

Codesigning and Validation of Mbili Mbili Strip Cropping System and Forage Integration in Mixed Farming Systems of Malawi

Report

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The [Sustainable Intensification of Mixed Farming Systems Initiative](#) aims to provide equitable, transformative pathways for improved livelihoods of actors in mixed farming systems through sustainable intensification within target agroecologies and socio-economic settings.

Through action research and development partnerships, the Initiative will improve smallholder farmers' resilience to weather-induced shocks, provide a more stable income and significant benefits in welfare, and enhance social justice and inclusion for 13 million people by 2030.

Activities will be implemented in six focus countries globally representing diverse mixed farming systems as follows: Ghana (cereal–root crop mixed), Ethiopia (highland mixed), Malawi: (maize mixed), Bangladesh (rice mixed), Nepal (highland mixed), and Lao People's Democratic Republic (upland intensive mixed/ highland extensive mixed).

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Abbreviations and acronyms

ABC	Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT)
AEDC	Agricultural Extension Development Coordinator
AEDO	Agricultural Extension Development Officer
ATCC	Agricultural Technical Clearance Committee (ATCC).
CA	Conservation Agriculture
CIAT	International Center for Tropical Agriculture
DAES	District Agricultural Extension Services
DAESS	District Agricultural Extension Support System
DARS	Department of Agricultural Research Services- Malawi
EPA	Extension Planning Area
GESI	Gender and Social Inclusion
MFS	Mixed Farming Systems Initiative
SDG	Sustainable Development Goals
WP	Work Package

Background

Farmer preferences and priorities

The MFS initiative in Malawi seeks to engage with farmers, rural communities, support agencies and stakeholders, to identify innovations for improved livelihoods, through enhancing productivity, profitability, social, economic, and environmental benefits.

The multi-component nature of MFS innovations provides an opportunity for farmers to integrate crop-livestock and soil and water conservation components, which can contribute to greater livelihood benefits, income and nutrition, climate risk mitigation, and nutrient cycling from animal manure, crop residues and biological fixation of atmospheric nitrogen, and at the same time might be potentially knowledge and resource intensive.

Integrating new components to systems could alter their configurations at farm and landscape levels, resource flows, knowledge and power relations and functions within farmer households.

The assessment of farmer preferences through experience with the Mbili Mbili innovation is a step to better understand farmer constraints, challenges and priorities for sustainable intensification of mixed farming systems in Malawi¹.

Co-validation of Mbili Mbili strip cropping

The Mbili-Mbili strip cropping optimizes resource use by reconfiguring cropping structure: maintaining the plant population and productivity of the main cereal crop while introducing two species of legumes in strip cropping. The aim is to support crop diversification, increase grain and residue yields, and improve nutritional benefits per unit land.

Mbili-Mbili was introduced to Malawi in the 2022/23 season, with 6 mother trial farmers in Kasungu and 4 mother trial farmers in Mzimba District, followed by field demonstration days attended by about 850 farmers.

For the 2023/24 season Mbili Mbili is being adapted and co-validated to suit farmer preferences (labor saving technologies, crops and varieties, low-cost input options) under different agro-ecological contexts and farm situations. New mother trials with food and multipurpose forages based on farmers preferences will be set up for on-farm validation and demonstration. Baby trials will be introduced to co-validate and demonstrate Mbili Mbili and explore farmer adaptations and innovations.

To improve livestock feeding and enhance nutrient use efficiencies, while benefiting environmental outcomes, a forage component will be introduced. The demand for forages is driven by increases in livestock populations, driven by an increasing

¹ Further Reading: <https://www.cgiar.org/news-events/news/boosting-soil-health-and-livelihoods-innovative-biofortification-in-malawis-strip-cropping-systems-boost-soil-health-and-livelihoods/>

demand for animal-based foods, and support programs. Linkages to soil and water conservation measures are also being explored.

Objectives of the Consultative Meetings

To inform the 2023/24 planting season and co-design of Mbili Mbili mother and baby trials with integration cultivated forages, the consultative meetings were held at community and District level in September 2023.

Community level

- Introduce the Mixed Farming Systems (MFS) initiative and co-design research approach, activities, and partners.
- Discuss constraints and how they interrelate as basis for better understanding how Mbili Mbili and forages would fit into the local farming system.
- Discuss advantages and disadvantages of Mbili Mbili and need for amendment, options for addressing livestock feed shortages.

District level

- Introduce the MFS initiative and co-design research approach, activities and partners.
- Share results on the Mbili Mbili mother trials and collect feedback on the innovation and approach.
- Discuss priorities for Mbili Mbili mother and baby trials and integration of different legume crops and multipurpose forages for the next planting season.
- Identify suitable EPAs to extend the Mbili Mbili mother trials and integrate forages, and identify partners interested in co-validating the baby trials.

