

Impact of Flood Resistant Red Rice Variety – Sahyadri Panchamukhi on Socio-Economic status of Coastal Farmers of Karnataka

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ABSTRACT: In Dakshina Kannada, paddy is a major staple food crop mainly grown during kharif in medium and low laying fields. Coastal Karnataka has > 1500 ha of paddy land that inundates with flood for long duration creating unfavourable situation for paddy cultivation and resulting in low production. In coastal Karnataka more priority has been paid towards cultivation of indigenous red paddy varieties. But these varieties are tall with lodging problem, does not respond to fertilizer and provide less yield. Realizing this problem during 2020-21 ICAR-Krishi Vigyan Kendra, Dakshina Kannada, Mangalore took initiative to purchase the truthful labelled seeds for introduction and popularization of flood resistant red rice variety - Sahyadri Panchamukhi in the coastal district. During 2020-21 to 2022-23, 12 capacity building programmes were organized at different villages of Dakshina Kannada benefiting 267 farmers and 6.25 quintals of truthful labelled paddy seed as critical input was provided to motivate the farmers for adoption of new variety covering an area of 25 acre under Front Line Demonstration programme. During the period from 2020 to 2022, KVK organized 3 FLDs, 2 seed production activity and seed source link connection to different line departments, NGOs, farmers group resulted an area expansion with Sahyadri Panchamukhi is of 576 ha across the district with a production of 28800 quintals and increase in productivity from 18 to 20%. The total additional returns gained in the district is Rs. 891 Lakhs due to varietal replacement.

Keywords: Flood, Sahyadri Panchamukhi, FLD, Production, Returns.

INTRODUCTION

In Dakshina Kannada, paddy is a major staple food crop mainly grown during kharif in medium and low laying fields. Area under paddy cultivation in the district has gone up by 8-10 % during this kharif season due to some farmers who had left their paddy fields fallow returning to farming and some youths who were working in cities and towns elsewhere returning to the roots of their family farming due to the COVID-19 situation. During 2021-22 the area under paddy shot up by 10000 hectares to 12000 hectares in Dakshina Kannada. In coastal Karnataka more priority has been paid towards cultivation of indigenous red paddy varieties. But these varieties are tall with lodging problem, does not respond to fertilizer and provide lesser yields. Generally, paddy varieties such as MO4 and indigenous variety-Kajejaya have been cultivated in large area even with a weeklong flood situation resulting in less production. During July to October paddy growers in coastal Karnataka (Dakshina Kannada) face frequently more number of floods and out of 12248 ha total paddy area, more than 1500 ha of paddy land that inundates with flood for long duration creating unfavourable situation for paddy cultivation and resulting in low production. Hence, there is a need of suitable paddy variety for low lying flood situation

of the region. In this regard, flood resistant red rice variety-Sahyadri Panchamukhi (under AICRP on Rice Project) released by ZAHRS, Brahmavar during 2019. The variety has features like high yielding potential with cultivation period of 130-135 days and can withstand flood for 10-12 days with tolerance to blast disease and gall midge insect pest, biotic and abiotic stress and high consumer preference due to better taste and aroma as well as high palatability of fodder. In multi-location trials, the variety recorded 14% - 26% increase in yield compared to MO4 and Kajejaya paddy varieties (Sridevi *et al.*, 2019). It was introduced in the district to assess its growth performance and its impact on socio-economic status of coastal farmers of Karnataka.

MATERIALS AND METHODS

Dakshina Kannada is coming under Coastal Zone No-10 with normal rainfall is 4040 mm. The annual average rainfall received during the period January 2021 to December 2021 is 4057.93 mm. This district receives heavy rainfall during the months of July, August and September. Maximum temperature of 35.3°C was recorded in the month of April-2021 and minimum temperature of 11.2°C was recorded during the month of January 2022. The Average relative humidity was recorded 70.4 during the reporting year.

The soil in the major portions of the district consists of three types, viz. coastal sandy, alluvial, laterite and lateritic, red loamy soil. Apart from this, coastal saline soil is also noticed in some parts of the district owing to the proximity to sea or backwater. Soils are low in CEC and highly acidic in condition. The pH of the soil ranges from 4.12 to 5.8 with low soluble salt content. The major nutrient status of the soil is varying from low to medium.

