

**Research thrust, varietal release  
and adoption of modern rice  
varieties in West Bengal, India**

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# Introduction

- West Bengal is an agriculturally developed state of India.
- The state occupies 8% of total population of the country and contributes 16% of total rice production.
- Rice production increased by 235% during 1970-2010.
- This development is partially attributed to introduction of modern varieties along with increase in irrigated area.
- A large number of modern varieties were released/recommended for the state.
- This was possible through continuous research work on varieties suiting to different agro-ecology.

- Out of six agro-climatic zones, Old Alluvial Zone is the largest with 32% of rice area followed by Red and Laterite Zone with 22%.
- Irrigated rice is about 34% of total rice area.
- Due to erratic behavior of climate, wet rice production suffers. Life-saving irrigation through canal water is sometimes not sufficient to combat mid-season drought. Wet rice is cultivated mainly by rain water while dry rice is cultivated by assured irrigation.
- During 1970-2010, area and production of irrigated rice increased by 5.55% per year. Whereas, growth of area and production of total rice during the same period was 0.45% and 2.87%, respectively.

- Yield increase of irrigated rice was 0.38% annually and of total rice yield was 2.87%.
- Decade-wise growth shows that 1970s and 2000s growth of irrigated rice productivity/annum was negligible or negative. Whereas, total rice productivity during the same period was 0.8% .
- 1980s irrigated rice shows substantial progress with 9.64% of increase in area and 13.25% in production.
- Increase in area was due to installation of private tube-wells and increase in production was due to increase in area and increase of share of modern variety to total rice area .
- Share of area under shallow tube-wells increased from 22%(0.21m) in 1980-81 to 53%(1.2m) in 1990-91.

- Growth of rice productivity was widespread in all districts.
- In 1980, there was no high productivity district whose rice yield/ha was 3.75 tons or above.
- In 2009-10, in about 60% of districts average yield of rice/ha was 3.75 tons and above.
- In 1980, 66% of districts of West Bengal had low productivity (below 2 t/ha). But in 2009-10, no district falls under this group.

# Objectives of the study

- To document rice varieties released/recommended for West Bengal since 1970 and changes in varietal characteristics in the past 40 years,
- To evaluate the research direction and importance of different themes related to rice germplasm improvement in West Bengal through researchers' survey,
- To pilot test the use of expert opinion/perception in obtaining quick and clean estimates of rice varietal adoption at the district level.
- To assess research thrust and time devoted by rice scientists, rice varietal release pattern and predominance of different rice cultivars in West Bengal.

# Varietal release pattern

- In 1970s, out of 13 varieties released/recommended for West Bengal, 8 was for irrigated ecosystem (60%). In 2000-2008, only 35% of released varieties were for irrigated ecosystem.
- Overall, 43% of varieties released/recommended was for irrigated ecosystem. Whereas, total irrigated rice area is 34%.
- Rice varieties released/recommended since 1970s:
  - 43% for Mediumland
  - 40% for Lowland
  - 17% for Upland

- Grain quality consideration:
  - Finer grain cultivars
    - 23% of varietal releases in 1980s
    - 50% of varietal releases in 2000s
  - Marketable surplus is increasing.
  - Demand for finer grain is increasing with the development of secondary and tertiary sector.
- Biotic stress consideration:
  - Losses due to pest and disease is about 17% in yield.
  - In 1980s, 70% of varietal releases were disease resistant,
  - In 2000s, all released varieties were pest and disease resistant.

# Investment in rice germplasm improvement research

- Researchers' survey consisted of 60 rice scientists
  - 23 from Chuchura Rice Research Station
  - 30 from different universities
- Full-time equivalent (FTE) of research allocation in varietal improvement by ecosystem
  - 72% for irrigated ecosystem
  - 8% for lowland ecosystem
  - 3% for upland ecosystem

# Time allocation by theme

Improvement of yield	- 28% of FTE
Improvement of grain quality	- 11% of FTE
Stress tolerance	- 15% of FTE
Research in saline rice	- 8% of FTE
Arsenic tolerance	- 2% of FTE
Seed production	- 15% of FTE

# Expert Estimates

- Variety wise estimation of area is not readily available.
- Although this can be estimated through seed sale, seed replacement rate (SRR) in eastern India is low. In addition, SRR differs by agro-climatic zone and by farm size group.
- The most popular way to obtain adoption rate of different varieties is through farmers' household survey but this takes a long time.
- Quickest way of obtaining varietal adoption is through expert estimates wherein experts of particular area, block, district or state provide their perception about different varieties grown.

