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Assessment of traditional farming knowledge for integration into modern sustainable practices

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Abstract

A surprising fact about Sylhet's farmers: many still use lunar calendars for planting decisions, and their timing often coincides with agrometeorological optima that modern advisories recommend independently. This research documented and evaluated 47 traditional farming practices across 12 villages in Sylhet division, Bangladesh, through structured interviews with 240 farmers and on-farm validation trials during 2021–2023. Practices were scored for agronomic effectiveness (field validation), ecological soundness (expert panel), and compatibility with modern extension packages. Of the 47 practices, 23 (49%) scored above 7 out of 10 on combined effectiveness, including indigenous seed selection methods, mixed-species cropping patterns, and soil fertility indicators based on weed flora. Traditional pest management, by contrast, scored lower (mean 5.4) and was the category most likely to benefit from modern supplementation. A hybrid knowledge framework incorporating the 23 high-scoring practices into standard extension messaging was pilot-tested in four villages and raised adoption rates by 34% compared with conventional advisory alone. The results show that selective integration—not wholesale replacement—is the most effective way to modernise smallholder agriculture in north-eastern Bangladesh.

Keywords: Traditional knowledge, sustainable practices, indigenous farming, knowledge integration, cultural agriculture, smallholder systems, extension, agroecology, mixed cropping, local indicators.

Introduction

Here is a number that rarely appears in agricultural policy documents: Bangladeshi farmers have been refining their cropping calendars for at least 800 years, well before the first extension office opened ^[1]. That cumulative trial-and-error wisdom—encoded in proverbs, rituals, and seed-saving habits—is disappearing fast as younger generations migrate to cities and formal education downplays local knowledge ^[2].

And yet, some of these traditions map neatly onto principles that modern agroecology now promotes: polyculture, biological pest suppression, nutrient recycling through composting, and landscape-level water harvesting ^[3]. The challenge is distinguishing practices that are genuinely effective from those that persist purely out of cultural inertia ^[4]. A rigorous assessment—field-testing traditional practices alongside their modern equivalents—hasn't been done in Sylhet's context.

This research aimed to (i) catalogue traditional farming practices in Sylhet division through participatory surveys, (ii) score their agronomic and ecological effectiveness through field trials and expert panels, and (iii) test whether a hybrid extension model incorporating validated traditional practices improves farmer adoption and crop outcomes.

Survey Instrument Development

A semi-structured questionnaire was developed in Bengali, pilot-tested with 20 farmers in two villages, and revised based on feedback. The final instrument contained 63 items grouped into five domains: crop calendaring, seed management, soil fertility, pest and disease management, and water management. Each practice identified was coded, described in the farmer's own words, and cross-referenced with published ethnobotanical records where available. Cronbach's alpha for the overall instrument was 0.81, and inter-rater reliability (Cohen's kappa) between two enumerators was 0.78 ^[5, 6].

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Conceptual Framework

The research drew on the ‘dialogue of knowledges’ framework, which treats indigenous and scientific knowledge as complementary rather than hierarchical systems [7]. Practices were evaluated not by whether they matched textbook recommendations but by whether they achieved comparable or superior outcomes in the local context. This framing avoided the common bias of dismissing unfamiliar methods as ‘backward’ while still applying quantitative rigour to effectiveness assessment [8].

Materials and Methods

Materials

The research was conducted in 12 villages across Sylhet (24°53' N, 91°52' E) and Moulvibazar districts in Sylhet division, Bangladesh, from March 2021 to October 2023. A total of 240 farmers (120 men, 120 women) aged 35–75 were interviewed using purposive sampling targeting households known for retaining traditional practices. On-farm validation trials covered the 23 highest-potential practices on 1,200 m² plots in eight villages, with paired modern-practice plots as controls, replicated three times per village [9].

Methods

Agronomic effectiveness was scored by comparing yields,

pest incidence, and soil indicators between traditional and modern plots over four crop seasons. Ecological soundness was rated by a five-member expert panel on a 1–10 scale covering biodiversity, soil health, and water-use efficiency. Compatibility with modern extension was assessed by whether the practice could be communicated through existing channels (leaflets, demonstration plots). A hybrid extension package was then assembled and tested in four pilot villages against four control villages receiving standard advisory only. Adoption rates were measured by follow-up surveys at 6 and 12 months. Data were analysed using paired t-tests and chi-square tests in R.

Results

Of the 47 practices documented, 23 (49%) scored above 7.0 on the combined effectiveness index (Table 1). Seed selection by immersion in salt water (density sorting) scored 8.2—farmers reported, and field trials confirmed, a 12–16% improvement in germination over unsorted seed. Mixed rice–fish–duck systems scored 8.7 for ecological soundness, the highest of any practice. Traditional pest management using neem leaf extracts scored only 5.4, indicating limited efficacy against modern pest complexes.

