dietary minerals/fibre, and their consumption reduces the burden of malnutrition to the poor and marginalised groups, particularly women and children. Despite the importance of vegetables, their production is crippled by both biotic and abiotic constraints. Biotic constraints include both pests and diseases that hamper production and encourage indiscriminate use of chemical pesticides, which is not sustainable owing to the cryptic behaviour of some pests, development of resistance, harmful effects on environment and humans, and lack of resources for continuous supply, especially by smallholder farmers. This necessitates sustainable solutions, hence icipe has assembled, validated, and is developing novel agroecological-based strategies to combat major arthropod and nematode pests of traditional African vegetables (TAVs) and crucifers cropping systems that are ready to be field-tested and disseminated in a participatory approach with stakeholders. This includes biopesticides, parasitoids, predators, resistant vegetable varieties and vegetable push-pull for wider adoption. In this initiative, icipe and partners are scaling these technologies to sustain the vegetable sector in Kenya and Tanzania.

Methodology

To assess farmers' knowledge and attitudes towards existing cruciferous and traditional African vegetables agroecological production systems, we conducted a multi-stage sampling technique where a total of 1071 vegetable growing households were sampled in Kenya and Tanzania. We also assessed behavioural response of key pests of crucifers and their associated parasitoids on some of the companion plants we identified in farmers' fields as intercrops and through desktop research approach.

Results & Discussion

Over 75% of the sampled farmers were not aware of vegetable agroecological production systems and only less than 20% had received any training on agroecological vegetable production approaches. Of those farmers who

were aware of agroecological vegetable production, only 2% applied them in their vegetable production, while few farmers were identified to be practicing intercropping for pest management. Behavioural assays of some of the identified intercrops showed repellence to key crucifers' pests, especially aphids and attractant to their associated parasitoid, Aphidius colemani.

Conclusion

The proportion of farmers who are aware of agroecological-based vegetable production systems like integrated pest management strategies such as parasitoids, biopesticides, insect traps, intercropping with repellant crops, or use of pest resistant cultivars is very low; and this prompted to awareness creation on the importance of TAVs, training on IPM and advocacy to shift from use of synthetic pesticides to application of IPM or agroecological strategies. Furthermore, an efficient strategy for scaling out the agroecologically based practices should be tested and rolled out. To increase the portfolio of push and pull plants, there are more identified potential intercrops which can also be used in designing vegetable-based push-pull systems for agroecological vegetable production.

Keywords

Agroecology, cropping systems, vegetables, pests, diseases, biodiversity.

Biography - Daniel Mutyambai is a Research Scientist at icipe with research interests in below- and above- ground multitrophic interactions. He researches on how to utilize such interactions to develop sustainable agroecological farming systems to fight food insecurity and improve livelihoods while protecting human and environmental health.

Track

Abstracts for papers, posters and exhibition

Topic Areas

Production, productivity, and sustainability of agroecological systems

Investigating factors that affect the adoption of pollinator-friendly agricultural practices within smallholder farms in Vihiga county, Western Kenya

Ms. Ennia Bosshard [1], *Mr. Harrison Carter* [1], *Dr. Ana Nuno* [2], *Dr. Christopher Kettle* [3], *Dr. Christopher Kaiser Bunbury* [4]

1. University of Exeter, 2. Universidade NOVA de Lisboa, 3. The Alliance of Bioversity International and CIAT, 4. University of Exeter, UK

Introduction

Ongoing degradation and loss of natural ecosystems have contributed significantly to the global biodiversity crises, including a rapid decline in wild pollinator species worldwide. Crop pollination is a key component of ecosystem functioning at the intersection of the global food insecurity, climate, and biodiversity crises. Many smallholder farmers in sub-Saharan African countries derive a large proportion of their food and income from pollinator-dependent crops. However, local communities are often not aware of the role played by pollinators and there is a lack of consideration of wild pollinators in current agricultural practices. Scientific evidence shows that proximity to natural habitat has a positive effect on crop pollination services from unmanaged pol-linators. In landscapes such as our study site in Western Kenya, where there is no natural habitat, however, a diversity of on-farm habitats and woody species is crucial to support and sustain an abundance of wild pol-linator species. Integrating agroecological principles into local farming practices, such as planting a diverse mix of on-farm shrubs and trees that provide habitat for wild pollinators, can provide an important pathway to alleviate poverty and increase food security by increasing the crop yield of nutrient-rich foods such as fruits and nuts that rely on pollinators. This project thus aims to shed light on the factors that influence smallholder farmers' intentions in diversifying the shrubs and trees on their farms.

Methodology

We conducted surveys with 625 smallholder farmers in Vihiga County using the Theory of Planned Behaviour (TPB) as a theoretical framework, which is the most commonly used conceptual framework when investigating farmers' decision-making process and exploring how attitudes, social norms, and perceived behavioural control influence smallholder farmers' intentions.

Results & Discussion

The preliminary results show that intention of farmers to diversify the shrubs and trees was generally high across Vihiga county. Attitude, subjective norm, and perceived behavioural control had a positive effect on the intention of smallholder farmers to diversify the shrubs and trees on their land over the next year. In particular, our results suggest that farmers who believe that having more pollinators on their farms and that planting a more diverse mix of shrubs and trees on their farm increases pollinator abundance have a more positive attitude towards diversifying, and thus in turn a higher intention. Further, the preliminary results highlight also that lack of financial resources and small farm sizes might be the biggest constraints for farmers across Vihiga County to plant a more diverse mix of shrubs and trees.

Conclusion

The preliminary results of this study highlight the importance of incorporating socio-psychological factors for the effective design and implementation of agroecological projects. Although a vast majority of the farmers surveyed in this study stated that they were likely or very likely to diversify the shrubs and trees on their farms, our findings suggest that smallholder farmers are concerned with meeting short-term needs such as hunger and provision of fuelwood which might compete with realising the benefits of diversifying on-farm shrubs and trees that can take several years.

Keywords: Agroecology, Pollination, Theory of Planned Behaviour, Food Security, Kenya

Lack of Access to Land by Women and Youth: A Big Constraint to Implementation of FMNR and other on farm Conservation Efforts

Mr. Jonathan Mayanja [1]

1. FMNR Network

Introduction

The Farmer Managed Natural Regeneration (FMNR Model is a low cost and sustainable means of protecting and multiplying indigenous trees within farming landscapes through systematically regenerating stumps, seeds, and roots. The FMNR approach is one of the strategic options to strengthen resilience of farming systems and supplements traditional tree growing which has enormous challenges such as low survival rates for indigenous tree species because of drought, stray animals, poor quality seedlings, low technical awareness by farmers and the cost involved in purchasing and managing planted seedlings.

Methodology

The FMNR secretariat held community dialogues with support of the member organisations in 4 districts. The dialogues were to help the network identify key challenges to adoption and scaling up of the FMNR model amongst farmers in the communities of Mayuge, Sembabule, Gomba and Rukiga districts. Over 250 smallholder farmers were involved in community dialogues and Focus group discussions were held with key informants (District Land Officers, Natural Resources Officers, Agricultural Officers and Local Leaders) and they identified land tenure and access to land as the major issue hindering the adoption of FMNR. Ranking of key issues affecting the adoption of FMNR from the highest to the lowest was done. A desk assessment of policies related to land was conducted by the FMNR secretariat and recommendations were used to guide the analysis of issues that were identified during the dialogues.

Results & Discussion

Five (05) issues were identified the highest ranking being Access to land (01) followed by lack of technical knowledge on the model (02), competing enterprises (03) Land fragmentation 04 and low knowledge on trees to regenerate (05) that there are discriminative customs against women and youth on land ownership; women and youth have no right to succession or inheritance of land, they fall victims to illegal land transactions by private surveyors, money lenders and Local council leaders, had access to Justice on land issues, land issues have led to wide spread domestic and gender based violence, land fragmentation has led to low capacity of women and youth engagement in meaningful agriculture, and these issues have been exacerbated by corruption in the legal system in Uganda. These factors have cause women and youth to embrace unsustainable farming practices.

Conclusion

There are several policy reforms recommended by this study, there is need for mass sensitization on land rights for youth and women, strengthening of the role of land issues arbitrators at community level, prohibiting land fragmentation for land under agricultural production, where necessary should take land dispute hearings close to where the cases come from in communities and have a feel of facts on the ground at community level. The FMNR network is pushing for land reforms.

Keywords

Natural Regeneration, Women and Youth, Land Access

Mainstreaming agroecological policy and legal frameworks in Agriculture for Transforming Food Systems by : The Case of Muranga and Kiambu Counties

Ms. Faith Gikunda [1], *Mr. Gathuru Mburu* [1]

1. *Institute for Culture and Ecology*

Introduction

Kenya's food systems heavily rely on industrial agriculture with heavy costs of inputs (fertilizers, seeds, pesti-cides and herbicides. This notwithstanding, Kenya has continued to experience soil degradation, droughts and famine, with catastrophic consequences such as those being currently felt in the country today. However, this is gradually changing as the government and other actors embrace sustainable and agroecological practices to address the adverse effects of a rapidly changing climate. For instance, Institute for Culture and Ecology (ICE has been spearheading the development of agroecogical policies and frameworks in Kenyan Counties with the most significant cases being those of Murang'a and Ki-ambu counties. Through ICE technical support, Murang'a County has developed and enacted the **Murang'a Agroecology Policy 2022-2030** and the **Murang'a County Agroecology Development ACT, 2022**. This makes the county the first to develop and enact an agroecology policy and ACT in Kenya and among the first globally. The Kiambu agroecology policy is at draft stage, having gone through various steps and is currently awaiting executive approval. **Significance (of the research or issue)**

Agroecology has been earmarked globally as a sustainable solution for helping farmers to adopt and address erratic climate change effects. The agroecology food system sustainably provides healthy, safe, adequate and culturally appropriate food and nutrition for all while assuring healthy agroecosystems. In its agriculture policy 2021, the Kenyan Government recognizes agroecology as a key strategy for addressing climate change as well as food, and nutritional security. For instance, Kiambu County has 252,770 children un-der five years. According to Kenya Demographic and Health Survey (KHDS 2014, stunting level was at 15.7%, wasting at 2.3% and underweight at 5.1%, while the national stunting level was at 26%, wasting 4%, and under-weight 11%. This can be countered through application of agroecology's transdisciplinary and transformative solutions. The ongoing development of the National Agroecology Strategy presents an avenue for various actors including the counties to mainstream agroecology in their development policies and strategies.

Methodology

To achieve this, ICE and the counties used a consultative process which involved formation of a Multi Stakeholder Platform whose operations were led by a multi-sectoral steering committee, community dialogues, dia-logues with policymakers and public participation.

Results & Discussion

Results (key findings or experiences)

1. Murang'a Agroecology Policy 2022-2030
2. Murang'a ACT, 2022
3. Draft Kiambu Agroecology Policy
4. Muranga Agroecology Multi Stakeholder Platform
5. Kiambu Agroecology Multi Stakeholder Platform
6. Mainstreaming of Agroecology in Muranga County Integrated Development and Annual Development Plans (CIDPs and ADPs)

Conclusion

- County policies should as much as possible be inspired from below and engage broad-based stakeholder participation to ensure fast-tracked policy development process
- Counties have an opportunity to influence national policy development by being pro-active
- Devolution provides an opportunity for holistic legislation where policy takes care of many connected functions (taking a catchment approach)

Keywords

- Agroecology
- Policy
- ACT
- County Government
- Constitution
- Draft
- Demographic Survey

Management of plant parasitic nematodes using different technologies for improvement of potato production in Elgeyo Marakwet, Kenya.

Ms. Jayo Manyasi Tracyline [1], Mr. Korir Mathew [1], Dr. John Chelal [1], Ms. Victoria Jepchirchir [2], Prof. Rimnoma Ouedraogo [3], Prof. David Hughes [3], Mr. Romaric Tiendrbeogo [4], Mr. Edwin Rotich [2]

1. Plant Village Dream Team Kenya, 2. PlantVillage Dream Team Kenya, 3. Feed the Future Current and Emerging Threats to Crops Innovation Lab, 4. PlantVillage Dream Team Burkina Faso

Introduction

Potato (*Solanum tuberosum*) is the fourth main crop grown and consumed in the world after rice and wheat. Potato is the leading cash crop in Elgeyo Marakwet County. Sustainable and eco-friendly measures are crucial in achieving increased potato production in the region.

Methodology

A field research experiment was set up to determine the effects of various treatments on populations of plant parasitic nematodes (PPN) in two wards of Elgeyo Marakwet County; Kabiemit and Chepkorio. Five treatments were planted in a randomized complete block design where different combinations of biochar, lignocellulose banana paper, velum, and farmer practice were used.

Results & Discussion

The results indicated that there was a high infestation of plant parasitic nematodes in both sites 261,000. In Kabiemit, there were higher plant parasitic nematodes compared to Chepkorio with 186,000 and 75,000 populations respectively extracted from 300cc of soil. In Chepkorio, a treatment combination of Organic Planting fertilizer and Toper from Safi Servi Company had the lowest significance ($P<0.05$) compared to another treatment with the same combination but with biochar. Lignocellulose banana paper, the treatment with velum had lower plant parasitic nematodes in Kabiemit while in Chepkorio, lower plant parasitic nematodes were recorded in treatment with organic planting and toper.

Conclusion

In summary, the lignocellulose banana paper performed well reducing the number of plant parasitic nematodes in both sites.

Keywords

Plant parasitic nematodes, Potato, biochar, Lignocellulose banana paper, Organic fertilizer

Organic farming system enhances belowground biodiversity than conventional farming system in the tropics.

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1. International Centre of Insect Physiology and Ecocology (icipe, 2. Research Institute for Organic Agriculture (FiBL, 3. Kenya Agricultural and Livestock Research Organization (KALRO, 4. International Institute of Tropical Agriculture (IITA, 5. Research Institute of Organic Agriculture (FiBL)

Introduction

Our food and agricultural systems depend on the biodiversity of plants, animals and micro-organisms. Biodiversity causes production systems and livelihoods to be more resilient to shocks and stresses, including the effects of climate change. The last two decades have witnessed an enormous research effort directed at understanding how biodiversity loss impacts ecosystem functioning and services but most research topics have focused on aboveground biodiversity. The lack of knowledge on loss of belowground biodiversity hampers our ability to predict the consequences of realistic scenarios of diversity change which can impact on greenhouse gas mitigation, soil health, sustainable food production, and livelihood. This study therefore aimed to evaluate the impact of farming systems on soil biodiversity of microbes, nematodes, termites and earthworms.

Methodology

The long-term farming system comparison trials (SysCom) initiated in 2007/09 in Kenya, India and Bolivia provide an opportunity to study the effect of organic and conventional farming systems on below ground biodi-versity. The SysCom trials in the 3 tropical countries were established to enhance know-how on potentials and limitations of different farming systems. Kenya has 2 experimental sites at Chuka and Thika, while India and Bolivia have 1 site each at Nimar valley of Madhya Pradesh state and at Sara Ana in Alto Beni respectively. In Kenya, diversity studies were on microbes, termites and nematodes while in India and Bolivia, earthworms and microbes were studied respectively.

Results & Discussion

After 9 years of trial implementation in Kenya, microbial community structure and diversity showed conventional farming systems having a higher microbial species richness and diversity than organic farming systems. A repeat of the same study 5 years later (14 years from trial initiation) revealed a change in microbial diversity, and this time organic farming systems had higher microbial diversity compared to conventional farming systems due to improved mineralization of organic matter. Regarding termites and nematodes, there was high abundance and diversity of termites, free-living nematodes (FLN) and lower populations of plant parasitic ne-matodes (PPN) in the organic farming systems. In India, there was higher earthworm abundance in organic farming systems than in conventional while after 12 years of farming systems implementation in Bolivia, fun-gal richness exceeded that of bacterial and fungal community composition was also distinct between organic and conventional systems. In addition, bacterial community composition also differed between organic and conventional systems and indicator species associated with organic system were taxonomically more diverse compared to taxa associated with conventionally managed systems.

Conclusion

Our results highlight the importance of organic farming management practices in maintaining soil health and soil biodiversity in agricultural farming systems whereby they appeared to suppress populations of PPN by promoting those of FLN directly, and improved the biodiversity and population buildup of microbes, earthworms and termites in soils.

Organic Consumers Study in Uganda May-August 2022

1 Ssekibaala Gonzaga & Audrey N'gom2, NOGAMU Intern & Master's Student, Makerere University, Kampala pursuing Masters in Agricultural and Applied Economics, 2Ms. Audrey N'gom, NOGAMU and INRAE Intern.

Abstract:

Interest in organically produced foods is increasing throughout the world in response to concerns about conventional agriculture practices and food safety. However, there is limited literature on who are or who might be the Organic consumers in the developing countries like Uganda. Therefore, the growing domestic demand of Organic products in Uganda and the void of research into the promising domestic organic market spawns several questions: First, who is buying organic products in Uganda? Secondly, how do they differ from the rest of the population in terms of their preferences, attitudes, and their considerations of choice of food? Thirdly, what are the factors motivating the consumption of organic food? This study was carried out in three major cities of Uganda namely, Kampala, Mbarara and Mbale. A total of 967 respondents conveniently participated in this survey.

Results

The results indicated that 65.5% of the total were female, 62.7% of the respondents were married, aged between 26-35 years, majority (56.7%) having a degree and mainly having a formal employment. When it came to the kinds of organic foods mostly preferred and consumed, the study found out that 95% of the respondents prefer and consume vegetables, 95.8% fruits and 80.10% animal products. It was significant from the study that there exists a positive correlation between gender, age, education level and nature of employment on the likelihood of one either being an organic consumer or not.

Conclusion

Based on the findings, this study concludes that Ugandans hold a very positive preference and perception toward organic foods. The future of the organic products market in Uganda is promising. The authors finally recommend based on the study that there is still a need for awareness and support from the government, sellers and NOGAMU.

KEY WORDS. ORGANIC FOODS, PREFERENCES AND PERCEPTIONS

Organic Versus Conventional Farmer Crisis Responses: Implications Under Covid And Russia-Ukraine War

Mr. Alex Mutungi [1], *Dr. David Amudavi* [1], *Ms. Venancia Wambua* [2]

1. Biovision Africa Trust, 2. master

Introduction

The study on "Organic Versus Conventional Farmer Crisis Responses: Implications under Covid- 19 and Russia-Ukraine War', was conducted under the African Union-led Ecological Organic Agriculture Initiative (EOA-I) in October 2021, to establish the impact of the pandemic three on agriculture and food systems in Africa. The study assessed how farmers practicing organic and conventional agriculture were affected by the pandemic, and how they were responding to it (adaptation). The study covered the five regions of Africa, with countries in Eastern Africa (Kenya, Uganda, and Ethiopia), two in West Africa (Mali and Senegal), two in Southern Africa (Zimbabwe and Zambia), two in Central Africa (Democratic Republic of Congo and Cameroon) and two in Northern Africa (Morocco and Egypt).

Methodology

The study employed a cross-sectional design and a mixed research approach guided by participatory tools and techniques for data collection. For objective comparison 11 Focused group discussions (FGDs) were held with organic farmers and 11 with conventional farmers. The study was enriched by interview perspectives from 106 Key Informants drawn from government departments, development partners and donors. Additionally, 129 KIIs were conducted with traders who included wholesalers, transporters, processors, retailers, and exporters. A survey was conducted with 620 farmers (75% male and 25% female) using a mobile-based digital data collection platform, KOBO Collect. Twenty-three (23) enumerators were recruited from the 11 countries of interest and trained virtually. This process and data collection in the ten countries was led by 11 country focal points. The survey data was collected, cleaned, decoded, and analyzed using the Statistical Package for the Social Sciences (SPSS) Version 23, providing valuable
descriptive findings.

Results & Discussion

The study revealed that the majority (86%) of the producers, both organic and conventional were significantly negatively affected by the pandemic and the inevitable subsequent government restrictions and public health measures. The impact was significantly ($p<0.05$), felt by more, 95% conventional producers than organic producers (83%). Whereas everyone was affected, more women (90%) than men (85%) were more vulnerable to the pandemic, though this difference was not statistically significantly different ($p>0.05$). The impacts cut across; access to farming support services, trade and access to food.

Impact of Russia-Ukraine war on livelihoods:

The advent of COVID19 pandemic in 2020 reversed decades of hard-won macroeconomic, socioeconomic and governance gains in Africa, leading to loss of human life, livelihoods, and incomes. The situation has worsened by Russia invading Ukraine in an unprovoked act of aggression on February 24. This has led to suspension of commercial shipping at its ports by Ukraine military, leading to supply disruption from the largest grain and oilseeds exporters. The prices of wheat have increased by 42% in Egypt, 31% in Tunisia, 25% in Nigeria, 24% in Tanzania, and 17% in Kenya.

Conclusion

The findings suggest that more organic producing households better cushioned themselves against the pandemic, leading to less impact on their livelihoods compared to their conventional counterparts.

Outcomes of a multi-year Agroecology Research and Advocacy project in Tanzania – Focus on maize production

Dr. Angelika Hilbeck [1], *Ms. Gladness Brush* [2]

1. Institute of Integrative Biology, Eidgenossische Technische Hochschule, Zurich, 2. SWISSAID

Introduction

The research presented here is an outcome of a multi-year Agroecology Research and Advocacy project implemented in 3 agroecological zones in Tanzania. A primary goal of this research project was to evaluate locally best adapted agroecological practices that can be recommended and advocated to smallholder farmers, farmer training organisations and policy makers with robust evidence and scientific confidence. The research was carried out in an integrated participatory way including a broad range of experts and practitioners from academic institutions, civil societies, a government institutions and smallholder farmers

Methodology

The research was conducted for four consecutive seasons at Bagamoyo (Chambezi), Morogoro (Vianzi), and Masasi (Mumbaka) sites in Tanzania.The tested agroecological practices corresponded to three common categories of agroecological methods: organic soil amendments included the addition of local organic material to the soil, i.e., compost and mulching. Although the amount and timing of soil amendments was standardized, as well as the preparation method and the ratio of compost to mulch, the precise composition varied between (but not within) field sites owing to the availability of different local organic materials to farmers. Secondly, biodiversity was increased through intercropping with cowpea legumes. Lastly, biological pest control was applied using comparable rigor across field sites, but the ingredients (i.e., ash, chili, aloe vera, garlic, and/or neem) differed depending on local practices. The experimental layout allowed for the testing of each practice's main effect and potential interaction effects. The compost amount of The field research work was supported by two specifically developed Information Communication Technology (ICT) tools, the AgroEco Research application (AER) for data gathering and storage, and the AgroEco Analysis application (AEA) for visualization and statistical analysis.