# Results of Expert Estimates

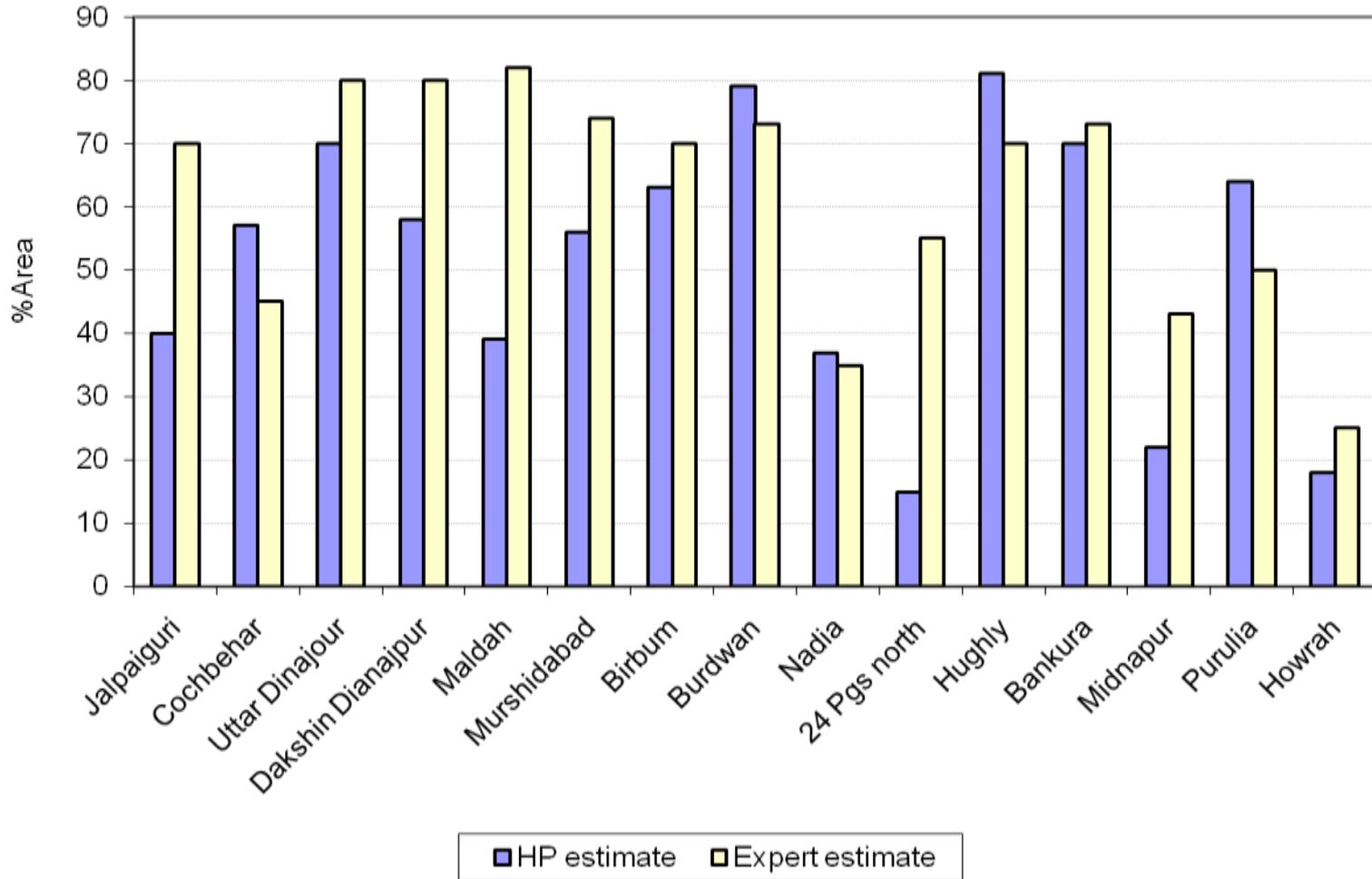
- 48 resource persons (agricultural experts) participated in the expert elicitation conducted in 17 districts.
- In wet season, district-wise estimates of MV area vary from 62% in South 24 Parganas to 99% in Nadia. Overall, 89% of rice area is under modern varieties when district-level data was pooled using rice area as weights.
- In dry season, 100% area is under modern rice variety.

# Results of Expert Estimates

## Cultivar-specific adoption

- Experts perceived MTU 7029 variety as the most popular covering 59% of the area in wet season. Harvest Plus (HP) survey in 2007 revealed 51%.
- In wet season, experts reported that varieties like IET-4786, IET 4094, MTU 1017, MTU 1001 and MTU 1010 altogether cover 15% of the rice area. Whereas, these varieties were insignificant in the HP survey.
- In dry season, experts perceive new varieties like Shyamasri and GB-1 to cover 5% of the rice area. These were absolutely absent in the HP survey.

## Comparison between Harvest Plus and Expert estimates of %Area grown to MTU 7029 in wet season, West Bengal



# 2011 Expert Elicitation & 2007 Harvest Plus Survey

- Wet season:
  - MTU 7029 is replaced by BPT 5204 in Coochbehar
  - MTU 7029 is replaced by IET 4786 in Nadia
  - NC 492 is replaced by MTU 7029 in Howrah
  - Pankaj is replaced by NC 492 in South 24 Parganas
- Dry season:
  - China boro is replaced by Ananda in Coochbehar
  - China boro is replaced by MTU 1010 in Jalpaiguri
  - IET 4094 is replaced by IET 4786 in some districts

# Conclusions

- Expert estimates are not flawless- on an average three resource persons per district joined for estimating area under different varieties.
- Since area estimation is based on perception, approximation or guesswork play an important role. Selection of experts and their knowledge about different varieties grown in the district are important.
- No expert deals with only rice crop. They have to look after all crops grown in the district.
- The district offices have no record of different rice varieties grown in the district.
- This type of estimation can be done where there is good infrastructure and specialized staff who have thorough knowledge of the district.

# Conclusions

- District officers need formal approval from the state-level officers to participate in the estimation process.
- Selection of experts is a problem. It is difficult to approach the right person.
- District officers are busy with so many administrative work. Due to pre-occupation or sometimes urgent work it becomes difficult to get their views/perception.
- In districts with wide agro-ecological variability, expert opinion differs. In such cases, expert opinion at the subdivision level (like in Murshidabad and Burdwan) or block level (like in South 24 Parganas) is more reliable.
- Despite the problems encountered, this method saves time and cost.
- More conclusive remarks will be made after results of expert estimation are validated using farm-level survey.