



TAFSSA On-Farm Research Trials Bangladesh

Protocol for field
implementation

Research Protocol 2, Work Package 2
December 2022

BACKGROUND/CONTEXT

On-farm research trials are part of TAFSSA's Work Package 2 (WP2) activities. WP2 emphasizes farm- and landscape-level interdisciplinary research to identify strategies to increase farmers' profits and nutritional yields, conserve resources, and maintain or enhance ecological services, while also mitigating greenhouse gas (GHG) emissions from farms and agricultural landscapes.

Going beyond typical agriculture-nutrition programs in South Asia, we explore field- and landscape-scale crop and animal farm diversification options supporting multiple benefits, including potential nutritional yield, across environmental and socio-economic gradients of rice-based farming systems. Rangpur and Rajshahi divisions in the north of Bangladesh have been selected as learning sites based on key information on food and nutrition security gaps, environmental stresses and climate challenges, as well as the prevalence of commodities and farming systems which offer the greatest potential to achieve TAFSSA's outcomes.

These on-farm research trials will contribute to the WP2 outputs:

2.1 Evidence informing the development of extension recommendations and materials tailored and appropriate for men, women and farmers from marginal groups to build profitable, equitable farming enterprises that support nutrition.

2.2 A decision support framework tailored to South Asia's farming systems supporting governments and communities in managing nutrition-sensitive landscapes.

2.3 Landscape- and watershed-level assessments of groundwater use sustainability.

2.4 At least two public-private partnerships supporting farm services provision business models that overcome innovation bottlenecks to socially inclusive income generation.

2.5 Open-access peer-reviewed papers, reports and datasets.

As per the Theory of Change of WP2 the Research Platform Trial at BWMRI, Dinajpur is part of the first impact pathway that focuses on farm diversification and nutrition-sensitive landscapes and will contribute to the outcome "farmers are exposed to innovations and improves management recommendations". This type of action research with national and international research and extension

institutes at the national and sub-national levels will facilitate endorsement and use of outputs 2.1 and 2.3 in development programs implemented by governments, extension agencies and large livelihood-, environment- and nutrition-oriented NGOs. Furthermore, these efforts will be aligned with professional capacity development opportunities for young and women professionals within national research systems to learn about innovative tools and methods for answering complex, multi-scale research questions using interdisciplinary methods.

OBJECTIVES

Test, adapt, target and position agronomic technologies and practices supporting crop (and animal) diversification across the region's farming systems.