Methods

Community level

Focus group discussions were held in the Extension Planning Areas (EPAs) where Mbili Mbili trials and demonstrations had been conducted, and farmers having direct or experience or observations from the demonstration days.

In Kasungu, Chulu EPA, and Mzimba South, Champira EPA, about 90 farmers each participated in the discussions, more than half of the participants were women.

FGD were held separately for women, men and young men to take into account different constraints and perspectives.

The discussions were structured around (a.) problems and constraints using the 5 sustainable intensification framework indicators (productivity, environmental, economic, human, social), (b.) farmer practices to support sustainable intensification, (c.) most critical value chains, (d.) feedback on Mbili Mbili, and e. entry points for cultivated forages.

District level

Results and feedback on Mbili Mbili trials were shared through the District Agricultural Extension Coordination Committee (DAECC) having the mandate for district level coordination of agricultural activities. The DAECC on behalf of MFS hosted a half day meeting, inviting all relevant district government and development agencies.

In Kasungu 24 members and in Mzimba South 22 members participated, about a quarter of the participants were women, representing various departments in the Ministry of Agriculture and wide range of development agencies operating in the districts.

The DAECC meetings started with the districts meeting protocol. A 3-hours space was provided for the MFS team to present the research results and facilitate a feedback and planning session with all DAECC participants.

The feedback and planning session was structured as plenary feedback on the Mbili Mbili trials, followed by two parallel groups discussing (a.) the agronomic constraints and possible solutions, and (b.) the livestock relevant constraints and possible solutions.

Feedback

Kasungu had lower rainfall (720 mm annual rainfall), more acidic soils, with similar landscapes across the district, hilly areas in some parts of the district. In comparison, in Mzimba South rainfall was higher (750 and 1000mm av annual rain), soils moderate to good, and the landscapes more heterogeneous, prone to soil erosion.

All farms produced maize, soya and groundnuts were common legumes for cash and food, cowpea and bambara nuts to a lesser extent and more for food. Common beans were grown in areas with favorable conditions, in Kasungu as winter crop, in Mzimba South as summer crop. Farmers also mentioned cassava, sweet potatoes and Irish potatoes. Farmers in Kasungu also grew sunflowers and tobacco.

Among livestock species chickens were most common, for food and cash income, and about half the household's kept goats for income. A few households kept cattle; new programs expanded dairy in Kasungu, beef cattle were more common in Mzimba South.

Inheritance in Kasungu is matrilineal; levels of poverty seemed more pronounced. Mzimba South is patrilineal with higher livestock ownership and high migration of men to South Africa.

Community level

Problems and constraints

Challenges related to food security and nutrition were pronounced in both Districts. The underlying cause was explained as a lack of capital, as the most critical constraint, emanating from low profits from selling farm commodities, dependence on farm gate sales as markets were poorly developed. This restricted farmers from buying improved seed and fertilizer, perpetuating low productivity. Soil degradation, variable rainfall, pests and diseases aggravated low productivity. Gender related constraints were more pronounced in Mzimba.

Table 1 summarizes the factors as they featured in farmer's narratives about constraints to sustainable intensification for Kasungu and Mzimba South Districts.

Women in Kasungu

Women in Kasungu emphasized that they are disadvantaged in accessing extension messages and prefer farmer-to-farmer demonstrations.

They questioned that the common plant spacing is not adequate, 'we are taking over the ridges from tobacco planting, and don't adjust to other crops like maize and legumes'.

They also emphasized the need for manure to restore soil fertility. 'Most people don't have manure to apply to their gardens to return to normal productivity; some just rotate but it does not help. If we don't apply more manure the land will be exhausted, it already is.'

Women in Kasungu emphasized that despite market programs they largely depend on vendors buying their produce at the time after harvest, when they are in dire need for cash, receiving very low prices for their produce. 'Vendors are based in the village, some come from outside, they buy at very low prices. The markets are seasonal; most sales are directly after harvest. A few vendors buy later in the year. Those vendors knock on our door, and we open, we sell to them at very low prices, as if they have magic.'

Deciding on the use of harvest for income or consumption seemed not a challenge for women and men in Kasungu. 'After harvest I discuss with the husband and leave some of the grain for nutrition. We eat soya and groundnuts in porridge and make groundnut flour. With sunflower we make cooking oil, there is a cooperative and plant in Nsinga TA'.