Frontline demonstrations (FLDs) were conducted for 3 consecutive years during kharif season 2020-21 to 2022-23 at farmer's fields of Dakshina Kannada districts to validate impact of FLD on flood resistant red rice variety – Sahyadri Panchamukhi for low lands across the district. 3 FLDs were taken at randomly selected farmer's fields in Mangaluru, Bantawala, Mulki-Moodabidri taluks.

Each demonstration size was 0.40 ha, 12 capacity building programmes were organized at different villages of Dakshina Kannada benefiting 267 farmers and 6.25 quintals of truthful labelled paddy seed as critical input was provided to motivate the farmers for adoption of new variety covering an area of 25 acre. During the period from 2020 to 2022, KVK organized 3 FLDs, 2 seed production activity and seed source link connection to different line departments, NGOs, farmers group to increase the area with Sahyadri Panchamukhi. The activities were also covered in Medias such as DD Chandana TV channel, All India Radio, local newspapers, folders, popular article for popularization of the variety. The total of 25 farmers were selected under FLD and trained them with improved paddy cultivation practices. The farmer practices were maintained in case of local check. The data were collected from both improved practices and finally yield, quality parameters and economics were calculated.

RESULTS AND DISCUSSION

A. Growth, yield and yield parameters

The crop from all the demo plots was harvested under supervision of the KVK scientists. The yield and yield parameters from both the plots i.e., demo and farmer's

practices were compared and it was evident that an average yield of demonstrated plots was 18-23 % higher than that of farmer's practice. The average grain yields under demo plots were 50- 51 q ha⁻¹ however, it was 34-39 q ha⁻¹ under farmer's practice (Table 1). The increase in yield in demo plots might be due to increase in average growth and yield parameters such as less days taken to 50 % flowering (96 days), plant height (93.50 cm), tillers (29.80/hill), tillers (390 m⁻²), panicle length (23 cm), grains/panicle (156) and test weight (24 g) over farmer's practice (102 days, 82.5 cm, 21.20/hill, 335 m⁻², 21 cm, 124 and 22 g, respectively) table 1. The reasons behind the increase of yield under demonstrated plots might be due to timely planting, withstand against flood, effective utilization of nutrients and adoption of other recommended technologies about which the farmers were ignorant (Das *et al.*, 2002; Darthiya *et al.*, 2021 and Bouman *et al.*, 2017).

Extension gap. An extension gap between demonstrated technology and farmers practices was also calculated and on an average basis, the extension gap of 14 q/ha was calculated. This gap might be attributed to the adoption of flood resistant red rice variety and improved production technologies practices such as proper seed rate, use of seed treatment material, nutrient management, pest management etc. in demonstrated plots which resulted in higher grain yield than the traditional farmer's practices (Panda *at al.*, 2011). On the basis of the extension gap, the farmers were motivated to adopt the Sahyadri Panchamukhi paddy variety under flood situation with recommended package of practices to reduce the extension gap and to increase their grain yield (Table 2).

Technology Gap. The technology gap was calculated by deducting the demonstrated plot yield from the potential yield of the paddy crop. The recorded technology gap was 9 and 7 q/ha during the study period. The average technology gap was found 8 q/ha. The difference in technology gap during two years could be due to more feasibility of recommended technologies like planting time, seed treatment, nutrient management and plant protection measures especially IPM (Table 2).

Table 1: Growth, yield and yield attributes of Sahyadri Panchamukhi over MO4 under FLD.