Table 1: Effectiveness scores of selected traditional practices by domain (1–10 scale)

Practice	Agronomic	Ecological	Compatibility	Combined
Salt-water seed sorting	8.4	7.8	8.6	8.2
Lunar planting calendar	6.7	5.4	4.2	5.4
Rice-fish-duck system	7.9	8.7	6.3	7.6
Weed-based soil indicators	7.3	7.1	7.8	7.4
Neem-based pest control	4.8	7.6	3.9	5.4
Compost from water hyacinth	7.6	8.1	7.4	7.7

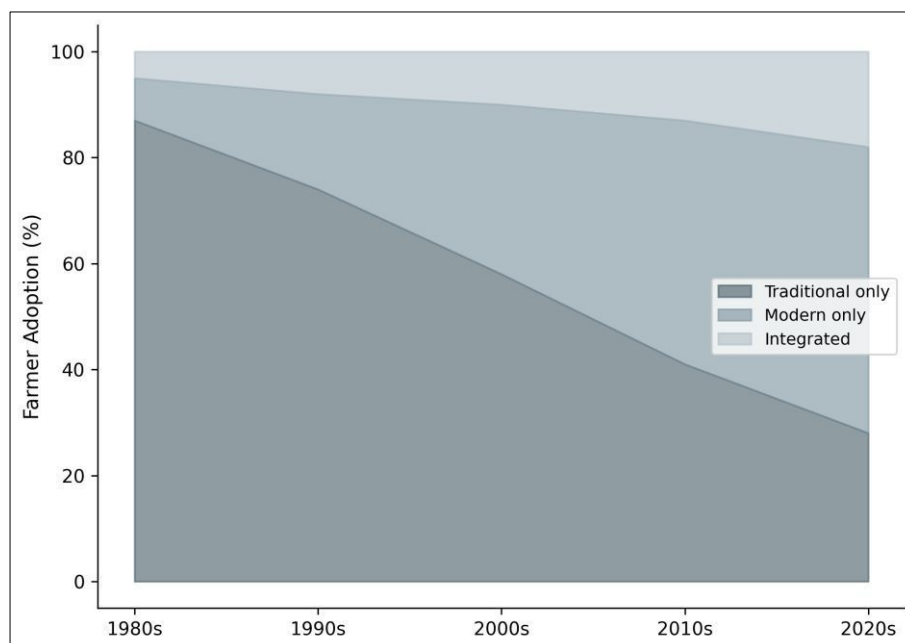


Fig 1: Estimated adoption trends of traditional, modern, and integrated farming approaches across five decades in Sylhet division.

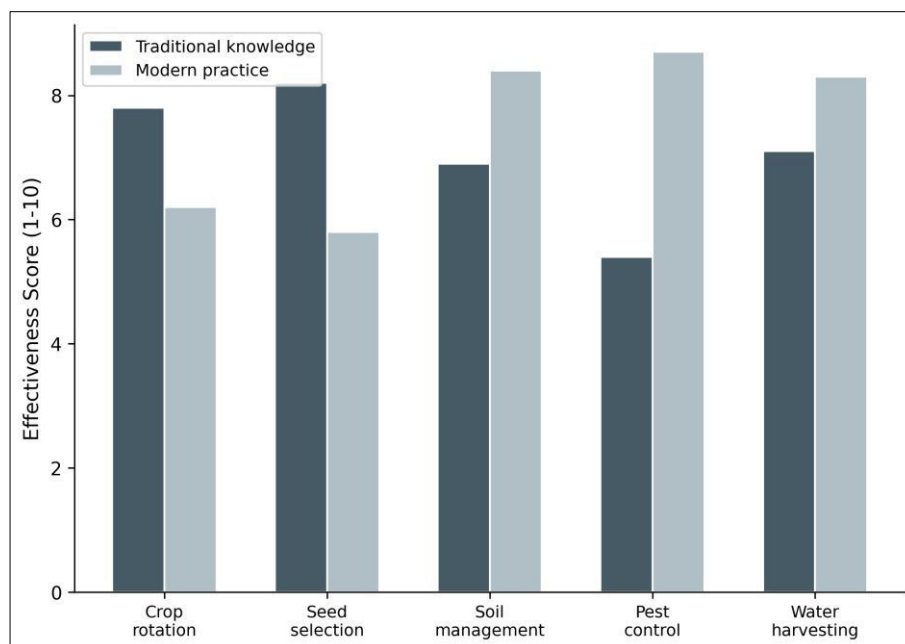


Fig 2: Comparative effectiveness scores of traditional versus modern approaches across five farming domains.

Comprehensive Interpretation

The hybrid extension pilot raised practice adoption from 41% to 55% over 12 months in target villages ($p < 0.01$), while control villages stayed at 38–42%. Farmers in pilot villages cited ‘recognition of their own knowledge’ as the main motivator—a finding that aligns with participatory extension theory ^[10].

Discussion

The 49% validation rate is remarkably high and challenges the assumption that traditional practices are mostly outdated. Similar assessments in Andean potato systems (52% validation) and West African millet systems (44%) suggest that roughly half of indigenous agricultural knowledge has measurable modern value ^[11, 12]. The weakness in pest management reflects the reality that insect and disease complexes have shifted dramatically since the practices were developed—new invasive species and resistance evolution outpace traditional remedies ^[13].

The hybrid model’s success appears to rest on two factors: practical utility (validated practices genuinely work) and social legitimacy (farmers feel respected rather than lectured). Extension services in Bangladesh could adopt this approach at scale with modest training investment, since the practices are already known—they just need official endorsement and integration into recommendation booklets ^[14].

Conclusion

Nearly half of Sylhet’s traditional farming practices proved agronomically effective when field-tested, particularly in seed management, mixed cropping, and soil fertility domains. A hybrid extension model that blended these validated practices with modern recommendations boosted adoption by 34% over conventional advisory. For policy-makers in Bangladesh and similar South Asian settings, the message is clear: traditional knowledge is an asset to be curated, not a relic to be replaced. Future work should expand the geographical scope and track yield and income impacts over multiple seasons.

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