Youth in Kasungu

Youth in Kasungu felt most disadvantaged in accessing adequate land sizes and input subsidies. 'The sizes of our farming plots are very small such that we hardly produce surplus for sale, sometimes not even enough to meet our family needs. The small land holding is particularly common for young families as we are allocated smaller land sizes, and sometimes allocated land which is not suitable for farming.'

'We are mostly told that as youth, we must buy our own fertilizers and that the elderly should be given priority for the subsidy program. It's not easy though for us to buy fertilizers on our own because we sell our crops at very low prices'.

'As young people, we are usually in fast need of cash. The vendors take advantage of this and give us loans when crops are still in the field. We pay back that loan at 3 to 4 times as much value of crop produce during harvesting, and we have very little or none to sell at normal price'.

Women in Mzimba South

The women expressed stress around food and nutrition, lack of capital for farming and depending on husbands' decisions. For women vegetables and legumes were the most important crops and source of income, as men dominate decisions over livestock and tobacco.

'At the time when we need to prepare our gardens, the ridges, weeding, we don't have food at home. Therefore, we do piecework, and work on other farmers fields,

and use the money to buy food and feed our families. That means we cannot work on our fields and our fields remain unattended. Women do the piece work.'

'Because of low maize production, we need to sell livestock to buy maize, which was foreseen to buy cooking oil and other foods. Hence, we are left without cooking oil, and our consumption is compromised.'

'Water is scarce; hence it is difficult to take care of our homes. Due to stream and river siltation, we don't have water for irrigating our gardens. Most of us depend on streams to cultivate vegetables, mostly tomatoes; less water means less income from selling tomatoes.'

'There is scarcity of trees for firewood. We walk 4 to 5 km for firewood, which takes away our time to do other activities.'

'The husbands make the decisions about crops, what to grow where, what to sell when, and about livestock, and how to use the income. Women don't own land. She can want to plant but the husband can decide otherwise. The main conflict is that women prefer to mix crops, like maize with beans or groundnuts, but men either like maize or tobacco. Women don't like tobacco, as men control it and the use of income.'

'Men don't want to take views of women into account. They feel they married a woman and paid lobola for her, and hence they can decide over her, and a woman has to listen. A man can ask the woman to go to the market and to sell the soya, but he will want to get the money.'

Table 1. Constraints to sustainable intensification identified by women, youth and men farmers in Kasungu and Mzimba South Districts.

SI indicators	Kasungu, Chulu EPA	Mzimba South, Champira EPA
Productivity	• Unaffordable seeds and fertilizer, especially for legumes, use of retained varieties. • Unreliable variable rainfall; rivers drying up and compromising irrigation. • Small land sizes • Degraded soils and landscapes	• Degraded soils and landscapes increasing dependency on external inputs. • Unaffordable seeds, fertilizer, pesticides • Unreliable variable rainfall, rivers drying up and compromising irrigation. • Pests and diseases, lack of control tools with large livestock numbers,

	• Water shortage, siltation, lower water table • Insufficient manure • Pest and disease control (soya rust, pigeon pea aphids, goat tick borne diseases, East African Swine Feaver, chicken Newcastle)	- resulting in high livestock mortality. • Low uptake of improved livestock feeding pasture or crop residues
Economic, profitability	• Dependence on informal markets (crops and livestock), unfair prices, result in poor capital. • Unfair access to land and loan terms especially compromises the youth.	• Selling individually to vendors, at low prices • Lack of credit to support purchase of seed and fertilizer • Informal markets dominated by vendors, due to poor accessibility, no value addition. • Selling livestock to cover food deficits, while livestock productivity is also low. • Interventions often limited to pass-on schemes, without the necessary training in enhancing productivity and marketing.
Human, nutrition	• Serious food shortages, starting in August, especially during low rainfall years. • Lack of capital to buy diverse food groups, eg animal sourced foods	• Unbalanced diets, nutrient, and protein deficits, as priority is given to income generation, • Livestock is being sold to purchase food, given declining maize productivity, and other needs.

Social, equity, cohesion	• Labor constraints especially for women taking up ganyu during main cropping season and compromising own food production. • Limited access to cooperatives; most common are VLS groups for women. • Group formation is difficult, lack of knowledge, coherence. • Lack of harmonization among programs and inclusiveness • Poor coverage of extension services • Poor policy enforcement	• Lack of group formation, market-oriented associations and cooperatives, alternative credit, especially for youth • Poor coverage of extension services, reliance on projects as resources are short.
Environment	• Deforestation (charcoal, construction, overgrazing) • Soil erosion, siltation, continuous cultivation, unreliable rainfall	• Deforestation and low rate of restoration • Soil degradation due to continuous maize cultivation • Siltation of rivers due to riverbank cultivation

Important value chains

In Kasungu, maize, soyabean and groundnuts were the most important sources of income for women, youth and men (Table 2).

