Environment and Ecology 37 (2) : 517—520, April—June 2019
Website: environmentandecology.com ISSN 0970-0420

# Adoption Strategies and Assessment of Yield Gap Analysis of Rice in Mandya District of Karnataka

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Received 14 November 2018 ; Accepted 17 December 2018; Published on 10 January 2019

**Abstract** A study was conducted in Mandya district of Karnataka during 2016 and 2017 to assess the rice yield gaps and to know the adoption strategies opted by rice farmers of Mandya district. One hundred respondents were selected to study the current status of adoption strategies, magnitude of rice yield gaps and strategies to narrow the gaps for sustenance of rice production in Karnataka. The selected farmers were interviewed using a pre-tested interviewed schedule. The results of the study revealed that among different rice varieties, majority of the rice growers were adopted medium duration varieties like MTU 1001 (51.85%), IR-64 (12.96%) and Thanu (11.11%) during the year 2016 and 20% of the farmers were grown different varieties viz; JGL, Super aman, Omkar, Siri, Sonamasuri, Rajamudi followed by BR 2655 (16%), IR-64 (14%) and MTU 1001 (13%). The cost for production of paddy was ranged between Rs 35,000 to 57, 500 per ha. The yield gap between farmers average yield and potential yield of demonstration was about 30.55%. The farmers obtained almost on par yield with package of practice during both the years. Scarcity of labor during peak period, high cost of labor, non-availability of hybrid seeds, lack of irrigation facilities and lack of electricity to irrigate during critical growth period were the constraints expressed by the farmers during the study.

**Keywords** Rice production, Yield gap analysis, Adoption, Constraints.

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## Introduction

Rice (*Oryza sativa* L.) is the worlds most important cereal crop and a primary source of food over one third of world population. India stands first in rice area (43.00 million hectares) with second in production (112.91 million tons) next to China and the productivity of 2,585 kg/ha (Anon 2018 a). In Karnataka, it occupies in an area of 8.74 lakh ha with a production of 23.59 lakh tons of grain and the productivity of 2,699 kg/ha (Anon 2018b). In Mandya district, it is grown over an area of 58,487 ha with the production 2155.60 lakh tones with the productivity of 3,280 kg/ha (Anon 2016). Rice production needs to be increased to meet

future food requirement aimed at strong competition for limited resources. The projected requirement of rice by the year 2050 for consumption purpose alone is 136 million tons for an expected population of 162 million (Ramesh Chand 2012). The gaps between yields obtained at research stations and farmers field still exist among various rice growing ecologies, soto meet the growing demand a rapid increase in rice production is needed. There are several approaches to meet this projected demand which includes expanding rice area, increasing productivity, bridging the yield gap and reducing post-harvest losses. Among these approaches closing the yield gap between maximum attainable yield and farm level yield is promising and it would be immediate approach to be adopted. Yield gap analysis is a useful method to examine how large the ranges are between potential, desirable rice yields and those actually realized in farmers fields (Laborte 2012). This gap is likely due to degraded, less fertile soils, pockets of endemic cropping systems and a low adoption rate of high yielding technologies by farmers. Adoption of improved rice varieties and technologies to bridge the yield gap could improve not only the production but also the efficiency of rice productivity. In view of the above challenges and opportunities, this paper attempts to assess the magnitude of rice yield gaps, their causes and strategies to narrow the gaps in order to sustenance of rice production in Mandya district of Karnataka.

**Materials and Methods**

The studies on adoption strategies and assessment of yield gap analysis of rice in farmers field was conducted during 2016 and 2017 in Mandya district of Karnataka under low land ecology, as it had a substantial area under paddy cultivation having uniform distribution of marginal, small and big farmers. The rice growers were selected from all 7 taluks of Mandya district for collection of data on yield and economics of rice during the year. A total 100 rice growing farmers were selected and the data collection was done by personal interview method with the help of the well-structured schedule. The schedule cover general information on rice production in terms of input usage, cost of production, income, varieties, time of planting, yield. For assessing the yield gap information available with Package of Practice (PoP) with respect to yield of paddy was compared. The statistical tools such as frequency percentage and mean were used to analyze the data. In the present study, the yield gap was operationalized as the difference between the maximum yield obtained at the research station (potential yield) and actual farm yield (Alam 2006).

Yield gap has been defined as the difference between the yield potential at experimental station during the dry season and in a good year and the overage national yield. The yield gaps in rice below potential and farmers yields are still substantially high due to the combination of factors like bio-physical (varieties, seeds, weeds, insects, diseases and other pests, due to inadequate crop management, poor soil health, poor water management drought, flash floods and temperature stress, post-harvest loss ) poor management and low socio-economic conditions of farmers and lack of resources, especially credit and knowledge and certain not so favorable policies of the government.