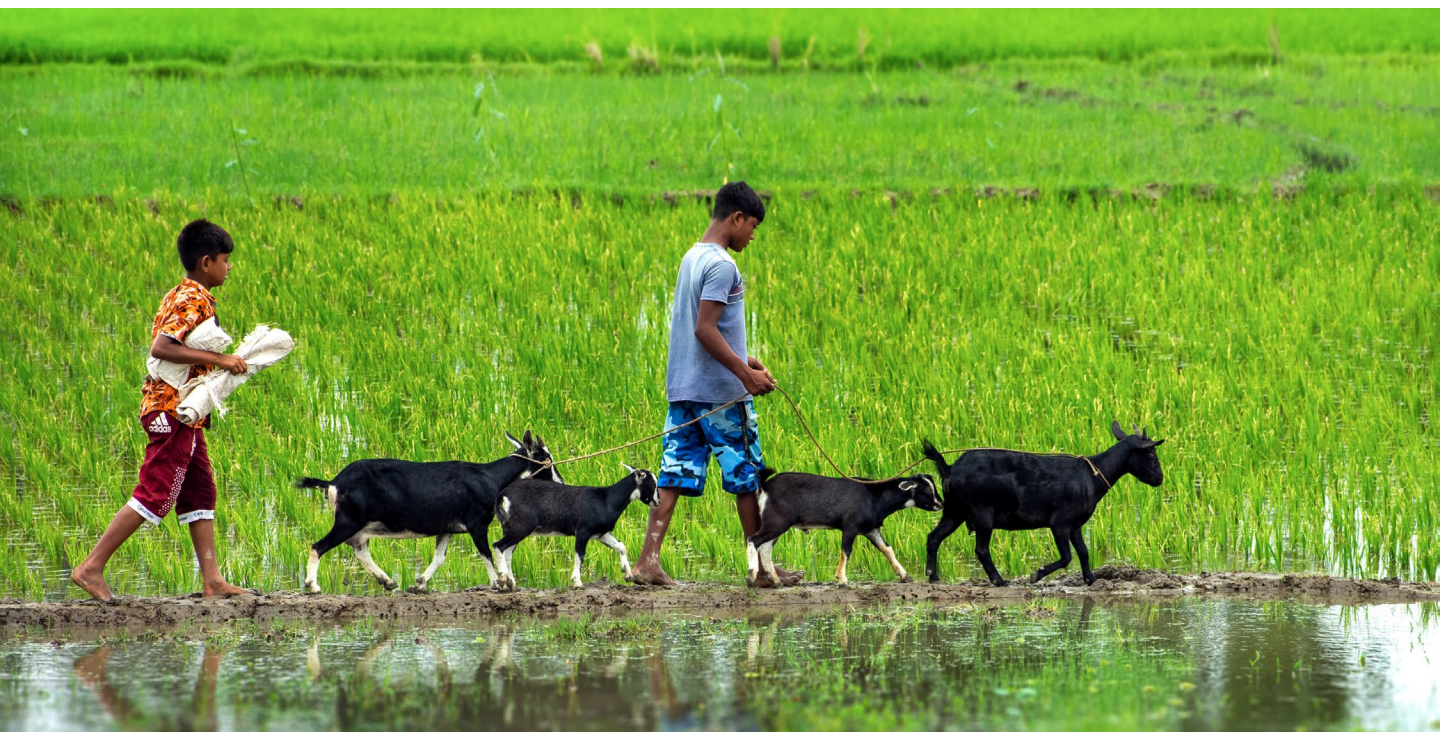
In particular, compare and study diverse cropping systems in terms of:

- i.** agronomic performance
- ii.** yields and nutritional yields
- iii.** labor requirements
- iv.** profitability
- v.** environmental impact

RESEARCH QUESTIONS

Research question 1: At the farm level, can crop diversification, biofortification, and animal components be managed to increase the production of nutritious foods and improve women's and men's livelihoods while conserving resources and mitigating GHG emissions?

Research question 2: How can foodsheds, watersheds and airsheds be managed at the landscape level to increase nutritional yields and agrobiodiversity while maintaining or augmenting ecological services?



Above: TAFFSA experiment field, Dinajpur. Photo credit: Abdul Momin

METHODOLOGY

The on-farm research trials in Bangladesh follow a randomized complete block design (RCBD), with 10–20 farmer households

being the replications within a locality. In each locality, three diversified cropping patterns, as well as an improved farmer practice (FC+) are being compared (Table 1). Plot size is 200–300 m² per treatment.

Table 1: Diversified cropping patterns tested.

Treatment	<i>Kharif-2</i>	<i>Rabi</i>	<i>Kharif-1</i>
Rajshahi district (2 villages)			
T1	<i>Aman</i> rice	lentil	sweet or baby corn
T2	<i>Aman</i> rice	maize/red amaranth intercropping	sorghum (fodder)
T3	<i>Aman</i> rice	mustard	pearl millet (fodder)
FC+	<i>Aman</i> rice	mustard (canola type)	fallow
Chapainawabganj district (2 villages)			
T1	<i>Aman</i> rice	chickpea	pearl millet
T2	<i>Aman</i> rice	lentil	sweet or baby corn
T3	<i>Aman</i> rice	maize/red amaranth intercropping	sorghum (fodder)
FC+	<i>Aman</i> rice	wheat	fallow
Rangpur district (2 villages)			
T1	<i>Aman</i> rice	"napa shak"	groundnut
T2	<i>Aman</i> rice	carrot	maize
T3	<i>Aman</i> rice	carrot	groundnut
FC+	<i>Aman</i> rice	potato	groundnut
Dinajpur district (2 villages)			
T1	<i>Aman</i> rice	carrot	maize
T2	<i>Aman</i> rice	tomato	maize
T3	<i>Aman</i> rice	"napa shak"	maize
FC+	<i>Aman</i> rice	fallow or potato	<i>boro</i> rice

Aman rice = summer/monsoon rice; *boro* rice = winter/dry season rice

LOCATIONS

These on-farm research trials are hosted by smallholder farming households in

eight villages across Rangpur and Rajshahi divisions in four districts of Northern Bangladesh (Table 2).