In Mzimba South, vegetables and common beans were the most important sources of income for women and youth, whereas maize, soya, and livestock tended to be dominated by men.

Table 2. Most important value chains listed by women, youth and men farmers in Kasungu and Mzimba Districts.

Kasungu, Chulu EPA	Mzimba South, Champira EPA
• Maize • Soya bean • Groundnut • Common beans • Vegetables • Sunflower • Chickens • Goats	• Maize • Soya bean • Vegetables • Common beans • Goats

Farmer practices to support sustainable intensification

Farmers in Kasungu and Mzimba South were asked to list current practices to improve crop and livestock productivity as well as soil and water conservation (Table 3).

Practices to improve soil fertility and using improved varieties focused on maize and soya beans. Farmers realized livestock feed shortages but were not aware of options to improve feed for livestock; crop residues were the most common source of improving feed for livestock.

Table 3. Current practices for sustainable intensification mentioned by women, youth and men farmers in Kasungu and Mzimba South Districts. (rate of farmers adopting * few farmers, ** half the farmers, *** majority of farmers, **** all farmers)

Kasungu, Chulu EPA	Adoption	Mzimba South, Champira EPA	Adoption
• Improved, drought tolerant varieties, by crop species. ○ soya bean ○ maize ○ groundnut • Planting spacing • Doubled-up legumes	**** ** * *** ***	• Improved, drought tolerant varieties, by crop species. ○ soya bean ○ maize ○ groundnut • Planting spacing	**** *** ** ■■■■■■■■■■ ***

• Fertilizer recommended rates, maize *** • Mbeya fertilizer ** • Compost using crop residues ** • Manure, for vegetables and maize ** • Livestock grazing residues ** • Contour ridges ** • Vetiver ** • Reforestation (Matete, Sangu, Gliricidia, Sesbania, Acacia ** • CA * • Incorporation of crop residues as mulch * • Local legume seed multiplication *	• Fertilizer recommended rates maize *** • Contour ridges ** • Bokash/Mbeya fertilizer * • Compost using crop residues * • Manure, mostly for vegetables * • Livestock grazing residues * • Incorporation of crop residues *
• Forage species: Gliricidia, Leucaena, Sesbania, Matete, Sangu, Acacia trees; Napier, Elephant grass, Rhodes grass	• Forage species: Napier, Brachiaria, Rhodes grass, Leucaena

Use of crop residues: Crop residues were mostly burned to ease farm operation and avoid free grazing that was perceived as degrading farmland, and to hunt mice as supplementary food. There was also perception that burning improves yields. Few farmers have taken up Conservation Agriculture (CA) and started retaining crop residues. Farmers also collected crop residues for compost; compost was used for own fields, not sold. Quantities of compost were however small. Dairy farmers collected and fed cereal and legume crop residues as main source of feed to their cows. Those with goats and beef cattle preferred groundnut residues for feed.

Manure management: Manure has become a critical source for improving soil fertility, primarily applied on vegetable gardens and secondary on maize fields. Price increases of inorganic fertilizer contributed to the increased use of manure. The availability of manure was insufficient. Most common use was cured manure and Mbeya fertilizer. Farmers with livestock started selling manure, cured in bags. Farmers without livestock seemed not to see the benefits from livestock keepers grazing crop residues in their fields. A female farmer stated that she would rather burn residues, than allowing livestock to graze the residues in her field.

Feedback on Mbili Mbili

Farmers confirmed realizing more benefits from Mbili Mbili as compared to farmer practice (Table 4). Farmers requested to include alternative legume crops, including groundnuts, soya bean and sunflower, to suit local preferences. Access to and affordability of seed and fertilizer was seen as a key challenge to exploit the full potential of Mbili Mbili.

Table 4. Advantages, disadvantages and suggested improvements by women, youth and men farmers in Kasungu and Mzimba South Districts.

