WP4

Scaling Innovations in Cereal and Food Legume Production in the Mixed Farming Systems of North Shoa, Ethiopia

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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

ICARDA	International Center for Agricultural Research in the Dry Areas
ARARI	Amhara Regional Agricultural Research Institute
ILRI	International Livestock Research Institute
SDG	Sustainable Development Goals
SI-MFS	Sustainable Intensification of Mixed Farming Systems Initiative
WP	Work Package

Background

The highlands of Ethiopia are dominated by a mixed farming system where cereals (wheat, barley, and tef) and food legumes are important crops for food, income generation and their straw used for animal feed. The productivity of cereals and food legumes is low due to biotic and abiotic stresses, access to quality seeds of framer preferred crop varieties, pesticides, and other inputs (Kassa et al. 2024). The new faba bean gall disease is threatening faba bean production in the highlands of Ethiopia causing over 60% yield losses (Bitew et al. 2022). Therefore, farmers are reducing areas of faba bean crop and growing more cereals leading to low crop diversity that can reduce soil fertility, incomes, diet diversity, and increase pest outbreaks. Recently an effective seed treatment fungicide (Noble 25%WP) has been identified and is ready for large scale use by farmers in disease prone areas. Moreover, faba bean growers are producing seeds of framer preferred varieties since the fungicide is very effective (Bereket et al. 2022).

Objectives

1. Scaling of farmer preferred faba bean varieties and fungicide seed treatment against faba bean gall; and
2. Creating awareness of new faba bean production innovations to farmers, seed growers and extension agents.

Methodologies

Scaling of faba bean farmer preferred variety: The scaling was carried out in Moretina-Jiru and Siyadebrina Wayu districts using the faba bean cv. *Shewa* released for waterlogged black soils in North Shoa and other similar agroecologies. Faba bean seed was treated with Noble 25% WP fungicide (a.i. *Triadimefon*) at a rate of 150 g for 100 kg of seed to control faba bean gall disease. Scaling of the faba bean variety was done in a cluster approach where a group of farmers plant cv. Shewa. The cluster planting approach is useful for easy access to inspections for seed regulatory authorities in the zone. Before planting, training on faba bean agronomy, quality seed production, and gall disease management was provided to the farmers and development agents (DAs).

Scaling of faba bean gall management: The scaling was carried out in Moretina-Jiru, Siyadebrina-Wayu, and Basona-Worena districts where improved and local faba bean varieties were treated with Noble 25% WP fungicide to control faba bean gall disease. Faba bean seeds were treated with fungicide at a rate of 150 g for 100 kg of seed. The project provided farmers with 17kg of Noble 25% WP to treat seeds of both improved and local varieties. Before planting, training on faba gall disease management, and how to treat seeds and precautions were given to farmers and was provided to the farmers and DAs.

Results

Scaling of improved faba bean variety: A total of 3.7 tons of cv. Shewa basic seeds produced in 2022/23 cropping season was provided to farmers through a revolving seed scheme to cover 18 ha of land. Forty-two farmers planted the variety in the cropping season.

The farmers visited the crop at flowering stage and rated the variety's adaptability to growing under waterlogged condition; good tillering capacity, high pod number per plant, and tolerance to lodging (Figs. 01 & 2). The Plant Quarantine Authority carried out first round of field inspections for two clusters and their initial feedback is encouraging, and final decision will be made in January 2025, and yield data will be available in January 2024.

Figure 01. Performance of cv. Shewa, 2023/24 cropping season, in North Shoa Zone

Figure 02. Cluster for community seed production of faba bean cv. Shewa in Siyadbrina -Wayu district, North Shoa

In addition to farmers who received cv. Shewa basic seeds from SI-MFS initiative and ARARI-Debre Berhan Research Center, other farmers were growing this variety using 6.9 tons of seeds from farmers who produced the variety in the previous season through a farmer-to-farmer seed exchange system. A total of 34.5 ha was covered with the improved variety involving 83 farmers (5 female farmers).

The Organisation for Rehabilitation and Development in Amhara (ORDA) organized two Seed Producer and Marketing Cooperatives in the Menz Lalo and Menz Mama districts in North Shoa. The NGO purchased 4 tons of seed of cv. Shewa from farmers in the Moretina-Jiru district and distributed it to farmers in both districts. About 22.8 ha of land was covered and 130 (45 female) farmers benefited from

the intervention. According to the project managers, the variety was performing well, and farmers showed a strong interest in growing it in the coming seasons. A field day was organized, and the seed produced will be collected by the Seed Producer and Marketing Cooperatives and distributed to farmers for next cropping season.

Scaling of faba bean gall disease management: About 109 (18 female) farmers) treated their faba bean seeds with fungicide and planted on 46 ha of land in four districts in North Shoa Zone (Table 1). After receiving training and have seen positive effects of seed treatments, farmers showed willingness to pay for the fungicide in the future (Fig.03).

Table 1. Scaling of fungicide seed treatment to manage faba bean gall disease in three districtsof North Shewa Zone, 2023/24 cropping season.

Districts	Kebeles	Noble 25% WP distributed (kg)	Area planted (ha)	Male farmers	Female farmers	Total
Moretina Jiru	Woiramba	4	11	25	1	**26**
Siyadebrina Wayu	Wole Deneba	2.25	7	13	3	**16**
Siyadebrina Wayu	Romie	1.75	3.25	8	0	**8**
Basona-Worana	Chiraro-Debir	9	25	45	14	**59**
Total	**4**	**17**	**46.25**	**91**	**18**	**109**

Figure 03. The performance of faba bean crop planted with fungicide to control faba bean gal diseases, Basona Worana District

Training: Training was organized and 133 (22 female) were trained on recommended management practices and community faba bean seed production using fungicide seed treatment (Table 2).

Table 2. Training of male and female farmers on seed production and faba bean gall disease, management

Districts	Kebeles	Male farmers	Female farmers	Total
Debre Birhan	Koso-Amba	39	4	43
Moretina Jiru	Kusaye	30	1	31
Siyadebrina Wayu	Wole Deneba	19	5	24
Basona Worena	Chiraro-Debir	23	12	35
Total	**4**	**111**	**22**	**133**

Conclusion and recommendations

Expansion of improved faba bean varieties targeting waterlogging affected heavy black soil is being driven with the production of quality seeds through community seed production and fungicide seed treatment to protect the crop. During the season, diffusion of cv. Shewa and fungicide seed treatments was observed through farmer-to-farmer seed exchange and the involvement of NGOs like ORDA to support seed growers and farmers outside the project target districts. Since additional effective fungicides have been identified by the research system, they must be validated and made available to farmers to have options.

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