Results & Discussion

We found that maize can deliver significantly higher yields on nutrient-poor soils when grown with added soil amendments and delivered highest kernel weights when intercropped with cowpeas on organically amended soil. Kernel weights often exceeded 3 – 4.5 t/ha under those conditions, with a maximum of up to 7 t/ha, indicat-ing the yield potential of the local maize variety used in our trials. While maize - legume intercropping alone did not affect harvested maize kernel weights at any station, it did exert a significant positive effect on harvested maize kernel weights when applied in addition to soil amendments at two stations. Similarly, biological pest control alone was not found to have a positive impact at any station, except in certain settings when biological pesticides formulations were applied in combination with other treatments (e.g. Bagamoyo 2021). Maize kernel weights in untreated controls plots, however, often varied very little both within season and between seasons and, thus, were fairly stable - albeit at a low level. In years with extreme weather conditions, floods or drought could cause a near complete crop failure in the control plots on all field stations while maize plants on plots that had received soil fertility amendments still delivered some harvestable maize kernels. Our methodology of testing single or combinations of different agroecological practices delivered robust and reproducible results that can inform evidence-based conclusions and recommendations to farmers and direct future research.

Conclusion

Further studies are needed to establish the best combinations of maize and legume varieties, most effective types and timing of application of soil fertility amendments, and planting times for the local conditions to synchronize the peaks of nutrient release and crop nutrient requirement.

Regenerative Agricultural Technologies for Improved Soil Fertility and Phaseolus Vulgaris Bean Production in Kenya

Mrs. Mercy Kamau Rewe [1], *Dr. Careena Otieno* [1], *Mrs. Judith Libaisi* [2], *Prof. Thomas Rewe* [1]

1. Great Lakes University of Kisumu, 2. SNV

Introduction

Acidic soils, especially in western Kenya is considered an important impediment to crop production, coupled with unaffordable fertilizers. Finding affordable and accessible sources of soil fertility is critical, thus Regenerative Agricultural (ReGenAgric) Practices for Improved Livelihoods and Markets (REALMS) Project answers this call. The Project aimed at validating ReGenAgric Technologies fronted by Small and Medium Enterprises in Kenya as solutions to the soil fertility problem.

Methodology

Trial plots on Farmer Field Schools in Kakamega, Bungoma, Kericho, Uasin Gishu and Nakuru were laid out in a Randomized Complete Block Design (RCBD), replicated 3 times. Technologies validated were organic soil amendments namely, Evergrow, Ecoplanting and Boom Max compared with conventional inorganic fertilizer (NPK). The *Phaseolus vulgaris* (common bean), Rose coco GLP2 variety, was planted at a spacing of 45*20 cm at the onset of rains. Organic fertilizers at a rate of 6.7 t/ha evenly spread on furrows and 5 g/hole of NPK were used. Effects of treatment on soil chemical properties, germination percentage and grain yield parameters were evaluated. Soil samples were collected before initial planting and at the end of each season, in the 2022 long and short rains. They were analyzed for pH, N, P, K, OC, Ca and Mg. Analysis of Variance for growth and yield parameters was done using the General Linear Procedures in SAS 9.0 (2002).

Results & Discussion

Organic fertilizers used were contained sufficient amounts of most nutrients, although efforts to increase pH, Ca and Mg concentration is required. Soils in all study sites were generally acidic and was deficient in most of the analyzed nutrients. Soil pH ranged from extremely acidic (<4.5) to moderately acidic (5.0-6.0), and were largely low in analyzed nutrients, requring key measures to support crop productivity. An increase in pH was noted in most organic and NPK treated soils. Increase in organic fertilizers ranged between 0.2 to 1.93 and 0.05 to 1.71 in season 1 and 2 respectively. Variation on effect of treatments on other chemical properties was noted in organic and inorganic fertilizers across seasons. Organic fertilizers supported robust germination rates compared to NPK. Germination percentage in Evergrow ranged from 67 to 92% in season 1 while in season 2, it was 41 to 86% across the counties while NPK was 28 to 94% and 23% to 76% in season 1 and 2 respectively. Higher yields were mostly realized in season 2 compared to season 1 across treatments. In season 1, yields were not significantly ($p<0.05$) different within a county. These ranged from 575 kg/ha to 2053 kg/ha and 489 kg/ha and 2186 kg/ha. In season 2, yields ranged from 458 kg/ha to 2572 kg/ha in organic fertilizers and 348 kg/ha to 3167 kg/ha in NPK, with significant ($p<0.05$) differences registered only in Kakamega and Bungoma.

Conclusion

Organic fertilizers used were capable of sustaining food production while building up soil nutrients hence could be mainstreamed as novel agricultural practices for sustainable soil health and crop production. Yields obtained were comparable to NPK treated plots.

Review paper: The role of agroecology in combatting hunger and food insecurity among smallholder farmers

Mr. Isaac MUBASHAKWAYA [1], *Dr. Joseph Ssekandi* [2]

1. Uganda Martyrs University, University of Technology and Arts of Byumba, 2. Africa Center for Agroecology and Livelihood Systems, Uganda Martyrs University

Introduction

The term agroecology emerged more than 80 years ago and originally referred to the ecological study of agri-cultural systems (Gliessman, 2007). The term agroecology was first used in the 1930s by Bensin (Schaller, 2013), a Russian agronomist, initially in reference to applying ecological methods to research on crops. In 1965, Ger-man ecologist and animal scientist Tischler published what is most probably the first book titled Agroecology (Tischler, 1965). Yet, some controversy about the definition of agroecology remains. Agroecology is a concept that inspires more and more people, but also means different things to different people. There is no single way to define or practice agroecology, but the concept unifies different groups of scientists, practitioners in the food systems, and social movements. Initially, Altieri (1983) defined agroecology as the application of ecological prin-ciples to agriculture. Twenty years later, agroecology was enlarged to the whole food system linking production with the food chain and consumers. This new definition allows for the analysis of the socio-economic and po-litical dimensions of food systems. Agroecology became an interdisciplinary method that put to test scientific and social borders.

Methodology Review paper

Results & Discussion

2. Principles of agroecology in relation to food security

As the definition of agroecology is rather wide, a better understanding of the concept can be obtained by ex-ploring the principles that guide researchers, practitioners and social actors involved in the field of agroecology.

3. Agroecology versus Green Revolution

Long before the era of Industrial Revolution in the 18th century, agriculture was dependent on the local resources of land, water, and other resources, as well as local varieties and indigenous knowledge.

4. Hunger and Food status on the planet

The vast majority of hungry people live in lower-middle-income regions, which witnessed a 42 percent reduc-tion in the prevalence of undernourished people between the periods 1990 - 1992 and 2012-2014. Despite this progress, in 2016, the global prevalence of undernourishment surged (FAO et al., 2017).

5. Potential interventions of agroecology for food security

5.1 Agricultural practices improvement

5.2 Increased agricultural production and productivity

5.3 Reducing inputs expenses and diversifying income sources

5.4 Agroecology and resiliency to climate change

5.5 Agroecology and gender

5.6. Agroecology and health promotion

Conclusion

As it is mentioned in this paper, many researchers demonstrate that agroecology offers the possibility to increase agricultural production and productivity through agroecological practices and local available resources. Agroecology is therefore increasingly being looked at as the best option to sustain food security and combat hunger without destroying the environment at small scale farming levels due to its advantages. It is healthy and offers long lasting and fully sustainable solutions to rural employment, environmental and climate chal-lenges, today and for the future. However, if this is to be wholesomely accepted and embraced by all, a lot more empirical evidence pointing to positivity must be provided.

Keywords

Agroecology, Hunger, Food insecurity, Smallholder farmers

Soil quality Change Following Compost and Farmyard Manure Application in Maize and Cassava based Agro-ecosystems of Mvomero and Masasi -Tanzania.

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Introduction

Increasing human population results into increased demand for food and fiber while total arable land for food and fiber production is decreasing due to land degradation caused by unsustainable land use; and allocation of agricultural land into non-agricultural uses. This calls for sustainable farming approaches which can restore degraded agricultural soils and maintain the soil healthy for sustainable agricultural production. Ecological farming relays on soil organic amendments (organic fertilizers and organic soil conditioners) to maintain the soil health and sustain its productivity.

Methodology

Field experiments were conducted for two consecutive seasons (2019/20 and 2020/21) in Mvomero and Masasi Districts to study the effects of different rates of compost (CP) and Farmyard manure (FYM) on selected soil quality attributes. The treatments comprised of CP and FYM applied on maize and cassava plots separately at the rates of 0 t ha^{-1} (Control), 2.5 t ha^{-1}, 5 t ha^{-1} and 7.5 t ha^{-1}. Kiroba cassava variety and an open pollinated maize variety (TMV-1) were used as test crops. For each crop, the treatments were arranged in a Randomized Complete Block Design (RCBD) in three replications.

Results & Discussion

The application of either FYM or CP resulted into enhanced activity of ß-glucosidase and phosphatase enzymes indicating improvement in soil health/quality. At Masasi site, the highest and significant ($p \leq 0.05$) ß-glucosidase activity (18.03 µgpNPg^{-1}dwh^{-1}) was recorded at the highest FYM treated maize plots (7.5 t ha^{-1}) in 2019/20, which was 41% above the control. At Mvomero site, the highest significant ß-glucosidase activity (15.67 µgpNPg^{-1}dwh^{-1}) was recorded in the FYM treated cassava plots at a rate of 7.5 t ha^{-1} in 2019/20 season, which was 55.8% above the control. At Masasi site, the highest phosphatase activity (40.41 µg pNPg^{-1} dwh^{-1}) was recorded in the FYM treated maize plots at a rate of 7.5 t ha^{-1} in 2019/20, which was 85.5% above the control. At Mvomero site, the highest Phosphatase activity (24.27 µg pNPg^{-1} dwh^{-1}) was achieved in the maize plots treated with CP at application rate of 7.5 t ha^{-1} which was 54.1% higher than the control. Application of either CP or FYM at the rate of 5 t ha^{-1} and 7.5 t ha^{-1} had similar effects in terms of activities of ß-glucosidase and phosphatase indicating that 5 t ha^{-1} of either CP or FYM was adequate to improve the quality of soils

Conclusion

It was concluded that incorporation of CP or FYM has a potential for improving soil quality and productivity while activities of ß-glucosidase and phosphatase can serve as sensitive indicators for change in soil quality

Keywords
Organic amendments, Soil health indicators, ß-glucosidase, Phosphatase, maize cassava systems

The Class Dynamics of Peri-Urban Land-use Change.

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Introduction

The last few decades have been marked by substantial urban growth all over the world, mostly in the global south. About 75% of the world's urban population lived in the global south as of 2015 and this same region ac-counted for 94% of the increase in the urban world population between 2010 and 2015. These cities in the global south exist as densely packed concentrations of people, which are nurtured by external areas. This symbiotic relationship may give rise to both innovations and tensions especially between the city and the peri-urban areas surrounding it. These transitory peri-urban areas, as a twin feature of urbanization are often an expression of the difference between the globally oriented functions of the city, and locally oriented society and culture. One of the areas where this difference manifests the most is in regards to food systems. In a neoliberal system, the interests of capital and an embracing of market mechanisms is often pushed forward, often at the expense of previously existing agricultural livelihoods of local residents. Agriculture, both as a significant economic ac-tivity and as an important activity for social reproduction is challenged by neo-liberal reform and demand for land for urban development. As these neoliberally oriented transformations happen, they often involve exclu-sionary processes that result in inequitable outcomes.

Methodology

This study theorizes on how this disempowerment arises using a social reproduction theoretical framework and secondary data on changing land uses in peri-urban areas. A social reproduction framework has been chosen because of its ability to encompass all processes and institutions that support the renewal of labour power. The role of land in social reproduction and class stratification exists as the main focus. The author explores the relationship between changing land use patterns, reduced capacity to meet social reproduction needs and social and functional decomposition of peri-urban areas. The centrality of the logic of capital in this relationship is acknowledged and the author explores how market relations continue to shape social reproduction in these areas.

Results & Discussion

Access and control over land and other natural resources along with labour that are key to social reproduction in these areas are lost due to land-use changes. Beyond meeting consumption needs, previous access to land also served ceremonial needs, including use of land as a means to support social relations through provision of space for gatherings etc. Therefore these land-use changes contribute to the restructuring of wider social relations and institutions. The changing ability of land to meet both the consumption needs and ceremonial needs only sharpens class contradictions and antagonisms. Amidst commodification of contemporary life, land plays an ever widening role in shaping class realities and daily and generational social reproduction.

Conclusion

Unsustainable peri-urban transformations result in resource stresses, social and spatial segregation and social and functional decomposition by disempowering families from meeting their social reproduction needs and only further exacerbate existing inequalities and class contradictions. Despite reduction in agricultural activi-ties, access to land remains key to social reproduction and frames social relations and identities.

The Effects in Crop Yield: Observation from Farmer-Led Research of Agro-Ecological Practices

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Introduction

Transformation of food production system to meet increasing global population demand without harming environments is the critical agenda debated worldwide. Agro-ecological practices inspired most agricultural stakeholders that can improve food productivity sustainably with health environment. The aim of this study was to investigate the effect of crop yield from farmer-led research on agro-ecological practices focusing on cow dung and poultry manure with the rates which are manageable by farmers.

Methodology

Masasi, Mvomero and Bagamoyo Districts of Tanzania were used as case studies. Sixty smallholder farmers, 20 in each study area were selected to participate in the study. Each individual farmer has developed research plots which contained treatment and control plots. Quantitative and qualitative data were collected. Quanti-tative data including data from the field were collected from each individual farmer through field visits, from *ugunduzi* app in which farmers used to keep records and by using structured questionnaire. Qualitative data were collected through focus group discussions. Quantitative data collected were analyzed using SPSS program, excel and R-software. Qualitative data were analyzed using content analysis technique.

Results & Discussion

The results indicate that there was positive significant effect in crop yield due to applying cow dung and poultry manure with the farmers' rates. The maximum average rates of cow dung and poultry manure applied by farmers brought positive effect in yields were 2.4t/ha and 1.7t/ha respectively for Masasi farmers, 3t/ha and 4.7t/ha respectively for Mvomero farmers and 3.5t/ha and 3.7t/ha respectively for Bagamoyo farmers.

Conclusion

From the results it is recommended that, Government through responsible ministry and NGOs, should promote agro-ecological practices of cow dung and poultry manure to be used by farmers around the study areas as one among strategic approaches for increasing crop yield. Encouraging investment in agro ecological practices, particularly cow dung and poultry manure to easing availability of inputs. More farmer-led research should be conducted to other areas in Tanzanian to identify beneficial agro-ecological practices among smallholder farmers.

Keywords

Crop yield, farmer-led research, agro-ecological practices, smallholder farmers

The Efficiency of Rabbit Urine as an Ecological friendly Bio-pesticide for Controlling Pest of Ethiopian Mustard (Brassica carinata)

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Introduction

This study focused on assessing the efficiency of rabbit urine in controlling pests and diseases in Ethiopian mustard (*Brassica carinata).* The study assessed the efficiency of rabbit urine in reducing the infection rate of plants at different time intervals and concentrations.

Methodology

The field experiment was done by using a complete randomized block design was used with three main plots divided into five subplots each, making a total of 15 subplots. Treatments with different urine concentrations ranging from: control (0%), low (25%), moderate (50%), high (75%), and very high (100%), were employed in each subplot. Field observations were used whereby; data were collected in each subplot for the time interval of one week for four consecutive weeks. In each subplot, three plants were selected for data collection, and the average numbers of infections were recorded across the urine concentrations.

Results & Discussion

Aphids and *Homopteran larvae* were the most common pests observed in the study area. The findings showed that the prevalence of infected plants was 21.41% (n = 91). The highest prevalence was noted at 0% (control) at 14-23%, while the lowest prevalence was observed at 75% and 100% at 0-1% across the urine concentrations. The difference between the infected and non-infected plants was significant (Mann-Whitney U test statistic = 9.50, $P<0.001$). The majority of infected plants were from the control and the infection rate decreased with increasing rabbit urine concentration while the time interval increased the infection rate ($P<0.001$). However, the plants under 100% concentrations suffered some damage due to the extremely high urine concentration, which resulted in leaf burning.

Conclusion

To maximize the production of *Brassica carinata* vegetables by using rabbit urine as a biological pesticide, we recommend the use of rabbit urine at an appropriate dosage of 75% in consideration of the time interval of plant growth for sustaining the environment and the well-being of the communities.

Keywords

Efficiency, Rabbit urine, bio pesticide, Ethiopian mustard (*brassica carinata*)

The Influence of Biochar in Improving Growth Rate of Black Soldier Fly Larvae and Quality of Frass

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Introduction

Use of Black soldier fly (BSF) technology is a good organic waste management technique that results in the production of valuable agricultural products[1, 2] .Waste management has been done using different technologies in every process including collection, transportation, processing, treatment, recycling or disposal of waste [3]. Those techniques depend on type of waste you are dealing with. This study manages organic waste using an insect called black soldier fly. The BSF larvae has high ability to degrade organic waste and after degrading the larvae are harvested for animal feed. The BSF larvae are used as a protein source for poultry and fish. The quality of harvested BSF larvae depends on what they eat. As a result, in this study, biochar was blended market waste as BSF larvae feed to improve both the larvae's growth rate and the quality of the frass. Biochar absorbs moisture in the feed makes the BSF larvae grow well in optimal moisture content. The results show that in-cluding 25% biochar in rearing BSF larvae improves their growth rate. Gram/larvae obtained in each substrate on the harvested day were 0.247g, and 0.164g in BI and MW, respectively. The unconsumed feed (frass) from each substrate used to grow vegetables, as well as the growth parameters recorded, show that the plants grow well in BI than in frass from MW and BI. Plants grown in frass without biochar grow slowly. Therefore, for more productivity of BSF larvae biochar should be blended in the BSF feed. This also reduce the smell of the fermented BSF feed and improves quality of the frass.

Methodology

2.0 Materials and methods

- **2.1. Preparation of biochar**

  Biochar is the black residue remaining after the pyrolysis of either pieces of wood or grasses [8]. In this study the pit was dug and used to prepare the biochar. The few dried pieces of wood were gathered and filled in the pit to start a fire. The more wood were added quickly as an old wood burns down. Then the water was poured on it to stop the fire. The biochar prepared were let to stay for overnight and collected in the morning ready to be used in BSF larvae feed.

- **2.2. Inclusion of biochar in substrate**

  Since the impact of biochar in the growth rate of BSF larvae can be obtained in both ways i.e as a bulking agent and as inclusion in the substrate. In this experiment, three (3) basins were prepared and in each the following were included; **A:** 25% biochar blended together with market waste **B:** 25% biochar on top of substrate (not mixed), This was done to observe if biochar will work best if it will be blended with BSF feed or if it will just put on top. The control of this experiment was 100% market waste as a substrate of BSF larvae.

- **2.3. BSF larvae distribution and sampling**
  About 10g of eggs were incubated in three (3) different trays and let them to hatch. When the BSF hatched larvae reached five (5) days old they were taken from incubator distributed evenly in each basin containing the prepared feed. The basins consist of the following feed type; A: A total mixture of 25kgs of biochar and 75kgs of market waste, B: 75kg of market wastes and 25kgs of biochar just spread on the top, C: 100kgs of market wastes. To ensure validity and reliability each category had two basins. For the basins that feed were blended with market wastes raking were of done from day 1 in the 5DOL were distributed. Moreover, for the basins that biochar was just on top raking were started in day 10 since the 5DOL distributed in the basin. After nineteen (19) days of stay in the basins the BSF larvae were harvested sampling of larvae, counting, weighing and recording was done for further analysis of the obtained data.

- **2.4. Plant growth parameters**
  The obtained frass was mixed with empty soil in a ratio of 1kg to 10 kgs. The ratios were placed in a plastic containers and vegetables were planted in it. The containers were namely P1: Frass with biochar, P2: Frass without biochar and P4: empty soil. The vegetable seed were sworn and start monitoring their growth. Plant parameters such as height of the plant, length of the leaf and width of the leaf were keenly measured and recorded after every three days.

Results & Discussion

The results show that including 25% biochar in rearing BSF larvae improves their growth rate. Gram/larvae obtained in each substrate on the harvested day were 0.247g, 0.261g, and 0.164g in BI, CM, and FW, respectively. The unconsumed feed (frass) from each substrate used to grow vegetables, as well as the growth parameters recorded, show that the plants grow well in CM and BI. Plants grown in frass without biochar grow slowly.

Conclusion

The results of this study explore that inclusion of 25% biochar in the substrate used to rear BSF larvae improves growth rate of the BSF larvae. Moreover, its frass performs well in vegetable growth.