	Kasungu, Chulu EPA	Mzimba South, Champira EPA
Advantages	• Diversified crops on small land • Demonstration plots had high yields of maize and legumes • Learned many things on one plot, including spacing, soil fertility, seed varieties, feed for livestock • Less pesticides as compared to farmer practice, due to pesticide application • Less labor intensive as more crops are grown per unit land using the same labor	• Land, labor and time saving, as harvested maize and legumes on the same land • Maximizes production and nutrition, with higher yields and more diversified crops than farmer practice • Labor distribution by planting and harvesting at different times • Pigeon pea was good for soil fertility and livestock feed • Encourages joint decision making, as it allows women farmers to integrate legumes on mens' maize field
Disadvantages	• Knowledge intense plant configuration • Access and affordability of seed varieties • Requires awareness creation • Pigeon peas attracted pests • Farmers to have greater ownership in plot management, to address issues like water logging	• Herbicide application on legumes was difficult

Improvements	• Promote the use of improved varieties whilst using less fertilizer with integration of legumes • Integrate other crops like soya bean, groundnuts, sweet potatoes, sunflower • Include treatments with Mbeya fertilizer • Include CA to reduce labor burdens • Develop a seed system that can support Mbili Mbili • Establish more trials on farmers field for many more farmers to learn • Contact NGOs to integrate Mbili Mbili into their programs	• Include groundnuts, soya beans, sunflower
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Integration of forages

Farmers in both districts acknowledged feed shortages during the dry season and period of land preparation. Farmers however prioritized crop production over forages, given land, labor and capital constraints, and the need to protect the forages from free grazing livestock. Free grazing of crop residues and pastures was the common source of feed; during the rainy season crop fields are enclosed against livestock grazing. Collection and conservation of crop residues for dry season feeding was not common. Knowledge of cultivated forages did not exist. Women in Mzimba South, Champira EPA, expressed interest in experimenting with cultivated forages in their gardens to feed their livestock and as source of income. This would require facilitating links to farmers who would buy the biomass, cut and carry and conservation technologies. Men farmers also expressed interest in experimenting with forages, once the free grazing policy was changed to restrict grazing on natural shrubs and grasses. Government and donors have promoted goat and dairy cow restocking, and initiated livestock cooperatives, which could present opportunities to initiated forage production and markets. The Department of Lands and Resources has visibly promoted vetiver grass and gliricidia trees, which could be complemented with more digestible resilient forage species.

District level

Feedback on Mbili Mbili

A presentation on the Mbili Mbili strip cropping system and feedback from farmers was provided to the DAECC. The subsequent discussion brought forward the following advantages and disadvantages as perceived by DAECC participants.

Advantages

- Mbili Mbili supports optimal use of land, by reduced spacing, reduced competition between cereal and legume crops, labor and cost saving, and reduces pest and weed pressure.
- It addresses poor harvest and resource constraints, supports diversification of crops and diets.
- It also reduces the risk of depending on one crop and total crop failure.
- Furthermore, it brings together women and men working on the same plot, on the crops that they are interested in.

Disadvantages

- Additional labor for the reconfiguration of ridges.
- Increasing planting density can also increase disease pressure.
- Increasing competition for light, especially in good rainfall seasons and in fertile soils.
- Small furrow (due to reduced ridge spacing) might fail to contain water if raining heavily and this can lead to erosion.
- Application of herbicides, pesticides might be difficult as those are plant specific.

Improvements

- Involve farmers during design and include crops that men and women are interested in.
- Combine with agroforestry, eg Sesbania, Tephrosia, Gliricidia, for feeding livestock and as direct input to soil fertility.
- Combine with organic pest control, eg Tephrosia, and other local knowledge based plant health and soil fertility improvement practices.

Socio-ecological context for Mbili Mbili and forages

Two groups brainstormed conditions and entry points for Mbili Mbili and forage integration in Kasungu and Mzimba South Districts. One group focused on agronomic practices, adaptation to climate change, and land restoration. The second group focused on crop livestock integration, livestock value chains and

nutrition. Participants identified constraints; innovations seen as critical to address the constraints. Based on that they identified sites for establishing new mother trials for Mbili Mbili integrated with forage innovations, and possible scaling partners for establishing Mbili Mbili baby trials (Table 5, Table 6).

Comments on the role of research:

- There is need for increased researcher involvement which will lead to generation of evidence-based solutions.
- Research also needs to improve on inclusion of local knowledge as opposed to replacing it completely.

Table 5. Group discussion on agronomic solutions, climate change adaptation and land conservation

	Kasungu DAECC	Mzimba South DAECC
Constraints	• Degraded soils that depend on fertilizers • Siltation and erosion due to settlements in riverbanks and forest areas, a result of rapid population growth. • Pests and diseases due to extreme weather conditions. • Lack of soil database for informed decision making • Lack of climatic information and lack of understanding of climate change • Adaptation measures are not well in place. • Lack of inclusiveness in the adaptation measures. Some adaptation measures are hard for the poor to manage. • Resistance of farmers to adopt soil improvement technologies. • Lack of harmonization among players/programmes, some even conflicting	• Deforestation causes soil erosion and drying of rivers which limit the potential for irrigation. • Flooding/dry spells due to unpredictable rainfall patterns, either erratic or too much. • Monocropping of maize and tubers: Farmers have a preference of monocropping of maize and tubers, mainly because these crops form the main foods in their diets. Maize and the tubers are heavy feeders and leave the soils depleted in nutrients over time. • Burning of crop residues undermines the efforts to have soil fertility improved through incorporation of crop residues, especially the nitrogen fixing legumes. • Farm inputs (fertilizers and improved seed) are less accessible to farmers due to high prices and unavailability.