Table 2: Villages hosting on-farm research trials

SL	Upazila	Union	Village	Latitude	Longitude
Rangpur Division: Dinajpur and Rangpur districts					
2	Birganj	Vognagar	Kalapukur	25.8968	88.6047
3	Chirirbandar	Auliapukur	Indropara	25.6521	88.7475
6	Pirgachha	Chhaola	Shibdeb	25.6735	89.5017
8	Kaunia	Tepamadhupur	Chargonai	25.7478	89.4605
Rajshahi Division: Rajahahi and Chapainawabganj districts					
9	Godagari	Mohonpur	Bautia	24.5457	88.4156
10	Godagari	Deopara	Soyghati	24.3914	88.4597
14	Nachole	Kasba	Sobdolpur	24.8127	88.4271
16	Nachole	Nijampur	Bashbaria Bakoil	24.6871	88.4424

FIELD LAYOUT

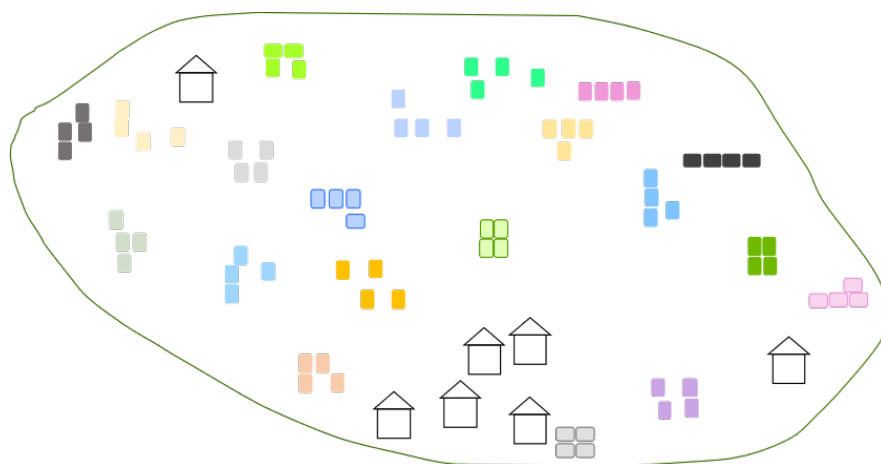


Figure 1: Schematic representation of a village with agronomic on-farm trials distributed across its area. Different colors refer to the replications, each hosted by a different smallholder farming household, which manages the trial following a protocol. Each trial compares four cropping patterns (treatments).

DATA COLLECTION

To compare performance and profitability of the various cropping patterns tested, data on a series of parameters are collected across the seasons:

- Soil sampling: a composite soil sample from 5 points collected before land preparation from 0–15 cm and 15–30 cm depth; for each smallholder farming household prior to trial establishment
- Tillage and phenological information for each crop/plot across each season
- Fertilizer information: rates, timing and method of application
- Pest management: monitor pest and diseases; record any control measures taken
- Weed management: keep plots weed-free during critical stages of respective crop growth; record any control measures taken
- Irrigation information: timing and amount of irrigation water applied
- Labor information: for all field and post-harvest activities.
- Harvest data: yield of main crop product as well as leftover biomass; collect samples for nutritional yield analyses (TBD).
- Market price information: for inputs and produce.



Above: Manual fodder chopping. Photo Credit: Abdul Momin

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SUGGESTED CITATION

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ABOUT TAFSSA

TAFSSA is a CGIAR regional integrated initiative to support actions that improve equitable access to sustainable healthy diets, improve farmers' livelihoods and resilience, and conserve land, air and water resources in South Asia.

ABOUT CGIAR

CGIAR is a global research partnership for a food-secure future. Visit <https://www.cgiar.org/research/cgiar-portfolio> to learn more about the initiatives in the CGIAR research portfolio.

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