Keywords

Black soldier fly larvae; environmental management; frass;

The role of agroforestry systems in improving farmlands and livelihoods in Agroecological highlands zones of Buberuka-Rwanda

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Introduction

Agroforestry systems are recognized as key factors to contribute to the farmlands and livelihoods improvement through soil protection and soil fertility that lead to the increase of income from agroforestry products and services for small-scale farmers in rural areas in Rwanda. However, soil degradation and infertility remain one of the underlying causes of low agricultural production in some areas of Rwanda, especially in high mountains regions. This study analyses different agroforestry systems adopted by farmers and highlights their effect on farmlands management and livelihoods improvement in the Agroecological highlands zones of Buberuka.

Methodology

- Agroecological highlands zones of Buberuka are located in Northern part of Rwanda and is generally dominated by small scale farming systems.
- Out of 1650 agroforestry farmers, 64 were selected as sample size. This sample technique was able to give us a global vision of the field realities. The farmers used as respondents in the study were selected randomly with their respective various farm sizes.
- A questionnaire consisting of structured items was designed, administered and conducted for the collection of primary data from the field.
- Qualitative and quantitative approaches were applied using the research techniques, use value matrix, free listing, priority ranking and preference-ranking to gather data sets.
- The data were entered and analyzed using the Statistics Package for Social Sciences (SPSS).

Results & Discussion

Agrosilvopastoral system (combination of trees, livestock and crops) occupy the first place with 71.8%. It is highly practiced by farmers because it plays many purposes of producing food and increasing soil fertility. Most agroforestry species used in this system are *Grevillea robista*, *Calliandra*, *Alnus acuminate* and *Leuceana leucocephala.* For Agrisilviculture system (combination of crops and trees), 64% of agro forestry farmers used to mix big trees with some leguminous trees (*Leuceana leucocephala, Leuceana leucocephala)* for feeding their animals, mainly cattle in zero grazing system. Trees also act as windbreaks, preventing crop damage. In silvopastoral system (combination of livestock and trees), 18.7% of small agro forestry species are mainly used for fodder production to animals. During the study, the researchers found that beekeeping is applied by few farm-ers (7.8%).Therefore it seems logical, compatible, and pragmatic to accept the components as the basic criteria in the hierarchy of agro forestry classification (P.K. Ramachandran Nair, 1993).

Conclusion

The findings of this study confirmed that there are four (4) main different agroforestry systems applied in Agroecological highlands zones of Buberuka which are Agrisilvicultural system, agrosilvopastural system, silvopastural system and Agrohorticultural systems. Most of agroforestry species are intercropped with plants such as Leguminous (calliandra spp, Leuceana leucocephala), no Leguminous (Alnus acuminata, Cedrella ser-ata, Grevillea robusta) and fruit (Avocado, Mangoes, Citrus, carca Papaya). Agroforestry systems contribute to the farm land improvement for the population through soil protection and soil fertility. Agroforestry systems contribute to the livelihood improvement for the population of Agroecological highlands zones of Buberuka through crop and animal production improvement. Agroforestry trees products make increase of income gen-erations, improvement of education, health, insurance, and assurance of food security.

Keywords: Agroforestry systems, Farm lands, Livelihoods, Agroecological highland zones

Towards a Conceptual Framework for Sustainable Agriculture In The Niger Delta Region, Nigeria

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1. cranfield university

Introduction

The Niger Delta is known as one of the most ecologically damaged environments in the world. It is also noted that a compromised and poorly managed natural capital presents not only an ecological but socio-economic liability. While the poor state of natural capital in the Niger delta is not in question, what is questionable is to what extent has the goals of extant agricultural policies in Nigeria captured the environmental peculiarities of the region and how that in turn support sustainable agriculture in the Niger delta? To answer this question, this paper employs the sustainability framework to interrogate extant agricultural policies in Nigeria within the context of extensive crude oil related environmental pollution. The paper seeks to highlight embedded limitations of these policies and use these as baseline for projecting sustainable tailor-made agricultural policy approaches for the Niger Delta.

Methodology

The five-step framework for stakeholder engagement (inform, consult, involve, collaborate with, and empower) was use to identify and gather information. This involved a preliminary planning outlining the scope of the engagement and an identification of relevant stakeholders to be engaged. Also a desk based literature study was carried out which reviewed relevant literature to identify appropriate methods suitable for stakeholders in the Niger Delta region. There were various contact and engagement between stakeholders and the researcher to explain the aim of the project and leading to the development of the research questionnaire which was piloted on a small group of community members for validation. Consequently, 45 participants were interviewed across
Rivers, Bayelsa and Delta States of the Niger Delta, using the questionnaire and observations to develop a conceptual framework for sustainable agriculture. Data collected from interviews were transcribed, coded and analysed using thematic analysis, Nvivo and MS Excel, and presented using Graphs and Tables

Results & Discussion

Stakeholders provided different definitions for sustainable indicating a disconnect amongst stakeholders. An understanding of sustainable agriculture was considered vital as it would define the diverse responses to the different parts of the framework. stakeholders had varying definition of sustainable agriculture, respondents seem to place importance on good living, security, environmental protection, better income and access to food. These varying definitions need to align for effective policy framework implementation and compliance. Key considerations in provisioning the key constructs of the conceptual framework for sustainable agriculture emerged from localized and contextual needs as captured from the fieldwork. Respondents identified the need for a con-textual framework for sustainable agriculture. The conceptual framework created by the research was built based on the research findings and field experience. It outlined contextual barriers and peculiarities of the Niger Delta and how to be addressed.

Conclusion

This sustainable agriculture framework brings into play the specific environmental and political conditions of the Niger Delta to frame a functional pathway for enhancing agricultural outputs in the region. The framework proposes a viable approach that is different yet emerges from well-established sustainability frameworks.

Youth Actions in Relation to Food Sovereignty Realization Across the Black African Continent.

Mr. Yafsap Afya Movement [1]

1. Pelum kenya

Introduction

Food sovereignty is the right of people to healthy and culturally appropriate foods, produced through ecologically sound and sustainable means and their rights to define their own food and agriculture systems. In a nutshell, food sovereignty is about systemic change – about human beings having direct, democratic control over the most important elements of their society – how we feed and nourish ourselves, how we use and maintain the land, water & other resources around us and how we interact with other groups, peoples and cultures among others for the benefit of the current and future generations.

Methodology

In Africa, most youths neglect agribusiness practices leaving the aged alone in farming. Luckily, Youth projects such as Promotion of Sustainable Agriculture and Marketing Through Youth Involvement (PSAMY-Project), a youth exchange program between PELUM-Kenya and FACHIG-Trust Zimbabwe have come in with a focus to increase youth's participation in Sustainable Agriculture (SA) and marketing. As it is acknowledged, agricul-ture remains unattractive to most youths. The project hence aims at increasing youth's participation in SA and agricultural markets and value chains through knowledge and culture exchange between Kenyan and Zimbab-wean youths. So far, since its start January 2022,10 youth participants have been actively involved, 5 males and 5 females. (5 participants from Kenya and 5 from Zimbabwe). The exchange is designed to absorb 10 different youths each year, 2023-2025 hence 30 youths to have participated by 2025. Also, the College of Sustainable Agriculture for Eastern Africa (CSAEA-College), has also enlightened a good youth number to venture in Sustainable Ecological Agriculture (SEA), a good field of profession and eco-friendly method of food production. The College has undertaken a major step in molding the capacity of a critical mass of SEA Youth practitioners to propagate and expand its concept in diverse farming communities. Since its opening, the year 2019, a total number of 34 youth practitioners, 15 males and 19 females have completed their two-years SEA certificate course in two lots. Nevertheless, its 5 years target is to have produced 500 SEA youth practitioners. It also stands as the best and unique way to Achieve food security through food sovereignty realization in Africa through youth involvement.

Results & Discussion

The programs have worked best for SEA youth practitioners. It is evident through improvements in sustainable food production and marketing knowledge & practices increase in diverse communities. This is as a result of PSAMY-Project and CSAEA-College youth trainings in different communities, mentioning, Machakos, Laikipia, Nakuru, Kiambu, Kitale and some parts of Mt. Darwin and Bindura regions of Kenya and Zimbabwe. The main objective of the PSAMY-Project is to have 150 farmers reached and 50 adopted the SEA Practices in Zimbabwe, and 10 farmer-groups reached with 5 groups adopted at least 2 Entrepreneurial and marketing strategies in Kenya by end of the year 2023.

Conclusion

For that reason, collectively and actively participating, it is possible to sustain food & agriculture systems hence Food Sovereignty realization through youth involvement across the black African Continent.

Adoption of Agroecological Approaches in Traditional African Vegetables in Kenya: Motivations, Barriers and Opportunities for Scaling up.

Ms. Anne Mwatha [1], *Dr. Rosina Wanyama* [1], *Dr. Ralph Roothaert* [1]

1. World Vegetable Center, Eastern and Southern Africa

Introduction

The ability of the food systems to produce and maintain food production has been weakened by climate change effects, soil degradation, biodiversity loss, and reduction in water quality and quantity. A major transforma-tion in food systems is needed to achieve food and nutrition security in the context of climate change. Ecological approaches like regenerative agriculture have been proposed to help restore natural resources and build economic resilience in food systems. This case study was conducted in the context of the Veggies for Planet and people project(V4P&P); a five-year, project being implemented by World Vegetable Center (WorldVeg) and the Netherlands Development Organi-zation (SNV), funded by the IKEA Foundation. The project is implemented in six counties: Machakos, Kiambu, Murang'a, Kisumu, Vihiga and Kakamega. The goal of the project is to create jobs, and improve incomes, par-ticularly for women and youth while ensuring environmental and human health through the safe production of vegetables.

Methodology

The case study explored farmer perceptions, barriers and motivations for the transition and scale-up of RA tech-nologies with a special focus on Traditional African vegetables (TAVs). Understanding farmer motivations for the adoption of regenerative agriculture is critical for developing the right policies, incentives, and interven-tions that encourage transitions ,scaling up of regenerative Agriculture. The qualitative study was conducted in 6 project counties in Kenya.Semi structured in depth interviews were conducted with 42 key informants along the TAVs value chain. Six focus group discussions were conducted. The respondents were selected using purposive sampling had in-depth understanding on barriers, perceptions and motivations for adoption of RA.

Results & Discussion

Findings show that V4P&P project implementation over the last two years has generated Positive experiences gained through experimentation of RA practices on the learning sites like composting and integrated pest management have sparked interest and contributed to a change of perceptions about RA. Social learning networks and participation in training (mentoring, coaching, exchange visits) have encouraged the transition process by creating new norms and a community of practice to learn from. Low-cost RAs that have been adopted by a large proportion of farmers include crop rotation, manure, compost, mulching, and botanical extracts while the capital-intensive bio-slurry and drip irrigation are least adopted. The main barriers to adoption of RA are lack of product differentiation in the market for regeneratively produced vegetables, perceived production loss in the short run, lack of awareness and access to alternative approaches. The key drivers of adoption are health concerns, ineffective chemical pesticides, and Changing farmers perceptions and mindset on the effectiveness of RA technologies through learning sites and peer support. The uptake and scaling of RA technologies can be improved through consumer education on food safety, financing SMEs or Start-ups in piloting business models to scale up innovations, improving access to markets and irrigation facilities.

Conclusion

The potential of regenerative agriculture technologies has not been fully exploited, interventions that remove barriers of adoption and promote a change in mindsets will go a long way to renew, restore and promote sus-tainable food production systems.

Agroecology and Scale: Experiences in leveraging the power of interactive radio in Northern and Central Tanzania

Ms. Catherine Mloza Banda [1], *Mr. Rex Chapota* [1], *Ms. Karen Hampson* [1]

1. Farm Radio International

Introduction

Using evidence-based participatory and interactive radio strategies, Farm Radio International (FRI), with funding from Biovision Foundation, designed a 36 month project, running from 2021-2023, to scale out agroecology among women, men and youth from rural communities in central and northern Tanzania. The project used proven interactive radio formats, mobile phone based interactivity tools, and gender responsive strategies to increase the awareness, knowledge and application of agroecology. This paper shares the successes achieved and lessons learned in using interactive radio and ICTs to scale agroecology.

Methodology

FRI worked with five radio stations in two regions and integrated 'Uliza', a digitally customized response sys-tem that includes Integrated Voice Response (IVR), gender-sensitive user polls, and other tools for gathering, analyzing and responding to listener feedback. The radio stations were supported with tailor-made, gender transformative broadcaster training on agroecology. We collaborated with key partners to provide support at the radio program design stage, content co-creation and quality assurance, and linkages to other on-going agroecology activities.

Results & Discussion

As of January 2023, the radio programs had reached around 2 million potential listeners with messages on agroecology. Using our Uliza system, farmers were asked weekly questions to allow them to share their experiences and ask questions about the topics on air. So far, 63,524 (78.5% men and 21.5% women) participated. Further, a total of 217,214 SMS were sent to farmers to remind them of the broadcasting schedule which contributed to high listenership and participation on Uliza. Key observations during implementation include capacity gaps at extension level which led to challenges in gen-erating content for the radio programs. Our collaboration with key partners championing agroecology such as Biovision Africa Trust and Islands of Peace (IDP) helped in bridging these gaps. FRI and other partners also con-vened a local innovation platform which helped to discuss the experiences of implementers within the region.

Conclusion

Radio and ICTs are an effective catalyst for the scaling process. It can reach a range of people over a wide geographical area. This paper also recommends strengthened investment in collaboration, marketing, consumer education and value chains through local innovation platforms to ensure involvement of all critical actors. Training the extension force at different levels and having 'agroecology champions' at higher levels beyond 'lead farmers' would also contribute to taking agroecology to scale. Further, putting deliberate measures in place to track gendered differences in understanding, decision-making, and interest can help to ensure every-body benefits from agroecology.

Efficacy of the Farmer Communication Programme in Promoting Agroecology Among Smallholder Farmers in Kenya

Mr. Fredrick Ochieng [1], *Mr. Joseph Nyamesegere* [1], *Mr. Christopher Rwnada* [1]

1. *BvAT*

Introduction

The threat of intensive external, input-based agricultural practices to the agroecosystems is real and the covid-19 pandemic underscored the vulnerability of food systems that depend heavily on external inputs. The use of synthetic pesticides is detrimental to soils and plants, while the use of genetically modified seeds cannibalizes indigenous plant species that are otherwise resilient to climate changes in Africa. Moreover, market distortions continue to limit farmers from gainful earning from farming activities. These conditions undermine farm-ers' resilience to climate and socio-economic shocks. Experiences from numerous projects in the region show that intervention success, efficiency and sustainability are highly related to appropriate sustainable models, processes and initiatives that take relevant climate- smart and resilient practices to scale. Farmer Communica-tion Programme (FCP), a programme of Biovision Africa Trust (BvAT) has through integrated communication channels contributed to increased adoption agroecology practices in the farming households while promoting development of markets for agroecology products. FCP is implementing through five projects namely – Farmer Communication Outreach, The Organic Farmer Magazine, The Organic Farmer Radio, Mkulima Mbunifu (implemented in Tanzania), andInfonet-Biovision. The projects carry communication channels that develop agroecological content and disseminate to farmers and other audiences. BvAT commissioned an evaluation for the implementation phase of FCP work spanning from 2020 to end of 2022. During the three years, FCP implemented its core activities in content development, dissemination through the five projects. This evaluation report details findings on key performance indicators based on data collected from sampled farmers in Kenya and Tanzania.

Methodology

Data was collected from surveys with randomly selected farmers in 11 counties where FCP has established outreach centres. Survey data was complemented by information collected through focused group discussions with farmer groups selected purposively. Two sets of farmers participated in the survey: i) farmers enrolled as beneficiaries and reached regularly by FCP activities through farmer training workshops, farm demos, home visits and field days, and ii) farmers who did not receive direct and regular support from FCP activities, labelled as control group.

Results & Discussion

Awareness and knowledge levels on agroecology

The findings indicate 88% farmers have moderate to high level awareness and knowledge among farmers FCP have reached over the last three years. The survey findings were corroborated by the information gathered from farmer focused group discussions. Farmers who do not received direct support as programme beneficiaries had awareness and knowledge but significantly lower than the for-mer at 51%. A difference of 57% demonstrates impact of using FCP channels of communication that results in increased awareness and knowledge levels by smallholder farmers.

Adoption of agroecological practices among smallholder farmers

90% of the smallholder farmers interviewed from the pool of those supported by BvAT through FCP interventions reported that they were practicing at least one of the environmentally friendly agriculture practices or technologies promoted by Biovision Africa Trust since 2020, compared to 73% of the farmers interviewed from the pool of those not supported by BvAT who reported they were practicing at least one environmentally friendly agriculture. The 17% difference between the two sets of farmers interviewed demonstrates impact of FCP activities that have focused on training farmers on agroecolog-ical practices. There is a positive correlation between farmers having higher levels of awareness and knowledge on agroecology and adoption of practices.

Production levels among the smallholder farmers

A majority of 84% of the target beneficiary smallholder farmers interviewed reported that their crop yields increased as a result of interventions from FCP compared to 67% of non-targeted farmers. The difference is significant, showcasing the efficacy of FCP communication channels.

Economic impact among smallholder farmers

82% of target beneficiary farmers interviewed from those supported by BvAT through FCP and embraced ESA practices reported their incomes from production of crops increased compared to 66% of non-target farmers who reported their income from production of crops had increased. 67% of target beneficiary farmers interviewed from those supported by BvAT through FCP and embraced ESA practices reported their incomes from livestock production increased compared to 52% of non-target farmers who reported their income from livestock production had increased. A difference of 16% of crops farmers and 15% of livestock farmers reached through FCP activities and farmers not under FCP direct support is significant indicating the positive impact created through FCP interventions.

Conclusion

On the four main areas of evaluation - knowledge, adoption of practices, production and economic impact - the findings strongly suggest that FCP activities which entails content packing and dissemination of information to stallholder farmers leads to increased knowledge and skills which leads to changes in practice by embracing more agroecological technologies and practices. Farmers directly link increased production and incomes to adoption of ecological practices. Farmers are motivated with awareness that agroecological practices are environmentally friendly, lead to production of safe foods, and increases pro-duction on the farm.

Keywords

Income, knowledge, ecological sustainable agriculture, farmer communication, organic agriculture, adoption, environmental health, content development, extension, information dissemination, agroecosystems, agroecological practices and tech-nologies,

Evaluation of Biopesticides for Traditional African Vegetables in Kenya

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1. World Vegetable Center, Eastern and Southern Africa, 2. World Vegetable Center

Introduction

Traditional African Vegetables (TAV) production is limited by insect pests that cause yield losses and reduce quality of produce. The indiscriminate use of synthetic pesticides to control these pests has been associated with increased pest resistance, and human and environmental health concerns. Biopesticides offer a natural, safe and effective alternative in controlling insect pests. Therefore, this study sought to evaluate the efficacy of commercially available biopesticides for controlling insect pests in kale, African nightshade and amaranth.

Methodology

Five biopesticide treatments (*Bacillus thuringiensis, Metarhizium anisopliae, Beauveria bassiana,* azadirachtin 0.03%), one synthetic pesticide treatment (Lambda cyhalothrin) and Control (no treatment) were applied to each crop. Each treatment had three replicates in a randomized complete block design. Treatment plots measured 2 m x 2 m with 1 m separating them. The pesticides were applied two weeks after transplanting and application continued at weekly intervals for 8 weeks. Weekly data on aphids and whiteflies incidence and leaf area damage was collected over the same period and analyzed using analysis of variance and post hoc Tukey test.

Results & Discussion

All pesticide treatments showed no significant difference in aphid population in kale and amaranth, however the aphid population in African nightshade, was significantly lower in plots treated with *Beauveria Bassiana* and Lambda cyhalothrin. White fly population in kales showed no significant difference in all pesticide treated plots. Leaf area damage in kale and African nightshade was similar in all treatments. In Amaranth, plots treated with *Bacillus Thuringiesis, Metarhizium anisopliae* and azadirachtin showed significantly lower damage than synthetic pesticide.

Conclusion

The findings indicate that biopesticide are effective enough in controlling insect pests in TAVs.

Keywords

Biopesticides, synthetic pesticide, insect pests, Traditional African Vegetables

Farmers' behaviour change towards sustainable vegetable production in Benin

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Introduction

Vegetables production in Benin plays an important role in food security and poverty reduction. However vegetable production is inhibited by pests and farmers rely on the usage of insecticides and pesticides to control them. Drawing lessons from traditional extension approaches and mass distribution of training videos, DVDs of "Improving vegetable production" video were sold through the commercial network to strengthen farmers' learning in agro ecological practices. This paper assesses how sustainable agriculture practice triggered by learning videos disseminated through the commercial outlet.

Methodology

About two years after learning video distribution, a snowball sampling procedure was used to select 120 buy-ers/ viewers and 60 farmers no videos viewers in four different areas where DVDs were sold. Using checklists, we interviewed respondent followed by a field visit to see some of the practices and changes people had men-tioned in the interviews. Farmers' knowledge towards sustainable agriculture (ecologic or organic agriculture) was investigated through simple-dichotomy statements (True or False). The attitude was measured by using Likert's rating scale (Likert, 1932) statements (Not sure or do not know, strongly disagree, disagree, agree, and strongly agree), while the practices was measured through frequency-determination statements (Never, once, and more than once). The questionnaire was pretested to validate the questions. All collected data was analysed using a formal method in ethnography, which was based on thematic trends in respondents' statements (Sanjek, 2000). We used quotes to bring respondents' views into the analysis either as testimonies or as concluding statements.

Results & Discussion

Results show that farmers were motivated to buy DVD and find their own way to watch videos, usually several times, with their families, friends and farm hands etc. Farmers who watched the video enhanced their creativity and adapted the learning to their environment. Farmers have started to nurse healthy seedlings; destroy all sources/places that serve as breeding grounds of pest/disease in and near their field; practice crop rotation by cultivating crops that are resistant to pests and diseases; avoid introducing diseases from other fields, protect seedlings by putting an insect net over them. About 86% of respondents indicated that they now spend less money on the purchase of pesticides to manage pests/diseases.