	• Poor enforcement of policies. • Some policies lack alternatives.	• Farmers' lack of understanding of soil fertility management measures. • Farmers feel there is too much work involved in establishing soil and water conservation structures e.g., contour ridges. • Some innovations are not friendly to some socio-economic groups due to high costs involved. • Weak policy enforcement measures • Most policies lack alternatives e.g. no alternative energy source to charcoal. • A good technology if introduced in a bad season may send bad signals. For example, CA in a high rainfall season may not produce desirable results, and farmers generalise that CA is bad.
Innovations to address the constraints	• Projects/actors who implement programs in the district should make sure to share results and data through the districts' feedback platforms. • Innovations that promote manure preparation and utilization should introduce innovations that enhance crop livestock integration. • Farmer field schools should be encouraged as platforms for learning and adoption • The Gender Action Learning System (GALS) approach enhances involvement of women and youth	• Integration of agroforestry tree species in economic activities and cropping systems. Total Land Care (TLC), SOLDEV and NASFAM support farmers with agroforestry trees across the district. • Farmers should be organized into clusters so that innovations can be easily taken up. Fast adopters will act as role models within the clusters, stimulating uptake of technology by follower farmers. • Participatory soil testing with the communities. • Seed banks in the villages. Farmers can access seed through loans.

	• Ongoing agronomic and climate adaptation solutions include ◦ Disaster warning systems ◦ Irrigated cropping ◦ Afforestation ◦ Energy stores ◦ Water harvesting ◦ Gully reclamation. ◦ CLAN based approach (Green Schools).	• Manure campaigns that are accompanied by innovations on crop livestock integration, eg small ruminants. • Support village savings and loans groups. These groups are mostly dominated by women and youth, hence improving women and youth involvement in agricultural innovations. • Digital information solution e.g., phone SMS, special radio programs.
Suitable EPAs	• Most innovations are promoted in all EPAs • Dry spells: Chilipa and Nkanakhoti EPAs • Floods: Mtunthama and Chipala EPAs	• Most vulnerable to climatic shocks are Eswazini EPA, Khosolo EPA, Luwelezi EPA
Scaling partners for Mbili Mbili	• Ministry of Agriculture • DAES • Department of Land Resources • Department of Livestock • Department of Forestry • Department of Water resources • Department of Meteorology • Ministry of Water and Sanitation • NGOs • Radio stations and media • Agro-dealers • Local leaders	• Msamala land restoration programme- Total Land care in Luwelezi and Khosolo EPAs • Climate smart agriculture by NASFAM in all EPAs • Reafforestation programme by the Public Works Programme Funded by the EU in all EPAs. • Tree planting programmes by Limbe Leaf, Alliance One and ARET in all the EPAs. • Integrated Carbon Project in all EPAs

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- Farmers
 - School learners
-

Table 6. Group discussion on crop livestock integration, value chains and nutrition

	Kasungu DAECC	Mzimba South DAECC
Constraints	• The main deficit for livestock feeding is protein, but farmers do not know about it. All livestock graze free, there is no confinement • Lack of construction material, due to deforestation, resulting in inadequate kraals for confining livestock, controlled grazing • Ruminants feeds compete with preservation of biomass for land restauration and conservation agriculture. • There is a lack of knowledge on the importance of pastures, farmers might have land but don't preserve pastures, this is a matter of sensitization and education • Forage seeds are eventually available at places that are far away from farmers. • Local composting technologies are coming up, based on local knowledge; they need validation and standards to prevent adulteration • High livestock mortality due to a combination of poor feed and health. Farmers receive drug boxes and are being organized in Newcastle clubs. However farmers lack	• Extremely low rate of livestock extension staff • Government resources are inadequate, reliance on short term fragmented livestock project, pass on schemes without adequately preparing farmers to improving productivity • Farmers in Mzimba South have been keeping livestock for long time; its difficult to change to recommended practices. • High mortality due to disease prevalence (Cattle East Cost Feaver, FMD Lumpy Skin, Trips; Goats and sheep, ticks, Heartwater, Orff, parasites, worms. Mange; pigs African Swine Feaver; chickens Newcastle, Korrizher. Rabies are on the increase. • Despite feed shortages farmers don't adopt improved pasture or fodder conservation; they rely on natural pastures and grazing crop residues. • Food shortages and protein deficits in human nutrition, due to low crop productivity, and low consumption of animal-based protein. People are keeping cattle for cultural reasons, lobola; they prefer selling cattle, pigs and goats for