**Results and Discussion**

In Karnataka, rice production is 23.59 lakh tonnes of grain with an average productivity of 2,699 kg/ha (Anon 2016). In Mandya district, rice production is 2155.60 lakh tones with the productiviy of 3.28 t/ha (Anon 2016).

Yield gaps in crops needs to be minimized in interest of increased and sustainable crop production. The state average (4,126 kg/ha) was far lower than the farmers potential yield (5,816 kg/ha) and demonstration yield (5,166 kg/ha) and research station yield (6,567 kg/ha), respectively (Table 1). The total yield gap of 2,441 kg/ha, which is the difference between research station yield and the state average yield can be broken up into 2 components viz, Yield Gap I or research gap (difference between research station and demonstration yields) of 1,401 kg/ha and Yield Gap II or extension gap (Difference between demonstration and state average yields) of 1,040 kg/ha. The total yield gap which is the difference between the potential farm yield and the actual yield by the sample farmers worked out to be 17.77 q/ha. Scarcity of labor during peak period, high cost of labor, non-availability of

**Table 1.** Yield gap in rice (t/ha). Source : Shankar et al. 2015.

| Particulars | Paddy yield (kg/ha) |
|---|---|
| World average yield | 4443 |
| National average yield | 3658 |
| Karnataka state average yield | 4126 |
| Mandya district average yield | 3052 |
| Research station yield | 6567 |
| Yield observed in front line demonstration (FLD) | 5166 |
| Farmers field yield | 5816 |

hybrid seeds, lack of irrigation facilities and lack of electricity to irrigate during critical growth period were the constraints expressed by the farmers during the study.

The extension gap can be bridged by motivating the farmers to adopt available improved production practices while scientists need to refine/modify the existing technology to address the socio-economic and environmental constraints under which the farmers operate to bridge the research gap.

Based on the survey conducted in Mandya district under Cauvery command area, it is evident from Table 2 that majority of the paddy growers during 2016 have adopted MTU 1001 rice variety (51.85%), IR-64 (12.96%) and Thanu (11.11%) followed by BR 2655, Jaya and Jyothi varieties (5.55,3.70 and 3.70%, respectively). Among different rice varieties, a farmer harvested 6.1 t/ha from long duration variety BR 2655 as compared to potential yield as of package of practice (6.5 t/ha) which resulted in 0.4 tonnes less yield than UAS Bangalore package of practice yield. Medium duration variety MTU 1001 recorded (6.7 t/ha) as compared to PoP yield (5.0 t/ha) resulted in 1.7 tonnes higher yield (+1.7 t/ha) followed by IR-64 (+ 2.2 t/ha), Thanu (+ 0.5 t/ha) and Jyothi (+ 0.2 t/ha) than PoP respectively. 11.11% of the rice farmers were growing other private company varieties like JGL, super aman, omkar, siri.

From Table 3 it is evident that majority of the paddy growers during 2017 have adopted long duration variety BR 2655 (16.0%) followed by medium duration varieties of MTU 1001 (13.0%), IR-64 (14.0%) and Thanu (11.0%) respectively. The result indicated that, among different rice varieties, long duration variety BR 2655 recorded (6.3 t/ha) higher farmers yield as compared to PoP yield (6.5 t/ha) resulted 0.9 t/ha less yield than PoP yield. Medium duration varieties MTU 1001 recorded 5.6 t/ha as compared to PoP yield (5.0 t/ha) resulted in higher yield (+ 0.6 t/ha) than PoP. This was followed by IR-64 (+ 2.6 t/ha), Thanu (+1.6 t/ha) and KRH-4 hybrid (+ 0.1 t/ha) respectively. 20.0% of the rice farmers were growing other private company varieties like JGL, super aman, omkar, siri, amogha, cauvery, MC-13, menakshi, sonamasuri and rajmudi.