Conclusion

The results of this study show that training videos can build farmers' agro-ecological knowledge without facilitation and enhance farmers' experimentation through their own learning initiative. About 86% of respondents realized that they now spend less money on the purchase of agrochemicals to manage pests/diseases. This study can be used as a starting point to make farmers aware of the benefits of ecological farming. Videos improve farmers' knowledge and trigger agro ecological practices. As improvements of farmer knowledge and capac-ity development approaches are important policy considerations for intensification of sustainable agricultural practices training video could be an excellent way to create space for sustainable agricultural and encourage farmers to come up with their own conclusion. This study reinforces also the proposal that videos can play an important role in enabling farmers to implement innovative practices.

Investigating Foot and Mouth Disease in Wami Village, Tanzania. A study of pastoralists' awareness, practices and vaccination applicability

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Introduction

Foot and Mouth Disease (FMD) is a highly contagious viral disease of livestock and wild animals that has a significant economic impact. The disease is globally known and Tanzania specifically Wami villages are among the affected areas. Currently, there is no cure for FMD. So, the control of the disease relies on adhering to biosecurity and vaccination. Due to the nature and mode of production of most pastoralists, it becomes difficult to adhere to strict biosecurity hence vaccination can supplement the control measures. vaccinations are a crucial part of a plan for the health of organic livestock and should be utilized when appropriate and feasible. Despite of vaccination being the major control measure of FMD, most of the pastoralists are stagnant in using vaccine to protect their cattle against FMD. A participatory applied study was conducted to determine FMD awareness and showcase applicability of vaccines in preventing FMD among the pastoralists community of Wami village.

Methodology

The baseline survey was conducted in Wami villages to assess the awareness of FMD and the FMD vaccine in cattle. Data were collected from 100 pastoralists through questionnaires and field observation. On other hand, the experimental trial was set to evaluate the effectiveness of vaccination in the prevention of FMD and its applicability in preventing FMD cases. Descriptive statistics were determined and the Chi-square test was used to establish significance.

Results & Discussion

The results show that due to the high cost of vaccines, ignorance, unavailability of vaccines, and inefficiency of vaccines, 62% of pastoralists do not tend to vaccinate their livestock against commonly occurring diseases. Despite 98% of respondents having experienced the occurrence of FMD in their herds, 69% of the respondents are not aware of the mode of transmission and prevention of the disease. Pastoralists use Table salt, Wood ash, Cattle urine, Diesel, and Olukulu custom where cattle jump over traditional herbs, wild onion, Penicillin-streptomycin, and Diminazine Diaceturate drugs to treat FMD. Some of these drugs are used extra-label. Moreover, it was determined that vaccination is effective in the prevention of FMD (𝜒² = 38.782, $p < 0.05$).

Conclusion

It can be concluded that pastoralists in Wami village have limited knowledge and awareness of vaccines and FMD in general. The experimental trial conducted revealed that vaccination is effective in preventing FMD and the study suggests that vaccination is an important tool to prevent FMD outbreaks. Efforts such as education and awareness campaigns, as well as strategies to make vaccines more affordable and accessible, should be implemented to improve FMD vaccination in this population. In addition further research is needed in testing efficacy of some mentioned herbal medicines in treatment of FMD in efforts of solving this disease problem.

Keywords

Pastoralists, Participatory research, Foot and Mouth disease, Vaccines.

Perspectives on premier pathways for sustainable intensification of agriculture in Africa

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Introduction

Sub-Saharan African (SSA) countries are disproportionately confronted with low agricultural yields and other associated challenges, which are exacerbated by global environmental changes. To feed the growing population, agriculture is being intensified and expanded, even in the marginal areas that are more vulnerable to such changes. However, expansion and intensification of agriculture is known to substantially contribute to climate change, especially in areas where climate-smart agricultural practices are not common. To effectively create a sustainable change in the sector, novel user-focused technologies need to be developed, tested, and applied to different local contexts across SSA. Simply put, innovative technologies will be decisive in transitioning agriculure toward greater sustainability. Yet choosing the right practice remains difficult because of context-specific information on innovations with potential to contribute to the sustainable intensification of smallholder farms. Literature abounds with a mix of anecdotal evidence and empirical studies with conflicting conclusions. To bridge this gap, this talk will provide an overview of options for further intensification of smallholder farm-ing in Africa by evaluating existing opportunities for increasing yield, creating resilient production systems and reducing carbon footprint. A case study will be highlighted to underscore the importance of participatory design and validation, including citizen science. We will show how continuous engagement with stakeholders increases our knowledge of regional-level systems and their needs, and supports the co-creation of regionally adapted pathways. Using examples from the UPSCALE project (https://upscale-h2020.eu/), we will discuss how multiple approaches can be combined to offer systemic solutions that can make agriculture in Africa more sus-tainable, and how these solutions can be fully integrated into regional-level climate adaptation and mitigation strategies, enabling resource conservation and circular approaches. Further, innovative technologies that can be further intensified to build multifunctional solutions that meet the pressing needs of food, fuel, and fiber will be discussed. We will then provide an appraisal of the necessary framework conditions for the selected solutions to succeed, based on empirical values from the examples and on targeted multi-actor knowledge exchange.

Methodology

NA

Results & Discussion

NA

Conclusion

NA

Keywords

Agroforestry, circular approaches, integrated agroecology, resource conservation, regenerative agriculture

Potential of Farmer-Driven Composting Technology in Improving Fertility of Common bean Phaseolus vulgaris (Fabaceae)

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Introduction

Common bean *Phaseolus vulgaris* (Fabaceae) is major staple food crop in Eastern Africa, which is rich in dietary protein among other nutrients (Wortmann et al., 1998). Average bean production in Kenya is 500 kg ha^{-1} which is below the potential of 2000 Kg ha^{-1}; with annual national production of 215,000 MT that unfortunately barely meets the 450,000 MT demand (Mungai & Karubiu, 2011). Bean production is constrained by decline in soil fertility with inorganic synthetic fertilizers such as diammo-nium phosphate (DAP) being used (Kamau et al., 2014). Unfortunately, this has resulted in problems such as soil acidification that reduces land productivity (Tittonel et al., 2008) and is associated with extreme soil pH which interferes with soil carbon and inhibits nitrogen fixation by diazotrophic bacteria (Obura et al., 2010). Use of composts which are rich in nutrients especially carbon, nitrogen, phosphorus and potassium maintains soil nutrient balance, making bean plants more tolerant to pest-related herbivory and diseases (Naluyange et al., 2014) and thus high yields.

Methodology

The study was a 2 × 7 factorial experiment with bean cultivar factor having two levels (i.e. KK8 and Mwezi Moja) and soil fertility amendment factor with seven levels (i.e. untreated control, DAP, and five types of composts from different trained farmers groups). Each of the resulting 14 treatment combinations comprised twin plots (3 m × 2 m) each having n = 40 plants spaced at 50 cm × 15 cm replicated in 3 blocks (24 m × 14 m). The interblock spacing was 1 m, with 0.5 m interplot spacing between the twin plots, while a 1 m wide perimeter buffer surrounded the three blocks resulting in a field measuring 26 m × 16 m.

Results & Discussion

Germination percentage was lowest in bean seeds grown with DAP (72.0 % b) and highest in those receiving FPC_1 (85 % a), FPC_3 (86.9 % a) and the controls (84.8 % a), while those treated with FPC_2 (80.6 % ab), FPC_4 (80.2 % ab) and FPC_5 (80.8 % ab) were intermediate (P=0.003). Bean plants grown with farmer-produced compost FPC_2 and FPC_3 were the heaviest in terms of shoot dry weight while those that received DAP and the controls had the lowest shoot dry weights ($P<0.05$) Number of bean pods per plant was highest in plots treated with farmer-produced compost FPC_2, FPC_3 and FPC_4, but were fewest in the DAP treatments ($P<0.05$) Seed weight per plant and per unit area was highest in plots that received farmer-produced composts FPC_2 and FPC_3 but lowest in the DAP treatments ($P<0.05$) Farmer-produced composts were associated with improved crop yields. In common bean, plants receiving FPC_2 and FPC_3 composts produced the highest number of pods and seed weight per plant and per unit area.

Conclusion

Use of composts that contained important nutrients were utilized by bean plants to promote growth and yields. Therefore, reversing the decline in soil fertility while improving yields.

Sim-Sim (Sesamum Indicum L.) Bio-Ash Efficacy Determination on Tomato (Solanum Lycopersicum) Shelf Life in Central Uganda

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Introduction

Tomato (*Lycopersicon solanum)* is a vegetable crop which belongs to a family *Solanaceae* and is dicotyledonous plant.Despite its nutritional, economic, and health value, tomato production is hampered by post-harvest losses, which limit the longevity of storage and the number of high-quality products available to customers. This study investigated the effect of sim-sim (Sesamum indicum L.) bio-ash efficacy determination on tomato (Solanum lycopersicum) shelf life in central Uganda. The specific objectives of the study were: to determine the effect of different rates of sim-sim ash on decay incidence and weight loss of tomatoes stored at room temperature, to assess the effect of sim-sim ash and their effect on textural characteristics (hardness, softness soggy and spoilt) of tomatoes stored at room temperature and to examine the effect of different rates of sim-sim ash on the sensory attributes (half ripe and full ripe) for the tomatoes stored at room temperature. An experiment was conducted at the Faculty of Agriculture of Uganda Martyrs University in Nkozi Sub County, Mpigi district during the months of March-July 2022 cropping season. A

Methodology

An experimental design used was completely randomized design (CRD) in the study with four treatments. The factors studied included 0.5kg (P2), 1.0kg (P3) and 1.5kg (P4) of sim-sim bio-ash and control (P1) in which tomatoes were stored for a period of 55 days. Different parameters were assessed, decay incidence, weight loss, hardness, softness, sogginess of tomatoes and number of spoilt tomatoes, half ripe and full ripe tomatoes .Data collected was subjected to statistical technique of analysis of variance (ANOVA) at ($P<0.05$) to ascertain the Fishers probability (Fpr), grand mean, Least signifi-cance differences (L.S.D and percentage co-efficient of variations (% CV). Means were compared using the least significance difference best (L.S.D) and was analysed using Genstat a statistical package version 14.

Results & Discussion

The results of the study indicated that there were highly significant differences ($P<0.001$) recorded with the different rates of sim-sim bio ash on decay and weight loss of tomatoes, The results indicated that 1,5kg of sim sim ash gave the lowest percentage decay of 79% and lowest weight loss. Further the results revealed that 1.5kg of sim sim ash gave the lowest number of soft, soggy and spoilt tomatoes but with the highest number of hard tomatoes. Finally 1.5kg of sim sim ash gave the highest number of full ripe tomatoes and lowest number of half ripe tomatoes during the storage period.

Conclusion

Basing on the results of the study ,It was also concluded that storing tomatoes in 1.5kg of sim-sim ash gave the lowest percentage decay and weight loss, increased number of hard tomatoes and reduced number of soft, soggy, spoilt tomatoes as well as increasing tomato ripening faster than the other counter parts treatments. Therefore farmers are recommended to store tomatoes in 1.5kg of sim-sim ash.

Soil Health Interventions in the Central Highlands of Ethiopia

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Introduction

The Vegetables 4 Planet & People (V4P&P) is funded by the IKEA foundation that aims to improve vegetable production and consumption through youth and women job creation and safeguarding the environment by employing regenerative agricultural (RA) practices. RA has been the focus of recent interventions as a planet and people-conscious alternative way of producing food. Most of the promoted farming practices under the RA umbrella are known to have an impact on soil health which has the utmost importance for sustainable food production. With a broad agreement that most RA practices are good for soil health and have other ecologi-cal benefits, the World Vegetable Center is working on piloting and scaling regenerative vegetable production practices in three districts in the central highlands of Ethiopia.

Methodology

A baseline soil sample collection and physicochemical analysis from 72 sites were done following standard procedures for soil sampling and lab analysis. Training on the different aspects of enhancing soil health was provided to extension workers and farmers. In addition, support during input production and the establish-ment of learning and demonstration plots were employed to increase the adoption of regenerative soil health improvement options.

Results & Discussion

The baseline soil analysis result showed that soil pH ranges from 6.97-7.35 and potassium is ample in the soils of all the districts. Micronutrients except for boron (B) are slightly above the critical level for plant growth. Soil organic matter (OM), organic carbon (OC), and total nitrogen (TN) were below the threshold for sustaining soil quality; OM varied from 2.68-3.48 %, OC was between 1.34-2.02 % and TN ranged from 0.14-0.21 %. In addition, there were sites with low levels of available phosphorus (P). It implies the need for adopting regenerative soil management practices such as manure, compost, vermicompost, bio-slurry, crop rotation, mulching, etc. For this purpose, intensive training was provided to 48 extension workers and 2451 farmers, and RA technologies were piloted on 402 learning and 3 demonstration plots. 407 farmers were involved in the piloting and input production, and because of that 450 kg of earthworms were distributed and 90.7 and 46.6 tons of conventional and vermicompost were produced respectively.

Conclusion

The organic matter, carbon, and nitrogen content of the soil were below the optimum level, and scaling soil management practices such as manure, compost, vermicompost, bio-slurry, crop rotation, mulching, etc. should be a continuous process. The effect of these interventions on different soil health aspects will be assessed and information will be publicly available.

Keywords

Soil health, regenerative agriculture, vermicompost, soil survey, central highlands

Striving for Resilient Farming Systems through Poultry interventions in Semi-Arid Eastern Kenya

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Introduction

Poultry farming is an intervention that builds resilience among smallholder farmers in arid and semi arid re-gions of Kenya. Resilience and diversity play a major role in agroecological transitions. Besides, poultry plays a very unique role in the lives of rural farmers, hence sustainable rural livelihoods. Farm diversity contributes to resilient food systems that deliver improved nutrition, hence greatly support and incorporates agroecolog-ical practices for instance, biodiversity and various ecosystem functions such as soil nutrient cycling (poultry droppings) and better nutrient retention. Adapting resilient farming systems to mitigate shocks caused climate change can improve food and nutrition security. Globally, products such as eggs and meat provide 34 per cent of the protein including the essential micronutrients such as Zinc, iron, vitamin B12 and calcium. Therefore, understanding how smallholder farmers deal with realities of poultry farming and production is critical. This study provides insights gained from on farm poultry baseline survey conducted among 48 smallholder farmers in the year, 2022 in Mukothima and Nkondi Wards, Tharaka Nithi County through a structured questionnaire. The study explored to assess and understand production and management information, disease and health practices, chicken breeding practices and marketing of chicken. The findings of this study could help to inform various stakeholders involved to improve the poultry productivity and climate resilience farming systems. Re-sults indicated that wife (90%) own and look after chicken. Poultry is kept for meat, eggs and as source of income. Diversity in crops for poultry feed and type of feed was observed, where (98%) mentioned (sorghum, pearl millet, maize and soyabean) as some of the crops exclusively planted for poultry feed. Further, house-holds using commercial feeds reported the highest monthly consumption (44.8 kg) followed by to by-product (23.9 kg), homemade ratios (23.6 kg) and kitchen waste (10.8 kg). Farmers, (91%) had chicken houses with good ventilation, while (93%) confirmed that poultry was a menace. On chicken breeding practices, it was observed that, majority of farmers hatch their own chicks (87.8%); change the breeding cock (77.6%), do not breed cock within flock (53.1%), do not breed cock within village (75.5%), change the breeding cock (77.6%) and encoun-ters chick mortality (95.9%). A large percentage of farmers (98%) sell their chicken for school fees and income. In conclusion, resilient farming systems should be enhanced through farmer sensitization and training hence, sustainable source of income, food and nutrition security. The results of this study are significant for both smallholders and policymakers, particularly in the context of rapid global change of environment.

Methodology

Fractional random farmer lists were drawn according to sampling statistics and formulae; for infinite popula-tions (http://www.surveysystem.com/sscalc.htm#one) where: Z = Z value (e.g. 1.96 for 95% confidence level), p = percentage chance of picking a choice, expressed as decimal (.5 used for sample size needed), c = confidence in-terval, expressed as decimal (e.g., .04 = ±4). Sample size in finite farmer populations constituting farmer groups was drawn following the formula: s where population represented the number of farmer constituting sam-ple source group (a complete farmer group). Thus stratified sampling was applied. Descriptive statistics were utilized through SPSS to analyze collected data.

Results & Discussion

Results indicated that wife (90%) own and look after chicken. Poultry is kept for meat, eggs and as source of income. Diversity in crops for poultry feed and type of feed was observed, where (98%) mentioned (sorghum,

pearl millet, maize and soyabean) as some of the crops exclusively planted for poultry feed. Further, house-holds using commercial feeds reported the highest monthly consumption (44.8 kg) followed by to by-product (23.9 kg), homemade ratios (23.6 kg) and kitchen waste (10.8 kg). Farmers, (91%) had chicken houses with good ventilation, while (93%) confirmed that poultry was a menace. On chicken breeding practices, it was observed that, majority of farmers hatch their own chicks (87.8%); change the breeding cock (77.6%), do not breed cock within flock (53.1%), do not breed cock within village (75.5%), change the breeding cock (77.6%) and encounters chick mortality (95.9%). A large percentage of farmers (98%) sell their chicken for school fees and income.

Conclusion

Resilient farming systems should be enhanced through farmer sensitization, training and participation hence, as a sustainable source of income, food and nutrition security. The results of this study are significant for both smallholders and policymakers, particularly in the context of rapid global change of environment.

Keywords

Agroecological transitions, Resilient Farming Systems, Poultry interventions, diversity, Food security

Swiss NGO Alliance Sufosec tackling the global food and nutrition crisis through agroecological transformation

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Introduction

In 2022, 828 million people were facing hunger worldwide - an increase of 150 million since 2019. Extreme weather events, such as droughts and floods, and the war in Ukraine drive acute food insecurity to new highs. Today, almost one million people face the immediate threat of starvation – almost double the numbers of 2021. Across the world, 222 million people are experiencing high acute food insecurity, almost one in five of whom are struggling to access enough food to survive the day. In 2019, six Swiss NGOs founded the Alliance Sufosec (Sustainable Food Systems and Empowered Communities) with the aim to improve global food security through agroecological transformation. In collaboration with more than 250 partner organisations in 34 countries across Latin America, Sub-Saharan Africa and Asia, the Sufosec Alliance implements a joint programme. The programme, which is co-funded by the Swiss Agency for Development and Cooperation, encompasses a variety of approaches to improve the food security of the affected population, including livelihood interventions, agroecological farming practices, strengthening of local food systems, and community empowerment. At the World Food Day 2022, the Sufosec Alliance published its first global food and nutrition report (see https://sufosec.ch).

Methodology

The Sufosec report presents the results of a baseline study in 2021 among 14'000 households at 29 sites in 16 countries on food security (measured by the Food Insecurity Experience Scale (FIES) indicator of the Food and Agriculture Organisation of the United Nations (FAO)) and the scaling-up of agroecological farming prac-tices (based on a multiple-choice list of 18 practices). At each survey site, a representative random sample among beneficiary households was drawn. The surveys were conducted by trained enumerators using KoboCollect. Descriptive data analysis was conducted by the Sufosec Alliance Monitoring and Evaluation Unit. Food security prevalences were calculated using the Rasch Model method through the FAO's online app.

Results & Discussion

The survey showed that 72% of the households were affected by moderate or severe food insecurity. Food insecurity in the Sufosec sites were generally higher than the respective national prevalences reported by the FAO. Concerning agroecological practices, the survey showed that at baseline, 92% of the households involved in the Sufosec programme applied at least one agroecological farming practice, whereas 45% introduced a new practice in the 12 months prior to the survey. Crop rotation, intercropping, crop diversification and locally adapted seeds were the most commonly used agroecological methods. Regression analysis showed that that the adoption of input reduction, biodiversity and soil health were associated with lower odds of being food insecure. Households that adopted multiple practices had 22% lower odds of being moderately food insecure. Case studies from India, Colombia, Mali, Guatemala, Kenya, and Madagascar demonstrated that for poor and vulnerable population groups, local food systems are often the only source of affordable, nutritious food. In Kenya, for example, *Caritas Nyahururu* supports self-organised savings groups promoting agroecological kitchen gardens and food forests.

Conclusion

The results of the Sufosec household survey show that agroecology – in addition to being a scientific concept and method – works well in highly complex field conditions. The study demonstrated that agroecological farmers diversify their production and, in this way, can reduce hunger and malnutrition, even in areas where hunger is strikingly common. Two key focus points of the Sufosec alliance are consistent with this overall picture: There is an urgent need (1) to enhance sustainable food systems through agroecological practice and (2) to empower communities to more actively steer the food systems they belong to and depend on. This approach takes elements from the productive basis (which are addressed through agroecological technologies) and the wider socio-political basis (community empowerment) and links them together with the topic of food security. The technologies surveyed by the study come from four fields of agroecological practice: input reduction, enhancement of biodiversity, promoting soil health, and synergies with livestock. The study shows – once again – that agroecology works in practice. Additionally, the study shows that agroecology not only improves soils and crops, but also food security. This finding is consistent with many other scientific case studies and specific examples, which have highlighted such benefits in very diverse contexts and under very diverse conditions.

Keywords

NGO alliance, food security, agroecology, monitoring, household survey, FIES

The Agroecology Coalition: an opportunity to accelerate the necessary food system transformation

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Introduction

The need for a profound transformation of our food systems is now widely recognized. In 2021, in the mar-gins of the UN Food Systems Summit, a Coalition for Food Systems Transformation Through Agroecology, or 'Agroecology Coalition' for short, was formed to address this challenge. The purpose of the Coalition is to accelerate the transformation of food systems, guided by the 13 principles of agroecology defined by the High Level Panel of Experts (HLPE) of the Committee on World Food Security (CFS) that are aligned with the 10 Elements of Agroecology adopted by the 197 FAO Members in December 2019. The Coalition already counts 44 Countries and regional commissions as well as 94 Organizations. In East Africa, the African Union Commission (through the EOA-I), the Democratic Republic of Congo, Ethiopia, Tanzania and Uganda are members, as well as many farmer and civil society organization from the region. The Agroecology Coalition provides a great opportunity to accelerate the necessary food system transformation by uniting forces among countries and organizations working in harmony.

