



Photo credit: CIMMYT/Sam Storr

# SPIA Bangladesh Report 2025: Updating the Green Revolution



Standing Panel on Impact Assessment

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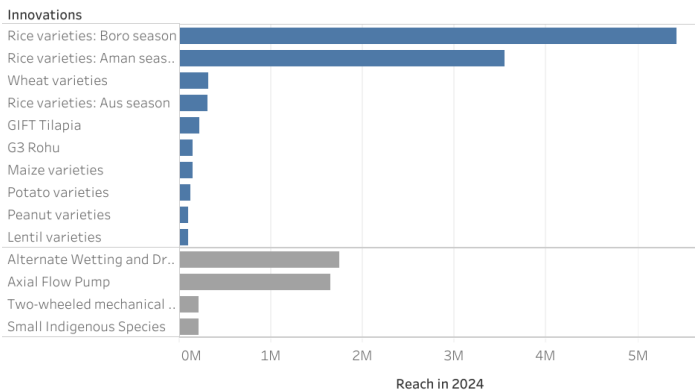
## Summary

- CGIAR-related innovations reached between 8.0 million households (lower bound) and 9.4 million households (upper bound) in Bangladesh in 2023/24
- Rice varieties in the major *Boro* and *Aman* production seasons dominate the reach when looking across all CGIAR-related innovations
- Newer stress-tolerant rice varieties are starting to be adopted at scale but have not yet displaced older releases
- Aquaculture innovations, particularly the G3 Rohu strain, continue to grow in importance

Agricultural productivity has risen steadily, supporting notable shifts in employment from agriculture (61% of national employment in 2000, to 35% in 2023) towards manufacturing and services. Even within rural areas, we see agricultural participation dropping in recent years from 58.9% in 2018 to 54.5% in 2024, suggesting the development of the rural non-farm sector.

Rice continues to dominate Bangladesh’s agriculture as a staple crop across its two major growing seasons – *Boro* and *Aman* – and a minor *Aus* season. Nonetheless, Bangladesh has experienced a four-fold growth in aquaculture production since 2000, a development dubbed the Blue Revolution. Between 2004 and 2014, the rate of growth in hatcheries and feed mills far out-stripped the growth in the number aquaculture operations, showing a shift towards modern inputs and intensification of production.

Despite these advancements, Bangladesh remains highly vulnerable to natural hazards exacerbated by climate change, ranking high in terms of susceptibility to projected temperature and sea level rises in the coming decades. The data used in this report were collected in early 2024, immediately before the major shock to Bangladesh’s economy associated with the student protest movement that resulted in the ousting of the Hasina administration and the installation of a transitional government.



**Figure 1.** Reach of CGIAR-related innovations in Bangladesh in 2024 (millions of households)

**Source:** SPIA Bangladesh Report 2025

## Context

Bangladesh boasts fertile alluvial soils, mangrove forests, tea plantations, and areas prone to both drought and flood conditions. Since its independence in 1970, Bangladesh’s institutions have partnered with several CGIAR centers, with IRRI, CIMMYT, IFPRI and WorldFish having particularly significant, extended collaborations.

## Methods

Starting 2022, SPIA began **stocktaking of CGIAR-related innovations**, through desk research, interviews with focal points, and consultation workshops. The focus was on the period since 2000. We identified 64 innovations, of which 45 were considered to potentially be present at scale in farmers’ fields. In 2024, SPIA commissioned and managed an additional (4th) round to the IFPRI-run Bangladesh Integrated Household Survey (BIHS) – a

nationally-representative panel survey with prior rounds in 2011/12, 2015 and 2018/19.

The BIHS 4 sample includes 275 sample villages from seven divisions, with a linear systematic selection of 20 households per village, tracking both original and split households across rounds. **Sampling weights were adjusted** based on updated PSU sizes from the 2021 census to ensure consistency and reduce variance within divisions.

A novel feature of BIHS 4 is the collection of leaf samples from rice fields during the *Boro* season. We used **DNA fingerprinting** to identify varieties from farmers' fields by collecting 2,202 rice leaf tissue samples, genotyped alongside 106 reference seed samples.

**farmer self-reports**, covering multiple varieties of wheat, maize, lentils, peanuts, potato, and sweetpotato. In natural resource management, 13 innovations were examined, including Alternate Wetting and Drying (AWD) and several digital platforms / mobile apps developed by CGIAR and their partners.

Adoption rates of CGIAR innovations were estimated using the **nationally representative data** from BIHS 4, distinguishing between a lower bound (innovations where the CGIAR contribution is tightly defined) and an upper bound (where CGIAR's contribution to the innovation is less direct).

## Results

In terms of **crop innovations**, rice breeding in Bangladesh has introduced 133 disease and insect-resistant varieties since the 1990s, primarily by BRRI and BINA. CGIAR-related varieties were found in the plots of 52% of rice growing households in the irrigated *Boro* season, using DNA fingerprinting data, with average varietal year of release of 2004, reflecting persistence of a few older popular varieties. Limiting to releases since 2000, the corresponding figure is 22.5% of rice-growing households. Broadening to also include self-reported data from other *Boro* plots, the estimates increase to 59% for any CGIAR-related variety and 26% for releases since 2000.

In the rainfed *Aman* season, 39% of rice growers report adoption CGIAR-related varieties with a weighted varietal release year of 2001. However,

stress-tolerant varieties are starting to take off. We find 7.3% of *Aman* rice-growing households report growing submergence tolerant rice. Administrative data show steady growth in seed dissemination for stress-tolerant varieties starting in 2013.

Approximately 60% of wheat-growing households cultivate CGIAR-related varieties, 42% of lentil-growing households, and 34% of peanut-growing households. These crops are of minor importance when compared to rice but still deliver reach in the hundreds of thousands of households.

Aquaculture has seen significant growth, supported by genetically improved strains such as the **GIFT Tilapia**. Between 1984 and 2024, farmed fish production increased from 124,000 to 2.1 million tons annually, now accounting for 55% of the country's fish supply. The number of hatcheries has grown considerably, and household pond sizes have become more consolidated (slightly fewer, slightly larger). WorldFish has played a crucial role in disseminating **G3 Rohu** which has already reached 6.5% of Rohu-producing households despite only being released in 2020.

**Alternate Wetting and Drying** in rice has been a sustained focus for IRRI since the mid-2000 given its potential to reduce net GHG emissions from rice fields. We find that 19% of rice-growing households report practicing AWD during the *Boro* season 2024. None of these households report using the perforated pipe that was promoted to support "safe" AWD adoption by allowing farmers to monitor the water level below the surface of the soil. This raises questions about the contribution of CGIAR research to this level of adoption, to be explored further in future, so we include AWD in the upper bound estimate only. Digital support tools / agronomic apps show no adoption despite Bangladeshi's enthusiastic use of apps in other areas of their lives.

Mechanization has been a core focus of CGIAR's strategy in Bangladesh, promoting affordable, small-scale machinery for smallholder farmers. The **Axial Flow Pump (AFP)** has seen steady increases in adoption, although traditional equipment remains prevalent. Power tillers, both **2-wheeled and 4-wheeled**, are widely used, with the latter showing increased adoption since 2018.