The study revealed that most of the farmers have adopted improved practices like use of improved varieties, timely main land preparation, wet nursery,

**Table 2.** Yield gap assessment in rice varieties in Mandya district of Cauvery command area of Karnataka during 2016 (n=100).

| Sl. No. | Rice varieties | No. of farmers | Pop yield (t/ha) | Farmers yield (t/ha) | Yield gap (t/ha) | % adoption | % yield gap |
|---|---|---|---|---|---|---|---|
| | Long duration varieties | | | | | | |
| 1 | BR 2655 | 06 | 6.5 | 6.1 | -0.4 | 5.55 | -6.20 |
| 2 | Jaya | 04 | 6.0 | 7.1 | +1.1 | 3.70 | +18.3 |
| | Medium duration varieties | | | | | | |
| 3 | MTU 1001 | 52 | 5.0 | 6.7 | +1.7 | 51.85 | +34.0 |
| 4 | IR 64 | 13 | 5.0 | 7.2 | +2.2 | 12.96 | +44.0 |
| 5 | Thanu | 11 | 5.0 | 5.5 | +0.5 | 11.11 | +10.0 |
| 6 | Jyothi | 04 | 5.0 | 5.2 | +0.2 | 3.70 | +4.00 |
| | Other varieties | | | | | | |
| 7 | JGL, Super aman, Omkar, Siri | 10 | – | – | – | 11.11 | – |

**Table 3.** Yield gap assessment in rice varieties in Mandya district of Cauvery command area of Karnataka during 2017 (n=100).

| Sl. No. | Varieties | No. of farmers | PoP yield (t/ha) | Farmers yield (t/ha) | Yield gap (t/ha) | % adoption | % yield gap |
|---|---|---|---|---|---|---|---|
| Long duration varieties (140-145 days) | | | | | | | |
| 1 | BR 2655 | 16 | 6.5 | 6.3 | -0.2 | 16.0 | -3.10 |
| 2 | Jaya | 06 | 6.0 | 7.1 | 1.1 | 6.0 | +18.3 |
| Medium duration varieties/ Hybrid (130—140) | | | | | | | |
| 3 | KRH-4 | 08 | 8.0 | 8.1 | 0.1 | 8.0 | +1.30 |
| 4 | MTU 1001 | 13 | 5.0 | 5.6 | 0.6 | 13.0 | +12.0 |
| 5 | IR 64 | 14 | 5.0 | 7.6 | 2.6 | 14.0 | +52.0 |
| 6 | Thanu | 11 | 5.0 | 6.6 | 1.6 | 11.0 | +32.0 |
| 7 | IR 30864 | 01 | 5.0 | 7.5 | 2.5 | 1.0 | +50.0 |
| 8 | Gangavathisona | 01 | 5.0 | 5.1 | 0.1 | 1.0 | +2.00 |
| 9 | Rasi | 10 | 4.5 | 6.3 | 1.8 | 10.0 | +40.0 |
| Other varieties | | | | | | | |
| 10 | JGL, Super aman, Omkar, Siri, Cauvery, Amogha, MC-13, Meenakshi, DRH-836, Chinnapoonam, Kamakshi, Rajmudi, Sonamasuri 20002 | 20 | – | 6.8 | – | 20 | – |

timely transplanting, application of NPK fertilizers as basal and top dressing, use of herbicides for weed control and plant protection measures to control pest and diseases, timely irrigating paddy field through canal water, varieties are available in the open market and Karnataka State Department of Agriculture (KSDA) has supplied seeds to the farmers under subsidy.

During the study some of the constraints were expressed by the farmers are scarcities of labor during peak period, high cost of labor, non-availability of hybrid seeds, lack of irrigation facilities and lack of electricity to irrigate during critical growth period. It was observed during the survey that majority of the farmers depend on input dealers such as fertilizer and pesticide dealers for information on usage of improved technologies. These informal sources of information mainly give instructions on use of improved technology based on hands-on-experience. Private extension can complement and supplement the efforts of public extension services, and farmers can rely on the timeliness of services provided by them. Public extension services should focus on imparting skill based technologies in rice cultivation.

From the study it was concluded that there is scope for enhancing productivity of rice by adopting Best Management Practices (BMP) and bridge the yield gap by way of consulted extension efforts to augment the productivity of rice in the district as well as in the state.

**References**


Alam M (2006) Factors affecting yield gap and efficiency in rice productions in some selected areas of Bangladesh. PhD thesis. Dept. of Economics, Jahangir Nagar University, Bangladesh.

Anonymous (2018a) www.Indiastat.com

Anonymous (2018b) Ministry of Agriculture and Farmers Welfare.

Anonymous (2016) www.des.kar.nic.in

Laborte AG, Bie CAJM, Desmaling EMA, Moya PF, Boling AA,. Ittersum (2012) Rice yields and yield gaps in South East Asia past trends and future out look. Europ J Agron 36 : 9–20.

Rameshchand (2012) Vision discussion. Presentation made in the knowledge meet : Of Philippines' rice farmers. Econ Dev Cultural Change 29 (2) : 375—399.

Shankar MA, Nuthan D, Chandrashekar K (2015) Strategies to bridge yield gap in field crops of southern Karnataka. Directorate of research, University of Agricultural Sciences, Bengaluru, pp 1—8.