Methodology

Not applicable

Results & Discussion

44 Countries and 102 Organizations are already member of the Coalition

Conclusion

The Agroecology Coalition provides a great opportunity to accelerate the necessary food system transformation by uniting forces among countries and organizations working in harmony.
Further countries and organizations are invited to join the Coalition

Keywords

Agroecology
Coalition
Food system tranformation

The Impact of Post-Harvest Response on Sustainable Consumption

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Introduction

Post-harvest losses continue to be a substantial challenge for smallholder farmers engaged in agricultural production of perishable goods. Food and agriculture organisation (FAO) estimate about 1/3 of all the food produced in the world to be wasted or lost in the agriculture value chain. Food security requires innovative solutions to address the post-harvest losses. The objective of this study is to assess the impact of post-harvest solutions in the improvement of the economic life of farmers. The study focused on BioAfriq an innovative social enterprise that has adopted innovative solar drying technology to solve post-harvest loss for small holder farmers .These dehydrators are fuelled by biomass briquettes and biomass pellets from waste agricultural materials. The study used case study approach where qualitative data was collected through Key informant interviews and Personal In depth interviews with the farmers, the community and the staff of BioAfriq. Participants of the study were purposively selected based on their interaction with BioAfriq organisation. The outcome of the study provide learnings on the post-harvest solution and how this contributes to attaining the sustainable development goals and the transformation of the communities. It suggests ways that BioAfriq can increase its impact and improve the product's uptake by the community.

Methodology

The aim of the research was to evaluate post harvest response on sustainable consumption . The study assessed the social impact of BioAfriq's post-harvest solution in reducing post-harvest losses. It focused on the financial and livelihood benefits of the solution to the community. Qualitative methods were employed to demonstrate the social impact of the solution, and the case study provided valuable insights into thebenefits of post-harvest solutions and how BioAfriq's solution has impacted the community. The study drew on primary data collected through Key Informant Interviews, Personal In-depth Interviews, and observation , as well as secondary data obtained from the organization's annual reports. The research sheds light on the community's attitudes, expe-riences, and perspectives of BioAfriq's post-harvest solution. The sample population was purposively selected from the personnel of BioAfriq Energy, the community as in-direct beneficiaries and the beneficiaries. Beneficiaries were selected based on their direct involvement and experience with post-harvest activities. The participation of the community as indirect beneficiaries was crit-ical in providing an outside observer's perspective. The respondents included farmers, community leaders, community members and employees of BioAfriq. Participants were selected from the population that BioAfriq targets with the organisation guiding the identification process.

Results & Discussion

Post-harvest losses continue to pose a significant challenge in Kenya's food system. However, our case study shows that there are creative solutions that can be utilized to tackle this problem. One such solution is the Bio Afriq model, which is both innovative and cost-effective in addressing post-harvest losses.

Conclusion

Numerous technologies are accessible to smallholder and large-scale producers, which if implemented, could enhance the quality and quantity of food and grains during post-harvest handling and storage. This presen-tation focuses on the case of Bio Afriq innovation as a promising approach to tackle post-harvest losses. It highlights the technological compatibility of BioAfriq's post-harvest solution with the food preservation chal-lenges facing the local community in Machakos County.

Keywords: Post-harvest losses, Responsible consumption, Innovative technology,

The struggle to scale up agroecology in constrained areas: The case of Agro-ecological Technical Center of the South (CTAS) in southern Madagascar

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1. Agro-ecological Technical Center of the South (CTAS)

Introduction

The Androy and Anosy regions are located in the south of Madagascar and they are among the most disadvantaged. 94% of rural people live below the poverty line and 68% are frequently food insecure. The irregularity of rainfall, the mostly sandy and fragile soils, the lack of organic fertilizer for crops, very frequent and violent winds are some contraintes noted. This violent wind, reaching up to 75 km/hour, dries out the soil very quickly. Its red color, like its local name "tio-mena" or "red wind" comes from the fact that it takes away all the fine and fertile particles from the soil, which is already very sandy. Agricultural fields become barren and degraded, no longer allowing for the production of food for the family, and farming households are forced to migrate to other regions of Madagascar.

Methodology

For the scaling up of agro-ecological techniques, 161 relay farmers are paired with 119 KM or Farmers' Com-mittee to ensure the animation and training of farmers. The KMs are mostly elders and lineage leaders to facilitate the farmer-to-farmer approach. They receive an average of 4 training sessions per year on animation techniques, crops and techniques disseminated, conducting a visit exchange, etc.. Each relay farmer has an objective of doing at least 5 animations and 5 exchange visits in his school field and according to his category -after the evaluation- he can move from one commune to another with a bicycle provided by the CTAS. In order to facilitate access to seeds for households, each participant in the exchange visits receives seed vouchers so that they can test on their field. Also, there are 101 seed shops set up by the CTAS so that farmers can obtain agroecological seeds at a reasonable price and it is also a place to exchange vouchers for seeds. Each year, the relay farmers are evaluated and the result of this evaluation allows them to be categorized according to 3 levels. The allowances, activities and support that the CTAS gives depend on their category.

Results & Discussion

The scaling of agro-ecological techniques increased from 167 ha in 214, 1,337 ha in 217 to 7,53 ha in 222.
This currently feeds 58,397 families and prevents them from migrating during the lean season. The integration of notables and lineage chiefs in the dissemination process has made it possible to accelerate scaling up, given that the main crop disseminated by the CTAS is a "forbidden" or "taboo" crop, whereas currently more than 9,ha are planted with this crop. This valuing the local structure and knowledge is a major pillar of success and especially working only with motivated farmers. For more than 7,5ha blocks, 119 notables and 161 leading farmers are the main collaborators. The establishment of seed shops, especially those in very remote areas, has facilitated the supply of more than 3tons of agro-ecological seeds per year. This is very important because during the rainy season, farmers lack seeds while the price of grain on the market is exorbitant.

Conclusion

The major challenge in this région is to strengthen food security by providing rural households with improved plant species or techniques, adapted to the zones of Androy and Anosy and wich which are financially accessible to poor populations

Addressing challenges in access to ecological inputs at the smallholder level in Ethiopia: The case of Veggies 4 Planet and People Project

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Introduction

Challenges in the agricultural input supply system severely hampered crop production and productivity in Ethiopia. Government institutions and farmer unions largely controlled the system, with little involvement from the private sector. Smallholder farmers often face stumbling blocks in accessing high-quality inputs in the quantities needed, in small packages, quality, at an affordable cost, and at the right time. Conventional inputs suppliers mainly utilised existing input supply systems, while suppliers of ecological inputs largely targeted sizeable horticultural farms, neglecting the smallholder farmers. Access to quality agroecological inputs at the smallholder level is one of the main limitations towards farmers transition to agroecology. Ecological input suppliers need to be open to supplying their inputs through existing input supply structures to tap into the smallholder farmer market. Linkages to agrodealers at the district and kebele level is critical to enhancing smallholder access to ecological inputs. Agrodealer shops are facing challenges in accessing high-quality inputs from reliable sources. They typically buy inputs from small retailers in Addis Ababa and stock their shops. This results in a lack of diversity of the inputs retailing at a higher price.

Methodology

To promote the use of ecological inputs as well as create awareness and build demand for ecological inputs, the project adopted the following approach: Conducted an agricultural input assessment within the Woredas of project implementation, provided technical training to improve the functional capacities of agrodealers as advised by the assessment, and facilitated business-to-business linkages between the input distributors and agrodealers.

Results & Discussion

The Veggies for Planet and People project is facilitating linkages between agrodealers and ecological input distributors to enable the agrodealers stock a variety of ecological inputs at better prices and to enhance smallholder farmers access to quality inputs. This will ensure the sustainable transition of smallholder farmers to agroecology. The linkages facilitated between distributors and agrodealers are proving to be profitable. Six agrodealers sold various inputs worth 8,731,440 birr (USD 164,744) to approximately 14,000 farmers in 2022.

Conclusion

The success of these agrodealers over the last year suggests that the approach can be replicated and scaled to assist smallholder Ethiopian farmers to adopt and transition to ecological farming.

Keywords

Agro-dealer, stockist, Ecological inputs, Regenerative agriculture, Planet, SNV

Maize from Push-Pull Technology (PPT): Can the produce be differentiated?

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Introduction

Maize is a staple food in East Africa with a potential to solve the food security and nutrition challenges. The crop is faced with several biotic and abiotic stresses leading to significant pre-and post-harvest losses. An im-portant biotic stress is *Striga hermonthica* weed (witchweed) usually associated with poor soils resulting in stunted growth, phytotoxicity, leading to reduced grain yield. Although several possible solutions to *Striga* control are available, push-pull technology (PPT) stands out to be agro-ecologically beneficial for smallholder farmers in East Africa. PPT uses Maize intercropped with *Desmodium*, a legume that promotes suicidal germina-tion of *Striga* weed, but also adds nutrients to the soil through nitrogen fixation as well as conserving moisture. *Brachiaria* grass which is a border plant helps to pull Stemborer pest out of the maize. Through UPSCALE, a Eu-ropean Union Horizon22 project, disseminating the widespread adoption of PPT in East Africa, smallholder farmers will produce maize with tradeable surpluses in the region. There is need to reflect how to collabora-tively differentiate the PPT maize as it enters the food chain in order to underscore its potential benefits to the community.

Methodology

This is a reflection on ongoing discussions at transdisciplinary multi-actor communities (MACs) of practice constituted under UPSCALE project in East Africa. As a reflection it draws heavily from several meetings with stakeholders, reviews of literature as well as the authors reflections and experience over time. UPSCALE is about realizing the transformative potential of PPT by expanding its scope and applicability. This can be achieved through widespread engagement with stakeholders along the value chains of PPT products in order to co-construct viable solutions.

Results & Discussion

We see that a greater involvement of stakeholders or MACs in mapping and tracing PPT maize produce, certifying and Eco labeling the produce to distinguish it from the rest, and collaboratively pricing the produce at a premium to incentivise more production as aspects worth considering. However, this will require lobbying governments to ease transfer of *Desmodium* seeds within the region, waive duty and sign common protocols on *Desmodium* Quality Declared Seed (QDS) systems. Potential spinoffs include: women and youth involvement as *Desmodium* community seed merchants and raising seedling nurseries; SMEs trading in differntiated PPT maize in the region; and farmers trading carbon credits with widespread adoption of PPT.

Conclusion

Push-pull technology (PPT) maize can be differentiated and promoted when stakeholders begin to reflect on its potential in the region. Ultimately, more adopters and expansion of existing crop under PPT justifies the need to differentiate PPT maize. Therefore, as stakeholders find adaptive and alternative PPT adoption pathways, it is imperative to begin discussions on differentiating PPT maize in East Africa.

Organic Lifestyle Influencer Approach (OLIA): Promoting Awareness and Consumption of Sustainable Food through Social Media Campaigns

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Introduction

The interest for organically produced food as part of a healthier diet is increasing among East African consumers. As a means to promote more sustainable food systems benefitting both consumers and producers, the "Social Media Influencer Project" aims at increased awareness and consumption of organic food in Kenya and has therefore developed the "Organic Lifestyle Influencer Approach". The project is coordinated by the Re-search Institute of Organic Agriculture (FiBL) and works together with the Kenya Organic Agriculture Network (KOAN) and Wowzi, an African social media marketing platform. Through influencer campaigns, about 3 mil-lion Kenyans have been reached and introduced to organic agriculture and food, and sales of organic products increased. As part of the project, various complementary influencer campaigns were designed, tested, evalu-ated, and scaled up. They included organic caravans, a campaign with the Miss Universe Kenya, with Safaricom, organic farmer markets campaigns, farmfluencer campaigns, E-commerce and retailer campaigns. Out of the project model, OLIA was developed as a replicable approach that aims to promote a more sustainable lifestyle and consummation of (organic) products in emerging economies through carefully crafted and exe-cuted social media influencer campaigns. Consumers benefit from healthier diets, and producers from more sustainable production practices and increased sales.

Methodology

The Social Media Influencer Project tested in 2022 four campaign types: staffluencer campaigns, retailer campaigns, "through the farmers eyes campaigns" and organic caravan campaigns. Staffluencers (from Safaricom) and macro and micro influencers (Tik Tokers, musicians, lifestyle influencers) were engaged and their content was spread on Facebook, Instagram, Twitter and Tik Tok. OLIA involves 5 main steps as methodological guidelines to plan and implement sound 'organic awareness campaigns' using particularly social media influencer marketing to reach out to a wide public. As a means to ef-fectively target and engage especially younger urban consumers, it involves well-selected 'lifestyle influencers' as part of the campaign work involving also 'farmfluencers'. These are farmers that are keen to become active in social media platforms by sharing part of their 'organic life'. According to their specific target, campaign activities vary, involving storytelling and sharing of experiences, exposure to organic brands and information, active engagement of consumers in special video challenges – all aiming to promote a more sustainable (organic) lifestyle.

Results & Discussion

The Social Media Influencer Project, where OLIA was developed and applied, has reached around 3 million Kenyans , through social media. Using social media analytics platforms such as Hootsuite and Wowzi's own proprietary platform, the project was able to track social media postings by the more than 290 involved influencers and their followers which showed a very high engagement (average engagement rate of 8.3 %) and trustworthiness of the 'organic messages' shared. This has increased the awareness of the Kilimohai Organic brand and had various positive effects on the organic value chain particularly driven by the interest among con-sumers in accessing organic food. Additionally, the project has enhanced farmers' social media capacity and organic sales/turnover growth has increased by around KES 120,000, partly due to local communities' active involvement in campaign activities.

Conclusion

The Organic Lifestyle Influencer Appraoch (OLIA) has great potential for impact on organic market develop-ment, particularly in targeting digital audiences (that are now shaping the society) at a lower cost than tra-ditional marketing methods. However, the interventions involved in OLIA, i.e. form of influencer selection and training and different awareness campaigns, require effective conceptualization to be highly successful. Thereby, a visual reference in form of a 'sustainability brand' (e.g. Kilimohai organic mark) is crucial to link awareness and purchase/sale of organic produce.

Keywords

Organic Lifestyle Influencer Approach, Organic marketing, Campaign strategies, Awareness conversion

Working With Micro and Small Agroecological Enterprises in Lake Victoria Zone, Uganda

Mr. Patrick Delba Kiirya [1]

1. Busaino Fruits & Herbs - BuFruit

Introduction

INTRODUCTION : Micro, Small & Medium Enterprises (MSMEs) are very heterogonous and constantly chang-ing. Yet MSEs face external challenges. Big food companies wield a lot of power and get unfair advantages at the expense of MSEs. In the past, some policies of governments have undermined work of MSEs. MSEs have some weaknesses. In order to achieve better business outputs that will spur local nutritional out-comes, MSEs must embrace appropriate technology. The paper argues that in transforming local food systems, a start be made at sub-national levels while giving room for cross-subnational, cross-border, cross- programme actions. This will localise agro-ecology. The most appropriate private sector structures to complement such a strategy are micro-small enterprises

Methodology

To suit the process of learning as micro-small scale entrepreneurs assessed themselves, an action- research approach was used. The 5 year study ensured that entrepreneurs were not passive subjects to be researched on but active influencers of activities. Both qualitative and quantitative methods were used. Farmers, consumers and entrepreneurs took active roles in providing their points of view, debating and trying out certain actions to verify some information.

Results & Discussion

There are diverging definitions of micro, small and medium enterprises. Government official definitions emphasize size and money worth. Entrepreneurs prefer to define themselves in terms of what they do and how. While numerous micro-small entrepreneurs exist and are active, they have capability gaps. To address these gaps, some consumers suggested that focus should be on attracting a new breed of entrepreneurs. To the en-trepreneurs, formal education was not as important as hands-on-job training and practical skills. Government officials suggested institutional certified training. The MSEs preferred competency specific packages that expand the number of entrepreneurs and enterprises. The most widespread form of skilling was the family based apprenticeship approach.

Conclusion

- Information gaps exist on understanding MSEs nature and roles.
- New forms of cooperation between MSEs, Micro-Smallholder farmers and consumers needed.
- There is need for donors, development organisations and NGOs to work with MSEs and build practical business / social relations between MSEs, farmers, urban and peri-urban consumers
- There is need to influence government to develop more enabling policies that promote MSEs as para-extension workers.
- Building various forms of networking through cross-border, cross-commodity and cross- subnational activities.

Agroecology issues in agricultural and allied policies: Experience from Tanzania

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Introduction:
Sustainable food systems are principally based on primary production and extraction from nat-ural resources, which are integral of the environment. This often poses land degradation, biodiversity loss, and low crop yields. The trends on impacts on land degradation are further exacerbated by climate change (SDG 13) – that altogether intricately relate with multi-dimensional poverty (SGDs 1, 6, 7) – of which 1.3 billion people live on US $1.25 a day or less. This suggests holistic changes in our current agricultural and food systems are needed to address the present and persistent food crisis. The science, philosophy and social movements of agroecol-ogy appear to be one of widely proposed approaches. Leading the Government of Tanzania and elsewhere in Sub-Saharan Africa (SSA) to pay attention to mainstreaming agroecology into agricultural agenda, policy and legal institutional frameworks. Despite some progress made so far, scanty information exists detailing strate-gies, policies, and programmes which create agroecology-enabling policy environments in Tanzania. This paper provides a review of evidence on how agroecology has been embedded in the current agricultural and allied fields' legal and institutional policy frameworks in Tanzania. The paper put a special focus on how agroecol-ogy is defined, interpreted, integrated or embedded in available legal and institutional frameworks related to agriculture and natural resources management.

Methodology:
The methodology adopted focuses on the review and analysis of context, conceptualization of policy, operational principles, and institutional frameworks. The paper also integrates information collected during policy dialogues conducted in Dodoma and Morogoro regions in between July and November 2022.

Results & Discussion:
The findings noted that most of Tanzania's policies, laws, and strategies related to the agricultural sector, environment, and application of industry and bio-inputs place disproportionate emphasis on agroecology aspects, a snag that arouses shortcomings in attaining a sustainable food system and environ-mental conservation.

Conclusion
Conclusion: Tanzania agricultural policy and other policies of allied fields do not mention agroecology directly, but they point out some disputes that are relevant to agroecology systems. This means agroecology as a disci-pline still lacks policy support to make it a national priority. Having the policy or even strategy will promote and fasten adoption and implementation of agroecological practices and principles, and subsequently contribute better to sustainable food systems and ecosystem conservation. We recommend that agroecology principles should be integrated into agricultural and allied field policies and laws for sustainable food systems and envi-ronmental management.

Keywords
Agroecology; Agricultural policy; food systems; environmental conservation, institutional frameworks

Community-driven gully mitigation and rehabilitation: Opportunities and challenges of community organizations

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Introduction

Gully erosion in the arid and semi-arid environments has devastating socio-economic and environmental impacts. Development of gullies has led to extreme land fragmentation threatening human settlement, sustainable food and fodder production as well as transport services. In some severe cases, deep gullies have led to death of people and livestock through fatal falls. The phenomenon contributes significantly to aridification and desertifi-cation of the semi and arid regions. Hence, there is urgent need for effective gully mitigation and rehabilitation in the ASALs.

Methodology

This paper presents some experiences of community-driven model(s) based on the lessons learnt, opportunities and challenges.

Results & Discussion

Community-driven gully mitigation and rehabilitation can provide a sustainable and cost-effective model in the ASALs. In West Pokot County, Kenya, the community were organized in a Farmer- Research Network (FRN) whereby they formed groups which were then formally registered as community-based organizations (CBOs). The concept of FRN brings together farmers, researchers, development organizations and other relevant stake-holders in co-creation and sharing of knowledge. By December 2022, 672 households had registered making nine groups. Gender aggregated data showed that there were 319 men and 353 women registered respectively in these groups. The groups have engaged themselves in mitigation and rehabilitation efforts within their areas, driven by the desire to see a sustainable change in their landscape and livelihoods. This has enabled establishment of 11 community trees nurseries, construction of terraces in 173 households and erecting 107 sand dams across different watersheds. Through a donor funded project the farmers were provided with tools, cement, and capacity building which motivated them to mobilize and engage in gully mitigation and rehabilitation in the area. To ease labor mobi-lization, the farmers devised a way "merry-go-round model" where the moved in groups to engage in community work. They also initiated a kitty, where each member contributed monthly for food and refreshments-for-work. Frequent droughts in the area usually lead to reduced economic survival negatively impacting on members' motivation and commitment to environmental conservation efforts among the farmers hence threatening ef-fectiveness and sustainability of the community-based organizations.

Conclusion

Community-based organizations have provided an equal platform to both men and women to participate in soil conservation, decision making and capacity building. Thus, with increased climate change, its critical to devise suitable models that spur members of CBOs' motivation and inspirations to sustainably engage in gully mitigation and rehabilitation while empowering them economically.

Keywords

Social capital, social responsibility, inclusion, cohesion, sustainability, semi-arid, incentives,

Evaluation of The Global Advocacy Project (Gap) for The Ecological Organic Agriculture Initiative: Focus on Eastern Africa

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1. master, 2. Biovision Africa Trust

Introduction

An End Term Evaluation (ETE) of the Global Advocacy Project implemented under the coordination of Biovision Africa Trust (BvAT) and Pelum Kenya from 2018 to 2020 in five (5) Eastern Africa countries (Ethiopia, Kenya, Rwanda, Tanzania and Uganda) was undertaken by a consultant. The goal of the GAP project was to create awareness and better understanding among policymakers, practitioners, technocrats and development part-ners of Ecological Organic Agriculture (EOA), stimulate discussion and debate among them about EOA and its benefits to human, animal, plant and environmental health subsequently leading to efforts of supporting the EOA agenda.