	awareness on vaccination and prioritize buying food over vaccines. • The pass on programs are meant for improving farmers access to animal based foods; however they are only implemented in few communities; they are not effective due to high livestock mortality. Pass on programs often fail in the first round. • There are no designated livestock markets, livestock sales are informal and disadvantage farmers in price setting • The demand for livestock products is however very high, while production does not satisfy the demand • Cooperatives, associations are being formed, to link farmers to formal markets, and facilitate buyers to come and buy the animals; farmers are being empowered to manage these markets • Most farmers fail to use animal-based foods for nutrition, as their priority is for selling livestock to buy staple food	solving food and livelihood problems. • Small livestock contribute more to nutrition, smaller animals, chickens, eggs. Recent projects promote small stock for consumption, integrated household farming • Inadequate markets are critical bottleneck. Legume and livestock markets are dominated by middlemen, given poor accessibility of farmers. Those exploit farmers selling out of emergency. There is limited value addition, for crops, vegetables, and livestock. This results in a cycle of low production, and poor incentives for producers to allocate scarce resources to improving production. There is need for farmers to communicate directly to end markets. • Selling manure locally became more common as fertilizer prices went up. Business people from Lilongwe sell compost, to add fertilizer.
Innovations	• Dairy production started a few years ago, farmers must have pasture to qualify for receiving cows, conserve grasses as hay, crop residues after harvest (maize, groundnuts), in Mthuntama, Lisasadzi EPAs • Agroforestry seed banks and seed multiplication plots are being established (Sesbania, Gliricidia, Leucaena, Napier,	• Government and NGOs promote improved pastures, the uptake is very low. There is need to promote improved use of dual purpose crops. ◦ Napier: A few dairy farmers grow Napier. ◦ Brachiaria: We started introducing brachiaria last year, it did not do well, due to negligence

Elefant grass, Rhodes grass); under the livestock infrastructure project in Mtunthama and Lisasadzi EPAs; EPAs have nurseries, farmer-managed • Pass on projects with goats and chickens, 15 -20 beneficiary groups per villages, raising livestock individually, including provision of drug boxes supported by CAHW, injectable antibiotics require veterinary services to avoid antibiotic resistance • Care groups for nutrition sensitization; pass on schemes were linked to care groups • Livestock market development at Chulu EPA (Chisinga section) Chatoloma EPA, organized by farmers, with defined market days, linked to the cooperatives and associations • Cooperatives and associations are being established, engaging all farmers with livestock, to access markets and receive livestock as pass on (government driven, offspring of ASWAP)	at farmer level. We encourage early land preparation, planting of forages after main crops, early February. We kept seed for nurseries. ○ Rhodes grass: The challenge is to access seed. ○ Desmodium: The challenge is to access seed. ○ Leucaena was tested for dairy animals, not enough care was given to the trees. • Vaccination programs are ongoing; FMD is for free; ECF vaccines are at a cost to farmers; Dipping projects failed due to misappropriation of funds; Newcastle vaccinations are promoted through farmer clubs, 4000 MK for covering 300 chickens; CAHW promote deworming. • CAHW support extension workers with general treatments, vaccinations, sensitization, drug revolving funds with start up drugs, farmers pay small fees to access drugs. • Projects were implemented by UNICEF, FAO, Kulima, Afikepo, Harvest plus, FOCUS. • Pass on interventions are mostly government initiated and managed through the agricultural office, earlier pass on projects through FOCUS and UNDP phased out. • ASWAP phased out; they initiated model villages, having
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		multiple interventions in all areas, including health, nutrition, production, following recommended agricultural practices.
Suitable EPAs	- Chulu EPA: more hilly, steep slopes, erosion problems; in process of establishing goat markets, facilitating buyers from all major cities (Chisinga section in Chulu EPA and Chatoloma EPA); Partners: World Vision, Plan Malawi, Lutheran Church - Mthuntama EPA: Drier, flat, sandy; dairy project, forages; Partners: K2taso, local NGO, implementing Agcom project, constructing dairy processing plant; forage seeds - Lisasadzi EPA: Higher rainfall, earlier rains, flat, sandy; dairy project, forages; Partners: K2taso, local NGO, implementing Agcom project, constructing dairy processing plant, forage seeds; Total Landcare - Nkakoti EPA: hilly, more agroforestry, more degraded; more soil conservation	- Select areas with livestock commercialization projects, for forage technologies to support livestock productivity and quality. - Farmer selection needs to identify farmers livestock, enough land to cultivate, and business oriented. - EPAs with beef cattle and goat components: Champira, Mbawa, Manhamula, Khosolo. Goat markets in Msalangwe, Hora, Luwiri/Champhira EPA, Kasiji/Mbawa EPA. - Champira EPA: Feed deficits most pronounced, as smallscale irrigation schemes are wide and take away land for livestock grazing. During rainy season land is protected for crop production, in the dry season the irrigation takes away the dry season feed reserves for livestock. Forage seed multiplication can be included in the irrigation schemes, and can provide a vibrant market. - Mbawa EPA: Diverse programs, incl. Heifer, ASWAP; with efforts to develop the livestock markets.
Partners	DAESS structures: - EPA: extension services, AEDC (EPA offices), AEDO (section offices) - TA, through ADC: farmer structures and feedback	- Work through the livestock officer, AEDC, AEDO, and farmer groups. - Kulima implemented Farmer Field Schools, it supported farmers with start-up goats and khollar construction. This was in