Variety	50 % flowering	Plant height (cm)	Tillers/hill	Tiller/m ²	Panicle length (cm)	Grains/panicle	Test weight (g)	Yield (q ha ⁻¹)
Sahyadri Panchamukhi	96	93.50	29.80	390	23	156	24	51
MO4	102	82.5	21.20	335	21	124	22	39

Table 2: Grain yield, economics and gap analysis of FLDs and farmer practices

Year	Yield (q/ha)		Increase (%)	Net return (Rs/ha)		BC ratio		Extension gap (q/ha)	Technology gap (q/ha)
	Demo	FP		Demo	FP	Demo	FP		
2020	51	37	37.83	58082	34907	2.34	1.91	14	9
2021	53	39	35.89	63732	48736	2.47	1.98	14	7
Average	52	38	36.84	60907	41822	2.41	1.95	14	8

Economics. An average basis, demo plot recorded higher net returns (Rs. 60,907) and BC ratio (2.41) over farmer's practice (Rs. 41822 and 1.95, respectively) (Table 2). Due to higher grain yield, net returns and BC ratio was also higher in demo plot as compared to farmer practice (Gautam *et al.*, 2014).

Impact. From the year 2020-21 to 2022-23, 12 capacity building programmes were organized at different villages of Dakshina Kannada benefiting 267 farmers and 6.25 quintals of truthful labelled paddy seed as critical input was provided to motivate the farmers for

adoption of new variety covering an area of 25 acre areas under Front Line Demonstration programme. During the period from 2020 to 2022, KVK organized 3 FLDs, 2 seed production activity and seed source (290 quintals) link connection to different line departments, NGOs, farmers group resulted an area expansion of 576 ha across the district with a production of 28800 quintals and increase in productivity from 18 to 20%. The total additional returns gained in the district is Rs. 891 Lakhs due to varietal replacement (Fig. 1).

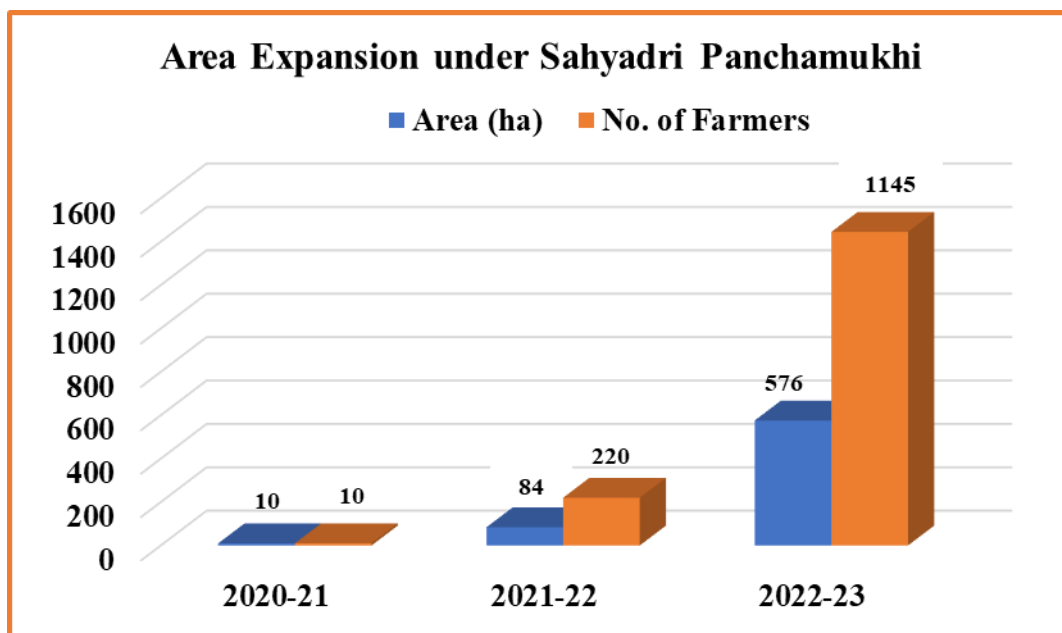


Fig. 1. Area expansion under Sahyadri Panchamukhi in the district.

CONCLUSIONS

Front Line Demonstrations on flood resistant red rice variety Sahyadri Panchamukhi contributed 36.84 % higher yield and 45.63 % higher net returns than farmer's practice. The increase in yield of paddy under flood prone area to the extent of FLDs created greater awareness and motivated the other farmers to adopt this flood resistant red rice variety.

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