Methodology

The evaluation was carried out through a mixed methodology including both quantitative and qualitative approaches. The evaluation approaches were blended ranging from Appreciative Inquiry to Value Chain Approach, Casual Effects and Participatory Approach. Appreciative Inquiry was employed because of its key premise of focusing on project strengths rather than on weaknesses. This approach demonstrated what worked well, envisioned results and the prospects of the project, what should be the ideal, planning and prioritizing activities and processes that worked well.

Results & Discussion

By implementing GAP activities there was wide contribution towards EOA-I goals. Capacity building was well conducted, and the key areas of focus were nutrition and food safety, organic technologies and practices, climate change, water management, resilience and sustainability of organic farming systems, inputs and product market development as well as technology transfer and learning among others. A wide base of stakeholders is reached through the GAP project and this is important in advancing EOA-I goals in the region. The number of stakeholders reached far surpassed the target number. For instance, through the project, a total of 1,720, 255 value chain actors comprising of farmers, input suppliers, processors and transporters were reached through GAP activities beyond the target of 34,000.

Conclusion

The GAP project External Evaluation has demonstrated the relevance of the project and the need to develop policy frameworks to support domestication of EOA into agricultural frameworks in Eastern Africa. Exposure of policy makers to the international organic trade forums like the Biofach Expo in Germany has really helped in changing their perspectives towards the potential of organic agriculture. Most of these policy makers have become advocates of organic agriculture within their ministries of agriculture and now pillars to leverage on as catalysts of policy discussions.

Keywords

Global Advocacy, policymakers, practitioners, technocrats and developmen

Nutrition Action Plans, a neglected instrument for advancing agroecological transformation: The case of the Uganda Nutrition Action Plan

Ms. Claire Atukunda [1], *Ms. Agnes Kirabo* [1], *Ms. Freda Orochi Laura* [1]

1. Food Rights Alliance

Introduction

Agroecology is increasingly being promoted for its potential to transform the food system by incorporating ecological principles into agriculture, ensuring sustainable use of natural resources, and addressing social inequalities in the food system such that people have control over what they eat as well as how and where it is produced. Globally, malnutrition in all its forms has been recognized as a hindrance to development. The global movement to end malnutrition has mobilized the world to develop interventional strategies categorized un-der nutrition-sensitive, nutrition-specific, and enabling environments. This movement has caused early-rising countries this call to develop multi-sectoral and multi-stakeholder Nutrition Action Plans (NAPs) to accelerate the mainstreaming of nutrition into country investments. NAPs are frameworks that guide the implementa-tion, monitoring, and reporting of nutrition actions. They present innovative multi-dimensional approaches and strategies that can be harnessed to promote agroecological transformation. Uganda is among such coun-tries and is currently implementing its second-generation Nutrition Action Plan.

Methodology

A desk review was conducted to establish opportunities the Uganda Nutrition Action Plan (UNAP) present for promoting agroecology in the country.

Results & Discussion

UNAP is aligned to the global Scaling-Up Nutrition (SUN) guiding frameworks that all SUN countries benchmark while developing their country NAPs. UNAP highlights three priority objectives, that is, nutrition-specific, nutrition-sensitive, and nutrition governance for achieving nutrition outcomes. With regard to nutrition-sensitive approaches, UNAP strategizes to increase the production of diverse, safe, and nutritious foods from plant, fisheries, and animal sources at household level through improving access to improved production technology, particularly climate-smart technologies, and promoting research for the production of both non-indigenous, indigenous, and underutilized nutritious foods food sources. These strategies promote numerous agroecological principles such as biodiversity, soil health, animal welfare, knowledge co-creation as well as food traditions. UNAP also strategizes to increase access and utilization of diverse, safe, and nutritious food sources through education and awareness creation, integrating nutrition in social protection programs as well as strengthening community linkages among farmers, consumers, and duty-bearers. This addresses social inequalities, promotes knowledge sharing, builds synergies, and promotes connectivity and participation of actors across the food system. Considering nutrition governance, (UNAP) strategizes to create an enabling environment through a multi-stakeholder approach involving over seven Ministries, Departments, and Agencies (MDAs). The UNAP framework also brings together the private sector, academia, and civil society through the SUN Business, Academia, and Civil Society Networks to catalyze the implementation of nutrition approaches among which is agroecology.

Conclusion

Although the term agroecology is not mentioned in this framework, the principles of agroecology are highly upheld. The absence of the term is not the absence of the provisions that are a haven to advance agroecological transformation. Given the benefits of agroecology including its contribution to ending malnutrition, broaden-ing engagements and profiling of alternative instruments such as NAPs is a significant step towards achieving agroecological transformation.

Policy contradictions, the worst hindrance to agroecological transformation: A case of Uganda

Oral

Ms. Claire Atukunda [1], *Ms. Agnes Kirabo* [1], *Ms. Freda Orochi Laura* [1]

1. *Food Rights Alliance*

Introduction

Uganda has a multitude of policy, legal and institutional frameworks on agriculture, food security and nutrition, natural resource management, and trade. In the long term, the country is directed by the Uganda Vision 2040 under the theme "A transformed Ugandan society from a peasant to a modern and prosperous country within 30 years". This vision is implemented through the five-yearly development plans that are operationalized through sector specific development and investment plans and/or program implementation action plans. According to Vision 2040, Uganda aspires to transform the agriculture sector from subsistence farming to commercial agriculture to increase profitability, competitiveness, and sustainability for improved food and income security for all its people. Agroecology presents a holistic approach to achieving this aspiration. Agroecology increases agricultural production and productivity while ensuring environmental sustainability, and holistic ecosystem interactions. However, agroecological transformation can only be realized when there is enabling environment at all levels.

Methodology

A desk review was conducted to determine the adequacy of Uganda's policy frameworks in promoting agroecological transformation.

Results & Discussion

All the policies are aligned with the Uganda Vision 2040. The key terminologies; profitability, competitiveness, and sustainability that were used in crafting this vision present barriers or enablers to agroecological transfor-mation based on the interpretation of the policymaker. This complexity in interpretation is reflected in several policy instruments where sustainable nature-positive production systems that are key to agroecology are in-stated as outcomes without supporting strategies and interventions. More often than not, commercial and/or industrial motives drive the policy strategies, making them contradictory to the high-level outcomes on agroe-cological transformation. For instance, most agricultural policy frameworks have provisions on sustainability, healthy and safe diets, regenerative production, social and cultural interactions, and biodiversity that can be leveraged to champion agroecology. However, within the same policy frameworks are provisions for the ex-tensive use of costly and environmentally degrading agricultural inputs and modern technologies. Moreover, Uganda has not, in principle, defined a production system that will lead to the achievement of the long-term development trajectory which has resulted in policies taking a dual approach namely; the seed policy. Further, whereas the country has sub-sector policies such as the fertilizer policy and organic agriculture, there is no standalone policy on agroecology.

Conclusion

Uganda needs to harmonize existing policies to harness agroecological transformation considering that agroecology is a multi-sectoral approach. Beyond policies, agroecological actors should intensify engagements on medium and long term plans and strategies at all levels. Further, evidence is required on the context-specific abilities of agroecology in achieving agricultural commercialization, food security, nutrition, and improved livelihoods. This will better position agroecological actors in evidence-based policy engagements, particularly in developing nations whose long-term goals are largely dependent on agricultural commercialization.

Testing Co-Management as an Option of Sustaining Fishery Resources for an Open Access Water Body: The Case of Lake Malawi in Nkhotakota District

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Introduction

Despite open access natural resources contributing significantly to peasants' livelihood, nutritional and food security, and hence occupying a critical agro ecological status in the Eastern Africa, how to sustainably man-age these resources including forests, lakes, rivers and rangelands remain has not been resolved. One such important resource in Malawi is the Lake Malawi which calls for sustainable management of the fishery for households and the country's economic growth and food security.A case study was undertaken in Nkhotakota District to undertake the fishery resource inventory, identify the fishery industry actors and evaluate actors in fishery resource management and examines the role of co-management in sustaining fishery resources for the lacustrine water body. The significance of the study is that it provides a resource management and governance option for a critical open access resource to enhance its benefits to the peasants and its conservation.

Methodology

Primary data was collected through semi -structured interviews of 32 fisherfolks that relied heavily on the lake for food and income, four focus group discussions and key informants' interviews. The Multi actors Perspective approach was used in identification of the actors, their assigned roles in the fishery resources and how their role perception affected the fishery co management system. Content analysis was used analyze the overall qualitative data collected.

Results & Discussion

The actors did not execute their assigned roles in their current position, due to their inability to relate the roles with the challenges they were experiencing. There existed unequal power relations among the actors in mobilizing power resources. The failure of actors in exercising the assigned roles and unequal power relations among them suggests existence of conflicts of interest in the co management.

Conclusion

Empowerment of actors is recommended to help them relate their new roles and power relations to the chal-lenges they are experiencing and, therefore, being able to openly declare the interest they have on the resources exists.

Keywords

Co management, power, power relations, role perception

Decolonizing Climate Finance: Shifting Finance to Agroecology

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Introduction

The current condition of agroecology financing in Kenya is examined in this study along with the creativeness of Community Savings and Lending Associations and their potential to decolonize and unlock Climate Finance for Agroecology.

Methodology

The study has used desk review of the existing literature and interviews with women farmers transitioning to agroecological practices in Isiolo, Baringo, Makueni, Kajiado, and Laikipia Counties, community-based stake-holders, government, and non-governmental organizations.

Results & Discussion

There is a clear consensus and urgency to transform our current conventional food systems, which are highly vulnerable to crises ranging from the most recent Covid-19 pandemic to the ever-evolving climate change, according to a review of the existing literature and interviews with women farmers transitioning to agroecological practices in Isiolo, Baringo, Makueni, Kajiado, and Laikipia Counties, community-based stakeholders, government, and non-governmental organizations. There is a huge and growing interest in agroecology because it of-fers a path toward changing unjust food systems. Agroecological changes continue to be financially constrained by colonialistic climate finance schemes that are overly bureaucratic. Increased funding for agroecology and regenerative businesses driven by locally led financial frameworks com-bined with credible innovative solutions that are people led is sustainable and builds a thriving community and nature.

Conclusion

The Community Savings and Lending Associations model allows for cutting-edge climate financing infrastructure in situations where traditional financial institutions are expected to assume significant risks and are occasionally referred to as "unbankeable." As more than 90% of smallholder farmers who are women convert to agroecological food production methods, the Savings and Lending organizations fills in the gaps in the data and builds on the overall statistics. The possibility to build a climate financing model for the disadvantaged while supporting locally driven, women-led, and community-led initiatives is provided by climate risks, credit worthiness and scores, and just transitions to more sustainable food production systems through Community Savings and Lending Associations (VSLAs).

Keywords

Agroecology
Climate Finance
Community Savings and Landing Associations
Women farmers

Prosperous Land, Prosperous People: Scaling finance for Nature-based Solutions in Kenya

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1. Food and land Use Coalition- AGRA

Introduction

This analysis presents a case study focused on Kenya, highlighting the considerable climate change mitigation potential of Nature-based Solutions (NbS), internationally and at national level. It presents a possible invest-ment pathway for public and private financiers to unlock the benefits of NbS in Kenya, which would require USD $1.2 billion of investment per year by 2050. NbS are getting increasing attention and recent evidence sug-gests that the implementation of 20 different land- based NbS can provide around 30% of global mitigation needed to limit global warming to 1.5°C. NbS are actions to protect, sustainably manage and restore ecosystems that address societal challenges effec-tively and adaptively, benefitting human health and promoting biodiversity. They are a critical part of the transformation agenda for food and land use systems. Protecting and restoring nature is key to delivering the 1.5°C target. Yet less than 2% of global climate finance is currently flowing to NbS. This finance gap is due to the fact that private and public investors often lack the infor-mation to assess the economic opportunities provided by a sustainable, nature-and climate-positive economy.

Methodology

This paper was originally produced by the food and land use coalition.The analysis was structured around answering five key questions:

1. What is the cost-effective mitigation potential of NbS at country level?
2. What are the project- and jurisdictional-level costs and revenue potentials of different NbS measures?
3. What is the finance gap between current flows and what is needed?
4. Who are funders (public and private) and what are the financial mechanisms that will be most effective in unlocking the potential of different types of NbS activities in different country contexts?
5. What are the features of an enabling environment needed to bridge the finance gap?

Results & Discussion

This report seeks to address the knowledge gap that exists around the investment requirement and possible financing strategies which can be used by both public and private investors to unlock the myriad benefits of NbS in Kenya. As such, the ambition is to inform the Government of Kenya's long-term investment and policy strategy for NbS and to inspire the mobilization of wider investors to deploy a range of financial instruments towards NbS in Kenya and globally.
The report is structured as follows:

- Chapter 1: Summarizes the NbS opportunity in Kenya – including the mitigation potential and analysis of typical costs and revenues associated with NbS business models.
- Chapter 2: Explores financing requirements and strategies for different NbS.
- Chapter 3: Discusses how Kenyan policymakers can help to create a positive enabling environment for invest-ment into NbS in Kenya.
- Chapter 4: Concludes with key recommendations and next steps for scaling NbS investment in Kenya and globally.

Conclusion

The study finds that a wide range of investors are required to fund the transition and suggests how Kenyan pol-icymakers can create the right environment to overcome key barriers to investment and attract private capital. Beyond Kenya, this analysis could be applied to other countries and globally.

Keywords

Finance, Nature based Solutions, Food Systems, Climate Change, Kenya

Public Investments in Organic Agriculture in Kenya

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1. Biovision Africa Trust, 2. master

Introduction

Over the years, the Government of Kenya has strived to achieve individual household, county and national food security through various legislations and investments. Despite the government making the provision of food one of its top four priorities, it is estimated that about 14.5 million of Kenyans face food insecurity and poor nutrition each year (GHI, 2020). The lack of food is closely linked to use of unsustainable farming practices, environmental and land degradation, unpredictable weather patterns, high rates of poverty, aging farming population among others (KIPRRA, 2020). Kenya's smallholder farmers constitute a huge portion of the rural population and therefore, are important stakeholders to consider in realizing the broader goals of food security. The potential to realize increased and sustainable agricultural productivity lies in investment in technologies that increase output while safeguarding the health of people, animals, waters, soils, and land. This paper is based in a study conduced to review public sector investments to the agricultural sector, with a focus on organic agriculture (OA) in Kenya over the period 2010-2020. Public investment referred to annual budgetary allocations for agriculture in the state departments crops, livestock, fisheries, and cooperatives.

Methodology

Review of public sector investment for organic agriculture was done at two levels of government, that is the National and County levels. This is because agriculture is a devolved Ministry, with the aim of enhancing agri-cultural production within the 47 Counties in Kenya. For national level assessment, public investment data was available from 2010 while the data from Counties was available from 2014. A mixed method approach was engaged to evaluate public sector investments. That is document search (hard and soft copy), key informant interviews and a participatory process using the KESHO tool.

Results & Discussion

Findings show that public investments in organic agriculture is very low, 3% and 5%, for National and County level, respectively. Returns on investments calculated by using the budget allocations (investment) and expenditure (assumption) costs with an interest rate of 8% shows that both organic and general agriculture have a negative IRR of 7.02 and negative 7.25, respectively. Despite the negative IRR for organic agriculture, it is worth-while to invest since there are additional benefits such as maintaining and improving soil fertility, enhanced biodiversity, reduced erosion, reduced risks of risks of human, animal, and environmental exposure to toxic pesticides and herbicides. The stakeholders and key informants listed positive impacts of organic agriculture on human health. Stakeholders shared negative experiences they have had consuming foods and fruits sprayed with pesticides and herbicides such as stomach illness after eating fruits sprayed with pesticides while organi-cally grown fruits did not have any effect on their health.

Conclusion

If Kenya can advocate for organic agriculture, increasing food production while reducing use of inorganic fertilizers and pesticides will require profound changes in agricultural systems. But is organic agriculture the solution? This question was addressed through focus group discussions that were held for various stakehold-ers and key informants on the implications of OA on soil, ecosystems/environment, and human and animal health in Kenya. To elucidate the positive and negative implications of organic farming on soil health, ecosys-tems/environment, and human and animal health in Kenya, stakeholders and key informants identified several

indicators detailed in the main paper In particular, stakeholders shared negative experiences they have had consuming foods and fruits sprayed with pesticides and herbicides such as stomach illness after eating fruits sprayed with pesticides while organically grown fruits did not have any effect on their health.

Keywords
national food security organic agriculture public sector investment

Agroecology and Sustainable Livelihoods as a Framework to Empower Women and Youth in East Africa

Ms. Celina Butali [1], *Dr. Monica Nderitu* [1]

1. Vi Agroforestry

Introduction

Countries in East Africa continue to face the negative effects of climate change with environmental shocks and irregular rainfall over recent years. This has resulted in below average crop production, crop failure, poor livestock production, localized resource-based conflict and high food prices and year-to-year food insecurity. Despite attempts made to attract women and youth in agroecology, there are underlying issues that deny them opportunities to participate actively and meaningfully. Gender social norms play a great role in marginalizing women and youth, especially when it comes to access and control over productive resources. The depletion of shared natural resources affects both men and women differently - when food is scarce, female family members often get the smallest portions which often are deficient in dietary requirements.

Agroecological principles advocate for inclusion, human and social values, diversity and the need for co-creation and knowledge sharing that provides rural women and youth an opportunity to exercise their voice, power and agency in their households and communities. The acquisition and application of new knowledge and skills empowers women and youth to have autonomy over productive resources and participate in decision making as well as present gainful employment opportunities that would enable them to exploit their full potential. Gender transformative approaches ensure that the root causes of inequalities are addressed. Agroecology thus can be a solution to sustainable livelihoods and the empowerment women and youth. This paper presents practical experiences of how agroecological practices can socially and economically em-power women and youth whilst contributing to climate change adaption and mitigation.

Methodology

The study used a cross sectional descriptive design. A mixed-methods approach consisting of both quantitative and qualitative techniques. A total of 1,744 respondents from the four countries participated of which 55% were women. The quantitative data were analysed using the STATA statistical package. Descriptive analysis was conducted for the selected variables of interest. Summary statistics were calculated for sample means (standard deviations), median, range minimum, and maximum values for all continuous variables. All these analyses were conducted at a 5% level of significance. Qualitative information was analysed using content analysis.

Results & Discussion

Results from the Agroforestry for Livelihood Empowerment (ALIVE) programme in East Africa, women participation in leadership and decision-making in the partner organizations increased by 18% compared to a baseline of 8%, achieving the programme target by about 87%. Joint decision making increased from 10% in 2018 to 74% in 2021. which was above the ALIVE programme target of 53%, Over 91% of the ALIVE programme respondents reported to have adopted sustainable agricultural practices introduced by the programme.

Conclusion

The adaptation of agroecological practices has proved that women, men and youth can work together for the benefit of their households and communities. Women are open to explore opportunities that can transform their families.

Enhancing Research Through Farmers Research Networks: Opportunities and Challenges

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Introduction

Since 2019 to date, McKnight Foundation through Collaborative Crop Research Program (CCRP) initiated support for Agroecological Intensification (AEI) under the project titled Agroecology Hub Tanzania (AEHT). The hub (AEHT) operates with partners through farmer research networks (FRNs). Farmers' research networks (FRNs) are among the useful means of promoting farmers' involvement in research to generate appropriate technolo-gies adaptable to their existing environment. Working as a network takes advantage of the existing FRNs and builds on their strengths while addressing their weaknesses. With FRNs, the research agenda originate from problems facing the group, hence the need for co- creation approaches. FRNs are an emerging approach that requires more research to generate information on the environment to permit its operation. As a response to the notion above, a scoping study was conducted to assess the status and needs of FRNs in order to inform the designing of interventions.

Methodology

A survey was conducted in Mbeya, Morogoro and Singida regions in Tanzania. A total of 37 respondents were purposively selected based on one criterion of being FRNs members. Hence the following were included; FRN leaders and representatives of farmers' groups established and/or working with AEHT partners. In addition, a total of 12 focus group discussions with other FRN members and 15 key informants' interviews were conducted.

Results & Discussion

The results indicated that lots of FRNs had fewer males than females, and the majority were youth. Another important aspect reported during FGDs was the decreased number of members due to dropout cases. The reasons for the dropout included failure to conform to rules and regulations, conflicts, and poor leadership. Farming activities in the three regions varied considerably. Maize and sunflower were largely grown in Singida whereas paddy was a common crop in Mbeya region. Based on livestock, animals kept included; cattle, goats, sheep, chickens, and pigs. The prominent challenges reported included disease and pesticides, lack of markets, lim-ited access to inputs, and drought. Based on gender issues, all men, women, youths and disabled had access to productive resources, however, males were mentioned to have more access to resources than their coun-terparts. Small differences were noted where men were found dominant in leadership and marketing issues. Women were entrusted to be treasures because of their trustworthiness.

Conclusion

The study concludes that farmers are involved in a mix of farming and non-farming activities. Research activities were undertaken by few farmers organized by one of the non-Governmental Organizations included in the study. The study recommends members of FRNs be trained on the principles of agroecology so that they can be able to undertake research as they conduct AEI practices. Another recommendation is that the use of lead farmers be encouraged. This will partly solve the problem of a limited number of extension staff as well as limited transport facilities to provide farmers with immediate support. However, continued research on AEI practices will provide farmers with alternative inputs for improving agricultural production

Food Sources and Dietary Diversity among Conventional and Organic Female Farmers in Murang'a County, Kenya

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Introduction

Kenya has made significant progress in addressing malnutrition although undernutrition continues to be a public health challenge in the country, in particular among rural women and children. Most rural families depend on farming for food, income and general livelihoods. A number of abiotic and biotic factors pose threats to food and nutrition security in Kenya. These, together with social drivers such as consumer preferences and food safety concerns and other factors, have led to an increased promotion and interest in organic agriculture (OA) in the country. However, the full impacts of OA to household nutrition and nutritional practices is not fully documented in Kenya. The current study assessed food sources and dietary diversity among selected non-certified organic and conventional farming women in Kenya.