Ministry of Agriculture has projects across all EPAs in Kasungu District	Chikangawa EPA, Luwiri EPA; not in Champira and Mbawa.
• Agriculture coordination project, • Women and youth empowerment agriculture project (Kanakoti and Kaluluma) • Kulima and Afikepo phasing out 2023; supported the well functioning of DAESS structures • Ministry of Trade supporting the establishment of crop and livestock cooperatives and market linkages; no livestock cooperative operating; dairy farmers are at association level • See above for EPA level partners	• Heifer has an office at EPA level and work with farmer clubs on beef production and stall feeding, in Champira, Kazomba, Mbawa, Manjamula, Bulala EPAs. •

Conclusions and way forward

Community level

Adaptation of Mbili Mbili

Farmers, women, youth and men, confirmed interest in Mbili Mbili strip cropping system and provided feedback how mother and baby trials can be adapted, and integrate livestock forage components, to suit the needs of farmers in Kasungu and Mzimba South Districts.

Recommendations:

- Complement Mbili Mbili with **packaged social and agribusiness innovations** including locally accessible seed systems and loan products for stimulating uptake of improved seed and alternative soil fertility amendment, farmer-organized collective marketing of outputs, exploring partnerships with private sector (seed and fertilizer companies, offtakers).
- Integrate **groundnuts and soya bean** as alternative legume crops to common beans, according to local specific preferences and adaptation to agro-ecological conditions.
- Even though **pigeon pea** is not a common crop in the area it can be integrated. Seed systems need established locally, and seed quality must be verified before dissemination.
- Expand Mbili Mbili with experiments on **soil fertility and soil health** enhancement, incentives that encourage integration of organic and inorganic soil fertility improvement.
- Strengthen ownership and management of the Mbili Mbili plots with joint decision making by women and men, through **on-farm experimentation and demonstration** at sites for where farmers can learn and adapt.

Integration of forages

Integration of forages will require access to affordable **forage seed systems** and local multiplication of seeds and vegetative material (research stations, scaling partners), sensitization through **forage production, conservation and feeding demonstrations**. Development of forage value chains needs to be linked to ongoing **livestock value chains** (dairy, beef cattle, goats) and **land restoration** programs. This can also contribute to ongoing discussions to introduce **controlled grazing policies**. Opportunities to integrate **soil and water conservation** and **integrated pest management measures** with Mbili Mbili and alternative forages of improved feed quality should be explored.

District level

Holding the **consultative meetings through the DAECC** was recognized as an important milestone, contributing to the DAESS as coordination mechanism for District level planning, feedback and partnership development.

District level government and development agencies expressed commitment to supporting the **scaling of the Mbili Mbili and forage innovations** and would promote those once released through the Agricultural Technical Clearance Committee (ATCC).

Building on local knowledge and expertise, Mthunthama EPA in Kasungu and Mbawa EPA in Mzimba North Districts were **jointly selected as high potential sites/EPAs for livestock** value chain development and hence a high demand for livestock feed. New Mbili Mbili mother trials will be established at those sites, in combination with new treatments of dual-purpose maize and legume diversification, cultivated forages and soil and water conservation.

Scaling partners were identified operating in the selected areas, through whom the baby trials will be implemented, including K2Taso, NASFAM and Harvest Plus. The joint partner identification at District level places experimentation and learning withing the agenda of development agencies and national extension agencies.



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