Methodology

We conducted dietary diversity assessments among 23 non-certified organic (referred to as organic later in the abstract) and 74 'conventional' female farmers in Murang'a County during a food plentiful season, between January and March 2020. To score for Minimum Dietary Diversity for Women (MDD-W), we used repeated (seven times) 24 Hour Food Consumption Recalls to determine the types of foods consumed from different Food Groups (according to UN-FAO system). We gathered information on food sources using a household survey questionnaire. The MDD-W scores were calculated according to the UN-FAO / FHI Methodology (2016) which focusses on 10 Food Groups.

Results & Discussion

Overall, the organic farmers tended to have consumed more food items from own-production (62 %) than purchase (73 %) while 79 % of the food items reported by conventional farmers were from own-purchase compared to 54 % from own-production. The types or categories of crops and livestock produced were largely similar between the two farmer categories. We found that 100 % of the organic and conventional farming women had consumed food from at least 5 of the 10 MDD-W Food Groups, meaning they tended to achieve acceptable levels of dietary nutrient intake and quality, overall. However, only 70 % conventional and 91 % organic had consumed from at least 9 of the MDD-W Food Groups. 'Fish/Seafood' had been the least consumed by both groups, followed by 'Eggs' (52 % organic, 23 % conventional), 'Vitamin A rich fruits', 'Meat', and 'Other fruits'. The consumption of some iron-rich foods was high as 83 % organic and 61 % conventional women farmers had consumed meat, and 92 % organic and 96 % conventional had consumed legumes.

Conclusion

Own-production and purchase contributed significantly to household food. The high MDD-W for both farmer categories reflected reasonable adequacy in dietary nutrient intake by the women though the low consumption of some animal-based products could mean low protein intake. We recommend similar studies to be held during a food lean season for a fuller comparison. Further, similar studies in sites where OA is certified and marketed with a premium price will help to evaluate the full potential for OA in a setting with higher household incomes

Roles of women and youth in agroecology to increase food production and reduce income poverty in Dodoma semi arid, Tanzania

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Results & Discussion

The findings show that 73.1% and 69.5% of women and youth practiced agroforestry, cultivating a total of 253 ha and 131 ha, respectively. Agroforestry practices involved planting exotic trees and retaining indigenous ones in the farm fields. The common types of agroforestry practiced include intercropping (agrisilviculture), home gardening (silvohorticulture) and livestock production (silvopastoral). The mean values for the perceived crop yield in tons per hectare from land with agroforestry were maize (1.98), sunflower (1.43), millet (2.34), sorghum (1.92), and cassava (32.1), while the yields from land without agroforestry systems for the same crops were 1.08, 1.50, 1.72, 1.02, and 36.8 tons per hectare, respectively. The perceived yield for maize, millet, and sorghum were significantly higher in land with agroforestry ($p = 0.001$, 0.001, and 0.003), while for cassava the yield was significantly higher in land without agroforestry ($p = 0.012$). The perceived average annual income generated from agroforestry was TShs 1,367,304 (USD 586). Respondents admitted improving their food security and reducing income poverty through agro-forestry systems. The main agroforestry benefits include increased food production, improved income, ecosys-tem services, increased forest products, increased land value, and farm boundary demarcation. The major drawbacks to practicing agroecology include lack of markets, inadequate financial capacity, lack of land own-ership, low availability of improved seeds, and prolonged drought.

Keywords

Semi-arid land, deforestation, food consumption, livestock keeping, poverty

Women Involvement in Use of Ethnomedicinal Products in Masaka and Mpigi Districts, Uganda

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Introduction

Cooked bananas, also known as matooke, are the main source of food in Uganda's Central, Western, and Mt. Elgon regions. Recently, the production of bananas has been seriously threatened by numerous pests and illnesses. Nematodes and banana weevils are major pests, and bacterial infections and panama wilt are the most common diseases. There hasn't been sufficient research that address women's engagement in the usage of biorationals in the study area. A study that was conducted in the Central Ugandan districts of Masaka and Mpigi assessed the extent to which women used biorationals to treat pests and diseases that affects bananas, as well as farmers' assessments of how efficient these treatments were.

Methodology

Using both quantitative and qualitative data, social economic approaches were applied. A structure questionnaire and key informant interviews were used. A logistic model was used to determine the farmers' perceptions of the effectiveness of biorationals in getting rid of banana weevils. The survey's sample size was 144 house-holds, or one hundred forty-four. Organic farmers were identified using snow ball sampling, while the remain-ing farmers were chosen using a random sampling technique. The sample was chosen using an undisclosed population sampling method

Results & Discussion

According to the logistic model, women were more likely than men to consider biorationals to be effective. Knowledge (awareness) of the product played a key role in farmers' perception of and use of biorationals goods. Farmers with a secondary education embraced and evaluated the usage of biorationals as being extremely important

Conclusion

According to this approach, women's participation, farmers' training in banana production, and the usage of livestock products are all crucial issues that need to be addressed in order to increase the use of biorationals in banana production.

Keywords

Women involvement; Gender Ethnomedicinal products; Perception; Logistic regression; Perceived Effectivness.

POSTER Presentations

Co-learning research methods for agroecology

Mr. Ric Coe [1]

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Introduction

Progress with agroecology and agroecological transitions has many unknowns and so many different types of research are needed to support it, using a diverse range of methods. Transdisciplinary systems research and farmer-centred methods are key. Co-learning is a principle of agroecology. What does it mean to co-learn and co-develop the research methods we need?

Methodology

We have explored co-development of methods in agroecological projects in East and Southern Africa over the last 10 years and drawn conclusions from the experience.

Results & Discussion

Evidence from cases studies and drawing on a framework of local-global connections shows the following. The key positive lesson is that it works, meaning that co-creation by researchers, specialists and others can generate new, relevant, adapted methods. There is clearly a demand to engage in methods co-development. The field components don't only bring in farmers' perspectives, they help give confidence to everyone, prompting project teams to further refine and use the methods. Project team members always have experience and insights that contribute, even when they do not describe themselves as researchers. The same is true of farmers and other community members. Many methods ideas tabled by researchers have been updated, improved or made more applicable by farmers. There are always sources of ideas to draw on in the literature – we are never starting from scratch. When it comes to sharing the results with the wider world, publication is not the only way - our networks can also be a useful channel. Some of the challenges include the fact that research methods can not be separated from the rest of project process and are intertwined with farmer priorities, capacities and motives. Motives are particularly important. Farmers with whom a project team already has a very strong relationship of trust can be prepared to contribute to methods development. But others are likely to see it as a waste of their time. A common barrier is that researchers need to relearn what they thought they new about research methods. A challenge for development of methods can be getting feedback from project teams on what is working, as their interest is primarily in action on the ground. Preparing descriptions of co-developed methods for publishing is hard work. Finally, there is always more. This process of co-development of methods is never finished, because the research questions, the contexts and the people involved keep on evolving.

Conclusion

Co-learning about the *methods* needed in agroecological research, not joint application of methods developed by researchers, is feasible and useful. But it comes with significant challenges. A key challenge is that researchers often need to re-learn what they thought they knew about methods.

Contribution of different Farming Systems to Soil and Ecological Health in Trans Nzoia County, Kenya

Dr. Janeth Chepkemoi [1], *Prof. Richard Onwonga* [1], *Mr. Noel Templer* [2], *Mr. Elkana Kipkoech* [3], *Ms. Angela Gitau* [1]

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Introduction

Current agricultural practices in developing countries are dominated by the use of inorganic fertilizers caus-ing land degradation. Others include inapprpopriate tillage practices that destroy the soil structure and crop-ping practises that contribute to reduced crop diversity (Pagliai *et al.*, 2004). The low soil fertility is majorly contributed by agricultural intensification particularly in developing countries due to the ever-increasing food demand for the rising population (Rezig et al., 2012). Nutrients can be partially returned through organic inputs which are essential for organic matter accumulation and farming systems sustainability (Omenda *et al.*, 2019). As such, there is an urgent need to transition to more sustainable means of food production. Organic agriculture can play an important role in solving present and future challenges in food systems while also promoting the ecological health of such systems (Rahmann *et al.*, 2017). In Kenya, smallholder farmers have adopted organic farming practices as a result, farm practices such as agroforestry, use of organic soil amendments, biological pest control and cropping systems such as crop rotation and intercropping have been widely adopted. Organic Manure improves soil physical properties and chemical properties such as pH and nutrient availability. Addi-tionally, it stimulates microbial activity, serving as food for microbes and hence enhancing soil health (Lindahl and Tunlid, 2015). Cropping systems adopted by farmers also have lasting impacts on ecological health of a farm system. Intercropping and crop rotation, on the other hand, have been shown to result in benefits that foster ecosystem health (Thierfelder, 2012). This study, therefore, sought to establish the extent with which such farm practises are utilised by farmers in Trans Nzoia county and hence their contribution to ecological health.

Methodology

A simple random sample was used to select 71 farmers for interview in Trans Nzoia County using semi-structures questionnaires. Ecological factors included were land preparation, agroforestry practices, soil fertil-ity management, soil and water conservation. Soil samples from a depth 0- 30cm were collected from each farm visited from the main crop in a zigzag manner and thoroughly mixed to achieve a composite sample. Samples were analyzed for pH, Total organic carbon, total nitrogen and available phosphorus as described by Okalebo 1993. Data collected was analysed using SPSS version 21. A data normality test was undertaken while Frequencies and percentages were tabulated using Microsoft excel.

Results & Discussion

66% of farmers practiced organic farming while 34% are conventional farming. The cropping systems included monocropping, crop rotation and intercropping. The soil pH from organic farms were slightly higher than from conventional farms. Nutrient content of soils from organic farms was significantly higher than that from conventional. While the average nitrogen (%), K (Cmol/ kg and P (ppm) of organic soils were also higher than conventional farms.

Conclusion

Organic farming system is the most preferred in Trans nzoia county. The average pH and soil nutrients of the soils obtained from organic farms, were slightly higher than that of soils from conventional farms, an indicator of improved ecological health.

Drought Induced Wilting and Recovery of Lablab (Lablab purpureus L. Sweet) Seedlings under Moisture Stress Condition

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Introduction

Lablab is a multipurpose and drought tolerant crop compared to its related crops. This crop is increasingly gaining popularity in terms of its uses for food, feed, conservation agriculture, enhanced soil fertility and income generation. Since drought tolerant improved varieties are still missing in many countries, this study focused on physiological responses to drought stress at seedling stage among 305 Lablab germplasm collected from different part of the world.

Methodology

The experiment in two repeating cycles was laid out in an Augmented Complete Block Design (ACBD) where water was supplied until all accessions germinated. Water was then stopped until wilting and drying of about 50% of the plants. Similar amount of water was again supplied to induce some plant recovery from the drought stress. Collection of data involved physiological responses of quantitative seedling traits to the drought stress at the three experimental stages i.e. germination, wilting and recovery stages. The Generalized Linear Model (PROC GLM) and Principal Component Analysis (PCA) were used to analyze variations and relationship of quantitative traits and their accessions at $p < 0.05$, 0.001, and 0.0001.

Results & Discussion

The results disclosed a great variations among accessions for their responses to the drought stress across the experimental stages. Accessions, blocks, experiments and weeks had a significant effect to the physiological traits almost in all the stages. Most traits had also a significant difference in relation to contrast among accessions, among checks, and between accessions and checks. 93.3% of the total variations among the accessions were accounted from the first three principal components (PC) with Eigenvalues > 0.4. Based on cluster dendrogram and their variation, D352 (C1), D349 (C2), HA4 (C3), D363, and D147 were considered as the drought tolerant accessions while D6, D28, D66, D106, and D271 considered as drought susceptible accessions.

Conclusion

These selected Lablab accessions and associated physiological responses to the drought stress among the accessions were crucial for breeding programs towards the improvement of Lablab production especially in dry farming systems.

Keywords

Lablab purpureus, Drought stress, Physiological responses, Qualitative data, Seedling traits

Efficacy Of Eucalyptus Ash (Eucalyptus Globules L) On The Tomatoes' (Solunum Lycoperscum) Shelf Life Under Room Temperature Storage Conditions In Central Uganda Tumwizere Collin, Dr.Murongo

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Introduction

The cultivated tomato, (Solanum lycopersicum L.) is the world's most highly consumed vegetable due to its status as a basic ingredient in a large variety of raw (Wu et al., 2022), cooked or processed foods. It belongs to the family Solanaceae, (Lima et al., 2022) which includes several other commercially important species. Tomato is grown worldwide for local use or as an export crop. In 2014, the global area cultivated with tomato was 5 million hectares with a production of 171 million tons (Camara et al., 2022), the major tomato-producing countries being the People's Republic of China (hereafter "China") and India (FAOSTAT, 2017). Tomatoes can be grown in a variety of geographical zones in open fields or greenhouses, and the fruit can be harvested by manual or mechanical means (Masetti et al., 2020).

Methodology

he researcher used a Completely Randomized Block Design which was a plan, strategy and investigation structure in a certain element, so this was used as a tool for obtaining the answers to research questions and problems. This was used in obtaining an operational plan in executing a few required steps for completing the research and ensures that the chosen research design was as sufficient and adequate as possible for seeking the authentic findings, answering the objective of the study and pointing sharply on research questions. The treatment which was replicated into three different quantities; this treatment was eucalyptus ash under measurements of 0.5g, 1g and 1.5g and the control where no ash was added to the tomatoes.

Results & Discussion

Analysis of variance showed that different quantities of eucalyptus ash based storage media significantly ($P<0.05$) influenced decay percentage in stored tomatoes (Table 2 and Figure 4). The results indicated that the first two weeks of storage and data collection, tomatoes stored in the different eucalyptus ash based storage media showed no significant differences ($P<0.00$) in decay percentage. The results also indicated that the different eucalyptus ash based storage media and control gave the same decay percentage of 0.00% in week one and week two. This could be attributed to the fact that in the first two weeks, tomatoes had not fully under gone physiological changes which can lead to rotting. On another hand, in the first two weeks of storage, tomatoes had not yet started losing water to the surrounding which could favor microbial attack. The results indicated that tomatoes stored in 1.5kg of eucalyptus ash gave the lowest significant ($P<0.00$ and <0.003) decay percentage of 7% and 79% in week three and eleven of data collection respectively. The results further indicated that there were no significant differences in same weeks among tomatoes stored in1.5kg of eucalyptus ash for instance in week three and four which gave a decay percentage of

Conclusion

It was concluded that 1.5 kg of eucalyptus ash gave the lowest decay of tomatoes, this further gave the lowest weight loss and also the lowest level of softness of the tomatoes.

Keywords

Eucalyptus, Bio ash, Soggy, decay percentage, tomato

Farmer Research Network Tests the Effects of Soil Health Interventions on Striga hermonthica and Maize Productivity in the Lake zone of Kenya

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Introduction

To be widely adopted, soil health-promoting practices with long-term objectives of improving soil fertility, organic matter content, and resilience to drought, disease, and other stresses, should also demonstrate short-term benefits related to food production and combatting pest, disease, and weed problems. This study aimed to assess the effectiveness of several promising soil health practices on increasing cereal (maize, sorghum) production, by controlling the parasitic weed, Striga hermonthica.

Methodology

More than 300 Kenya Lake zone farmers from 6 counties were part of a Soil Health Farmer Research Network (FRN) that compared the effectiveness of their current maize production practices to several residue-based soil health interventions, specifically biochar, boma compost and a lablab rotation. The farmers evaluated the degree to which the different practices suppressed the parasitic weed, *Striga hermonthica*, and improved their maize yields. Here we present trial results for long rains 2020 and 2021.

Results & Discussion

This poster focuses on the Migori county results, where more than ninety farmers participated in the trial in both years. Results in both years showed that all three of the new interventions reduced striga infestation levels ($p < 0.001$) compared to the farmer's current practice. There were no severe striga infestations in any of the residue-based treatments in year one. Lablab and boma compost plots had low striga infestation incidence in more than 80% of the farms in both years, whereas striga infestation in biochar plots was mostly moderate. In the farmer practice treatment, striga infestation was severe in 32% of the plots in year one and in more than 80%of the plots in year two. Factors associated with severe striga infestation in the farmer practice plots included location, farm topography, and various stress factors (late planting, and pest and disease attack). Maize grain yields for "new" interventions were significantly higher than the farmer practice yields ($p<0.001$) in both years of the trial (mean farmer practice yield was 0.6 t/ha in year one and 1.5 t/ha in year two). Com-pared to farmer practice plots the mean maize yields were more than 3x higher for lablab in both years and 2x and 3x higher for boma compost in years one and two respectively. Mean maize yields in biochar plots were substantially lower than for lablab and compost interventions but almost always higher than for each farmer's practice. Importantly, these results are not merely a function of averaging. Across the two years of the trial, the higher yields associated with the "new" intervention treatments were remarkably consistent for individual farmers. Though yields varied significantly by geography (different villages), 100% of farmers had higher maize yields in lablab and compost plots compared to their own practice plots. At least 90% of farmers also obtained higher maize yields in biochar plots than their own practice plots in both years, though the biochar treatment was not rated highly by farmers.

Conclusion

The FRN approach enabled Migori farmers to identify soil health-promoting practices that will help them to mitigate Stria's devastating effects on maize productivity.

Soil Carbon, Nitrogen, Phosphorus, and pH impacts from a two-year trial of agroecological practices conducted with a Farmer Researcher Network in Western Kenya

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Introduction

To inform processes of agroecological transformation in smallholder farming contexts, Multipurpose soil management practices should be assessed alongside farmers that can build soil carbon and other related aspects of soil health and fertility. This study was co-designed with a network of some 300 farmer-experimenters to tackle issues of striga infestation and soil infertility, targeting unproductive fields on farms with a small set of promising practices.

Methodology

Practices selected were (1) biochar using a variety of local feedstocks; (2) boma compost, an improved method of composting manure and feed refusals to better recycle nutrients and carbon to the farm without losses; (3) growing of lablab forage/food/green manure during the Kenyan short rainy season to incorporate remaining biomass to soils. These were compared to farmer practice plots with lower rates of inputs and management typical to each farm. The striga and yield impacts of these practices are described in a separate poster presentation. Here we focus on the soils impacts of these practices using a representative sample of some 60 farms within the study. To measure soil health impacts we used baseline and endline tests of permanganate-oxidisable soil carbon (POXC, active carbon), light fraction particulate organic matter (POM) assessed using a simplified siev-ing/flotation assay, Olsen P, soil pH, and amino-sugar nitrogen using an NaOH digestion and trapping of evolved ammonia from soils using boric acid.

Results & Discussion

The strongest impacts were seen in soil carbon fractions, in which POXC increased by approximately 80 mg kg^{-1} over two years in biochar and boma compost treatments, compared to an increase of ~35 mg kg^{-1} under farmer practice ($p<0.05$), with POXC from lablab intermediate and not significantly different from farmer practice. Olsen P was higher after compost than under farmer practice, while POM did not differ significantly but was ranked in the same order of treatments as POXC. Soil pH showed no overall significant impacts, and amino-sugar N results showed greater variability and no significant differences, although the ratio of POXC to amino-sugar N was lower in the lablab plots than the other organic residue treatments (statistical contrast, $p=0.02$), indicating potential shifts to lower C:N quality ratios of soil organic matter from the use of a high-biomass multipurpose legume. Further work will examine the dependence of these results on farm contexts.

Conclusion

Along with increases in cereal yields and decreases in striga from these practices, Our findings suggest that impacts on key soil health indicators, including carbon stocks, may be gained from relatively short time periods of applying organic residues at appreciable rates (e.g.. ~8 tons ha^{-1}). Our study emphasizes the need to more efficiently recycle organic materials from on- and off-farm sources to upgrade unproductive soils and maintain soil carbon in smallholder systems. The farmer research network approach showed potential to both demonstrate positive innovations at farm level as well generate evidence to assess longer-term benefits of recycling residues and using multipurpose legume crops, across a wide variety of contexts in regions such as Western Kenya.

The Kenya Agroecology Hub's Experiences with a Farmer Research Network Approach

Dr. Beth Medvecky [1], *Mr. Kevin Wanjare* [2], *Dr. Elizabeth Dyck* [3], *Dr. David Stern* [4]

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Introduction

East African farmers are struggling with several interrelated agricultural crises eg increasingly erratic weather, degraded soils, major pest and disease problems, and lack of income generation from agriculture. Agroecology (AE) can help farmers meet these challenges due to its emphasis on (i) using locally available and internally generated resources rather than relying on external inputs; (ii) harnessing natural processes to improve nu-trient cycling, soil health and pest, and disease control; (iii) increasing farm functional diversity for improved resilience and food security; and (iv) integrating crop and livestock enterprises to increase efficiencies and prof-itability. An important approach for farmers to learn about AE options that can make a difference for them is to participate in a Farmer Research Network that focuses on testing AE interventions with the potential to mitigate and manage specific challenges.

Methodology

Farmer Research Networks (FRN) involve farmers collaborating with other farmers and development partners to test the strengths and limitations of several AE options at the farm, community, and regional levels. At the individual farm level, farmers compare their current practice (not a zero control!) to a small set of AE alternatives. Farmers from the same community or, even the same region, who are testing the same sets of interventions, network and share their knowledge, observations, and results with one another via WhatsApp and face-to-face encounters.

Results & Discussion

The Kenya AE Hub currently works with FRNs that evaluate the potential for AE interventions to rehabilitate degraded soils, boost crop productivity, and control farmers' prioritized agricultural pest and disease problems. This poster highlights some of our key insights gained from working with the Migori county-based Rural Farmers Research and Development Network and other FRNs from the Lake zone region of western Kenya.

Conclusion

The FRN approach is a powerful tool to build farmers' familiarity with AE options with the potential to address their most pressing agricultural constraints. When farmers' priority challenges drive the research, and their experiences and local knowledge are recognized as essential, the discovery process becomes genuinely collaborative. Through simple but meaningful comparisons and an emphasis on social learning, the FRN approach delivers clear results while building farmers' motivation to innovate and problem-solve. FRN research reveals the broadly useful and realistic interventions vs. those with more context-dependent effects or those that are unrealistic for farmers to implement due to labor and/or capital levels. For these reasons, FRNs lead to greater impact and uptake of useful AE interventions compared to a promotional approach, where farmers are ex-pected to take outsiders' words at face value, and the disadvantages or shortcomings of interventions are not made explicit.

Keywords

"research for development", "farmer participatory research"

Effect of Sisal (Agave Sisalana) and Sweet Thorn (Acacia Karroo) Ethno-Medicinal Extracts on Prevalence of Selected Pests and Diseases in Assila F1 Tomato Variety

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Introduction

This study compared the efficacy of sisal (*Agave sisalana*) and sweet thorn (*Acacia karroo*)ethno-medicinal extracts on prevalence of selected pests and diseases in Assila F1 tomato variety was carried out in order to provide cheap and safe alternative in controlling tomato pests and diseases.

Methodology

A 13x13m complete randomized block design with nine replicates was used to determine the prevalence of tomato pests and diseases. The assessment was done at organic demonstration site of Uganda martyrs university using three treatments; sisal extracts, sweet thorn extracts and control. Healthy tender leaves of sisal and sweet thorn were harvested and 10kgs of each treatment were measured and chopped into small piece, crushed then 5litres water was added. The prepared mixtures were then shaken and sprayed uniformly onto the tomato plants in the plots to which they were assigned to at a 4 days interval starting from one to eight weeks 8interval after transplanting for 8 times. Meanwhile control plants were not sprayed. Each replicate had 20 plants and 10 plants were selected for data collection in each replicate. Agronomic traits were evaluated by measuring plant height, stem girth,leaf length,leaf width, leaf length using ametre rule. Final fruit yield was measured by weighing mature tomatoestomatoes. Pests were assessed as follows; whiteflies were assessed by counting the adult white flies. Aphids were assessed using a pest scoring scale of 0-5;African bollow worm is assessed using a scoring scale of 1-5. Disease severity was assessed as below; early blight and late blight severity was assessed using ascale of 1-4 .Bacterial spot severity was scored using the scale of 1-6 and then powdery mildew severity was estimated using a disease scoring scale of 0-5. The analysis of variance (ANOVA) at($P<0.05$) was carried and means were compared using LSD.

Results & Discussion

The results of the study indicated thet there was significant ($P<0.05$)diferences recorded between sisal and sweet thorn ethno medicinal extracts for pest prevalence. The lower mean for white flies (0.78), tomato fruit borer (1.3) and aphids (0.86) and red spider mites(0.3) prevalenece score were recorded for sisal ethno medicinal extracts than sweet thorn extracts but lower than the control plots. There was significant differences ($P<0.05$) observed between of application of sisal and sweet thorn ethno medicinal extracts for disease prevalence. The lower mean for early blight (1.1), late blight (1.6), bacterial spot (1.1)and powedery mildew severity (1.8) severity scores were recorded for sweet thorn ethno-medicinal extracts than sisal extracts but lower than the control plots. The results of the study revealed that application of sisal extracts significantly ($P<0.05$) increased plant height, stem girth, leaf length, leaf width and final fruit yield. Application of sisal and sweet thorn ethno- medicinal extracts significantly ($P<0.05$) showed an effect on the yield components and yield of tomatoes. The higher final

Strengthening the Farmer Managed Seed system for sustainable food Systems and Biodiversity conservation, a case of Lindi and Mtwara regions in Tanzania

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Introduction

Seeds is a vital component in crop production. Farmers obtain seed for agriculture from both farmers' seed systems and formal seed systems. However, more commonly, farmers access their seed from sources within farmers' seed systems, which include on farm saved seeds, local grain and seed markets and social networks. According to the National Agricultural Sample Census of 2019/20 by the Ministry of Agriculture it indicated that more than 76% of the total cultivated area by smallholder farmers, used seeds from the farmer managed seed system, there is a need to strengthening the farmer managed system that helps in biodiversity conservation and creating sustainable food systems, However the farmer managed seed system in Tanzania faces challenges to thrive and legal recognitions due to several reason, lack of functional community means which helps in storage and development of agro biodiversity within particular areas, less recognition and support of farmer managed seed system, shortage of in situ research on farmer managed seeds, technical know-how of farmers to produce, multiply, save and distribute good quality farmer managed seeds

Methodology

The study used a participatory and team approach requiring involvement of all stakeholders including but not limited to the smallholder farmers, local government authorities. Through dialogues, workshops, Focused group discussions TABIO members and stakeholders under the CROPS4HD and RESEARCH & ADVOCACY pro-grams have formed the seed working group which acts as a think tank for issues related to farmer managed seed system advocacy relevant policy and legal frameworks namely the National Agriculture Policy of 2013, Seed Act of 2003 and its Miscellaneous Amendments of 2014 and Plant Breeders Act of 2012 on farmers rights, together the seed working group analyzed the identified Gaps are; the importance of local seed has largely been unrecognized and unappreciated as a distinct and expanding presence.

Results & Discussion

Seed laws in Tanzania still favors private sector involvement in the seed industry. The approach of favoring the 'formal' commercial seed sector is weakening smallholder farmers' core rights to save, share, exchange and sell their seeds. Furthermore, the policy weakens smallholder farmers' core seed rights by rendering the sale of uncertified seed as an offence and denying farmers the right to share and exchange seeds saved from their harvest. These land races are vital for agricultural biodiversity and climate resilience with improving the seed and food sovereignty. Farmer managed seed systems are diverse, they range from simply saving seed from one season's harvest to the next, to sharing based on social obligation, farmer-to-farmer exchanging and selling. In this way, they can be adapted to the local context.

Conclusion

In order to strengthen the farmer managed seed system the following ways should be emphasized Advocate for recognition and support of farmer managed seed system in Tanzania, Capacity building for farmer groups on Farmer managed seed system and its impacts towards food sustainability and sovereignty, Expanding the Seed Working Group, Reinstating the lost varieties, Strengthen the establishment of functional community seed banks and lastly Promote local seed and food fairs

Testing the Efficacy of Bofertilizers

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Introduction

Interest has been stimulated among Kenyan farmers by demonstrations of biofertilizers that are in use by small-scale farmers in Latin American countries. Biofertilizers are substances that incorporate animal products, plant materials, or a combination of both, and are often supplemented with minerals and substances that promote fermentation. In Latin America, biofertilizers have been shown to increase growth and yield of crops, and there is evidence that their use can increase plant resistance to pest and disease attack. To test the efficacy of biofertilizers in the context of Kenyan smallholder farms, three years of replicated experiments have been conducted by the Kenya Agroecology Hub at the research farm of Manor House Agricultural Centre, Kitale.

Methodology

Experiments in maize, kale, and black nightshade (using a randomized complete block design) initially focused on two biofertilizers of interest to farmers: bokashi, a compost-like material that can be ready for use in 14 days, and vairo (sometimes referred to as supermagro), a manure-based liquid that must be produced under anaer-obic conditions. The bokashi and vairo were prepared at Manor House according to recipes in use by farmers. Subsequent experimentation with kale used a split plot design (with and without bokashi) and was expanded to include six commercial biofertilizer products, plant teas made from freshly harvested leaves of *Tithonia di-versifolia* and *Tephrosia vogelii*, a solution made from dried, powdered *Tephrosia vogelii* leaves, manure tea, vermiliquid (leachate from vermicomposting), and human urine.

Results & Discussion

Over three years of trials, bokashi increased maize yield on average by 42% in comparison to a no fertilizer control. Bokashi more than doubled yield in comparison to a no fertilizer control in two years of trials with leafy green vegetables. In a 2021 experiment, bokashi application also protected kale from attack by chafer grubs (Schizonycha spp.): Without bokashi, plant stand averaged 30% less. In a 2022 maize trial, bokashi made from locally sourced cereal materials (e.g., maize stovers and bran) performed as well as the bokashi made according to the standard, "preferred" recipe which calls for rice husks and bran (materials often unavailable or unaffordable to farmers). Results of nutrient analysis of the two bokashi types were similar, suggesting that farmers may substitute locally available materials without significantly affecting bokashi efficacy. In three years of trials, yields of leafy greens treated with vairo did not differ from yield of a water control. However, four liquid biofertilizer treatments did show promise in increasing crop yield: Tithonia tea, vermiliquid, the solution made from powdered *Tephrosia vogelii* leaves, and manure tea.

Conclusion

Three years of experimentation have shown that bokashi can increase yield of leafy green vegetables and maize under low fertility conditions. Although vairo was found to be ineffective, several other liquid formulations show promise in boosting crop growth and yield. These results will be used to enrich discussions with farmers during planning for implementation of a farmer research network on biofertilizers.

Keywords

biofertilizers, bokashi

The role of African Progressive Cultural Practices and Social Institutions on Sustainable Agri-food Systems and Improved nutrition

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Introduction

Culture refers to values, beliefs and norms; and all socially transmitted information. It dictates what most people believe is right through the information they grow up being passed to them. Generally, what we eat, as well as how and why we obtain, process, store, prepare, share, and eat food, is affected by culture in various ways. Culture is often reinforced through in social institutions hence level of their practice depends on the strengths on the social institutions in place. The paper is deliberately focusing on progressive cultural and traditional practices because there exist retrogressive cultural and traditional practices which can cause harm and exacerbate food insecurity.

Methodology

This paper has relied on desk review for data. I have scanned various literature, analyzed the secondary data, and created a reference list. The literature review focused on understanding the nexus between cultural practices and sustainable agrifood systems. This was done through scanning various publications on traditional food practices and beliefs across African communities. The data was then analyzed based on the trends of beliefs, values and festivities; and how these impact on agrifood systems. The analysis also focused on the how the cultural practices relate to modernization, for better adoption in today's life. The analysis was done with gender lenses and through human rights approach to ensure that the proposed solutions do not cause harm. The literature reviewed was then used to create reference list.

Results & Discussion

Culture makes food more accessible to various members of the society and helps in preserving various indigenous and traditional food crops which are resilient to the weather conditions in their geographic areas. Various African ceremonies like the breaking of kola nut and celebration of new yams have helped in preserving indigenous traditional agri-food systems, and promote agroecology. The place of kola nut has ensured its conservation over the years. Kola nut is an indigenous tree and indigenous trees help in enhancing soil health hence support agroecology. Yam produces more food than most crops and is more resilient to harsh climatic conditions. There is also need to adopt effective technologies like storing milk in traditional pots of unbaked clay, lactic fermentation and sun drying. Policy makers might be conflicted between the preservation of cultural heritage versus the introduction of more efficient production methods or nutritional changes. They can harness can harness cultural heritage to improve dietary and food security programs.

Conclusion

Weak social institutions and colonialism, and not necessarily modernization, disrupted our cultural and traditional practices including those that promote sustainable agrifood systems. It is necessary to strengthen the social institutions with mandate of reinforcing progressive cultural and traditional practices. It is also impor-tant that the adopted food systems take into consideration culturally determined preferences as lack of this leads to ineffective interventions. One of the most effective means towards achieving Africa food sovereignty is through embracing the progressive cultural and traditional food practices. Promoting progressive cultural and traditional food practices will also

Drivers and barriers towards healthy and environmentally sustainable food consumption of low- and middle-income consumers: a case study in Kenya

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Introduction

Covid19, conflict and climate change continue to expose inefficiencies in the food system in Kenya, putting consumers at risk and undermining their access to necessities and their right to adequate and safe food. At the same time, Kenya is facing an increasing nutritional transition with a rising prevalence of overweight/obesity and diet-related non-communicable diseases alongside persistent undernutrition. Also consumer preferences have shifted over past years towards unhealthy foods, whilst options of purchasing affordable, safe and nutritious foods remain a challenge for most urban and rural households in Kenya.

Methodology

To understand the drivers and barriers towards healthy and environmentally sustainable nutrition in Kenya, a mixed-method study using qualitative key informant interviews and a questionnaire survey is has commence involving a team from the University of Nairobi, department of Agricultural economics. The study is being conducted in six counties, which are Busia, Homaby, Kajiado, kirinyaga, Nakuru and Nairobi Counties. The target group is both rural and urban low- and middle-income consumers.

Discussion

There is need for a substantial food system transformation in Kenya. Incorporating consumers in this process is indispensable to ensure they have access, can afford, and shift their preference towards healthy, sustainable, and culturally acceptable diets. We argue that this shift needs to be guided by increased consumer information and knowledge on safe and healthy diets, addressing consumer concerns, motives and barriers, amongst others through direct consumer forums as well as increased media interactions and campaigns. These awareness-raising initiatives will be coupled with coalition forming/organizing social movements that support innovations to increase traceability and accountability mechanisms. They include consumer desks, consumer parliaments, and public hearings; as well as continuous policy work with the objective to advocate for more accountability across food system governance.

Conclusion

The right to food; Article 43 (1) (c), is basic, and no citizen should go hungry but access safe, adequate, and nutritious food. Engaging consumers in agroecology conversation as an alternative and guarantee to sustainable food systems, will improve and transform the information ecosystem and food environment in the long term. Agroecology is indeed the best option.

Keywords: Consumers, Nutrition, sustainable food systems, Agroecology

Trench Gardening: An agroecological means to improve access to food and nutrition in Arid and Semi-Arid Areas of Ethiopian Rift Valley

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1. *PELUM Ethiopia Consortium*

Introduction

Communities living in moisture stress areas are not only food insecure because of lack of access to crop production,but they are also nutrition insecure due to unfavorable climatic conditions to grow diverse varieties of crops, vegetable and fruits. The situation is aggravated due to the climate crisis globally. Water use efficiency technologies are helpful in order to improve food and nutrition availability. Trench gardening is one of the agro-ecologically best fitting technologies to make vegetable production possible in moisture stress areas of Afar Regional State. It is found at the foot-hills of the Rift Valley escarpments of the highlands of Northern Ethiopia. Trench gardening was piloted in Koneba and Semurobi Gela'elo districts of Afar Region and implemented by Best Practice Association (BOA) and Voice of Wilderness Development Organization (VOWDO) respectively; through the financial support of Bread for the World/ PADD via PELUM Ethiopia. It was started in 2019 in four individuals in two locations first but spread very quickly into 24 within six months and more afterwards. It is still continuing throughout the conflict period in the country. The technology used was tested, made vegetables available and accepted by agro-pastoral communities living with no sufficient moisture, land or soil to grow.

Methodology

The methodologies used are: First, physical reports of different organizations i.e. Best Practce Association (BPA), PELUM Ethiopia and Voice of Wilderness Developmental Organization (VWDO). Second, field observation and project evaluation; Third, questionnaire. Last but not least is referring different documents.

Results & Discussion

This technology became popular in empowering women, elderly people, children and people with disabilities because of its applicability around homestead areas and because of its need for less water or moisture. This technique is meant to assist farmers, agro-pastoralists and development practitioners all over the country and beyond to use trench gardening as a means to achieve food and nutrition security for moisture stress areas to enhance their foodand nutrition security. Therefore, it is suggested scaled out/up among different partner organizations and it mightbe translated into different languages in order to become most useful for grass-root communities in similar envi-ronmental conditions. However, it is also suggested to conduct further study on the moisture intake status and nutritional status of respective families. Key words: trench gardening, moisture retention, food and nutrition security.

Conclusion

Therefore, it is suggested scaled out/up among different partner organizations and it might be translated into different languages in order to become most useful for grass-root communities in similar environmental conditions. However, it is also suggested to conduct further study on the moisture intake status and nutritional status of respective families.

Policy Recommendations on Agroecology Approaches for Sustainable Agriculture and Food Systems That Enhance Food Security and Nutrition in Vihiga County-Kenya

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Introduction

Vihiga County is a small peri-urban landscape in Western Kenya with two agroecological zones, and a population of about 630,000 persons, representing one of the highest population densities in Kenya (1050 persons per Km^2) .The main economic activities in Vihiga is subsistence farming; and generally counties in Kenya are at risk of land degradation, that is associated with high-input, resource-intensive production systems which have caused massive deforestation, depletion in soil fertility, and in Vihiga, emergence of new pests, diseases and invasive weeds is an additional challenge. Farm families and small-scale producers contribute significantly to food systems, and hence public policies at regional and national levels need to adequately address their needs . It is critical to reduce pressure on natural resources in relation to biodiversity . This is a great opportunity for fostering ecological networks that can maintain and improve connectivity of landscapes, agroecology and resilience of the environment in the face of landscape change (ICIPE, 2020). A policy on Agroecology will therefore sort these in addition to establishing a foundation for enterprise development through Public Private Partnerships.

Methodology

- Creation of decent work opportunities using agroecological approaches with digital technologies;
- Identify specific challenges for young people and women eg. access to land and entrepreneurial opportunities; farm mechanization, credit and information.
- Propose interventions for protecting the rights and livelihoods of youth and women
- Establishment of six nature positive landscapes for a multisectoral approach to Agroecology for wider stakeholder engagement

Results and Discussion

A policy on Agroecology for the county will deploy context specific GIS technologies, to promote the use of ICT as an entry point for the involvement of youth, women and local communities in agriculture for agroecological approaches with the needs of small scale producers and farm families in Vihiga.

Conclusion

There is an apparent but critical need for harmony between the various complementary or conflicting policies and strategies that impact on Agroecology. Devolution of governance for Agroecology from national to county government levels, accompanied with the requisite authority to make rules or regulations (Chomba et al. 2016), will validate this policy after enactment. The policy framework aims to strengthen investment and innovation in micro, small and medium sized enterprises that support sustainable agriculture and food systems; add value locally; Create an incentive for young people to remain in rural areas. The policy will enable the County Government of Vihiga (CGV) to partner more effectively with targeted research institutions like ICIPE for new skills, greater information and understanding of the many complex interactions associated with pest and disease con-trol, human health, ecology, biodiversity and agricultural productivity. Furthermore, policy intervention on Agroecology for Vihiga will deploy context specific GIS technologies, to promote the use of ICT as an entry point for the involvement of youth, women and local communities in agriculture and food systems for agroecological approaches. These will cut across soil protection, production incentives, youth mentorship, food safety, ecosystem services, crops and livestock insurance, and market access for a range of agroecologically produced outputs. Awareness creation among the youth on potential of agritourism in biodiversity conservation of Maragoli Hills and Kakamega forest ecosystem will be an added advantage.

Keywords

Key Words: Agroecology, Biodiversity, Food Systems, Food Security, Sustainable Agriculture

Herbs Made in Africa! bringing Health & Food to People, Crops & Animals. Exploring herbs as medicine, food, spices, essential oils and cosmetics

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Introduction

Herbal plants have multiple uses as medicine, as food, as spices, as oils and as cosmetics. Herbal preneur-ship and the use of herbs since COVID is at an all-time high in Africa and the world. Global industry analysts forecast that the market of herbs or medicinal plants will become $114 billion by 2030.The retail value will be over $1billion within Africa. Over 70% of the essential medicines consumed in Africa are imported. They could be partly produced locally from our own plants and this could lower the heavy import bill as a share of the Gross Domestic Product (GDP).

Herbal plants are a resource with considerable potential to improve health care, increase incomes, cre-ate jobs and drive economic development in Africa. More than 60% of Africa's population depends on herbal medicine because it is accessible, affordable and culturally familiar. With an estimated one traditional health practitioner for every 200-400 Africans (compared to 1 western trained doctor per 20,000), herbal medicine has long been used to manage a range of common conditions, including malaria, digestive and respiratory problems, toothaches, skin diseases, and childbirth complications.

The thousands of medicinal plant varieties in Africa are our cultural heritage, and herbalists carry with them hundreds of years of knowledge, history and culture. Medicinal plants carry the "intelligence of nature", however, many of these plants face inter-generational extinction or severe genetic loss. We need to re-think seriously about what our bio-resources and bio-diversity are in agroecology and plan how to save and multiply it them and show case to the world.

Bakirya Organics is an agroecological herbal enterprise, **working in partnership with rural women** and young people in Uganda to identify, preserve, multiply, process, document and promote the use of herbs for treatment, learning, research, aesthetic beauty and income.

Methodology

This Poster Paper sheds light on the local realities surrounding scaling, access to and use of herbal medicines and policy implications.

Information in this paper was collected through observations, interviews, on-going conversations and best practices documentation around these objectives:

1. Collecting and Collating the knowledge available in communities about medicinal plants and their use for humans, crops and animals
2. Sharing experiences of gathering, artisanal processing and use of herbal medicine for humans, crops and animals in Eastern Africa

Results & Discussion

Use of herbal medicine as food and medicine is widespread and estimated at more than 60% in Eastern Africa. A wide variety of common illnesses are treated by herbal medicines in humans, including general pain relief, since food purchase constituted a significant source of food. wound healing, fevers, stomach problems, infertility and skin disorders. Herbs are used in animals and chicken treatments as well. .Policies and regulation to enforce standards should be the government's role.

Conclusion

This Poster Paper sheds light on the importance of understanding herbal medicine and its use local realities for policy, interventions and broader public health debate surrounding access to and use of herbal medicines. Given that increasing recognition of the importance of herbal medicine in health coverage and access the issue of regulation becomes paramount.

Keywords

Herbal Medicine, Women, Artisanal Processing, Community Knowledge,

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