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Assessment of New Paddy Variety MTU-1153 through On-Farm Trials in Tribal Area of East Godavari District, A.P.

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Abstract

In district, tribal farmers of Rampachodavaram division are habituated with continuous cultivation of old paddy varieties like MTU-1010, MTU- 1001, 1061, and 1064, etc., in late kharif *season under rainfed condition with low yields, pest and disease incidence. In view of this, a promising new paddy variety MTU-1153 has been introduced for its higher yield potentiality and short duration with long bold grains possessing tolerance to blast. The study was carried out through On-Farm Trials in 24 locations during three consecutive* Kharif *seasons in 2017, 2018 and 2019 under rainfed conditions of 6 adopted tribal villages of Krishi Vigyan Kendra, Pandirimamidi in East Godavari district, Andhra Pradesh with an objective to evaluate the performance of new paddy variety MTU-1153 (Chandra) as compared to the local cultivar (MTU 1010). This variety recorded higher plant height (118.2 cm), no. of effective tillers (12.7), length of panicle (27.25 cm), no. of filled grains panicle^{-1} (197) and test weight (24.3 g) than the local check and also recorded highest grain yield of 55.74 q ha^{-1} which was 11.9 per cent higher yield than local check (MTU 1010) during the three consecutive* kharif *seasons of 2017 to 2019 under study. In spite of increase in yield of improved technology, the highest technological gap and extension gap existed with 8.32 q ha^{-1} and 7.40q ha^{-1} respectively. The improved technology of HYV Chandra recorded higher gross return of Rs. 83813 ha^{-1} with benefit cost ratio of 2.81 during the study with an average additional net return of Rs.12138 ha^{-1} as compared to local check. Hence, the existing high yielding paddy variety MTU 1010 can be replaced with new paddy variety MTU-1153 (Chandra) since it fits to the existing farming situation for higher productivity and income.*

Keywords: New Paddy variety MTU-1153 (Chandra), Crop Production, On-Farm Testing and nutrient management in paddy

Introduction

Rice is most widely consumed staple food next to wheat for a large part of the world population, especially in Asia. It is the predominant dietary energy source especially for South Indian states (Singh *et al.,* 2009). With varied geo-climatic condition, East Godavari district has varied topographical soil conditions ideally suited for cereal, millets, horticultural and other plantation crops. As cereal grain, Paddy is the most important food crop in East Godavari district with a total coverage of 2.33 lakh hectares which is about 86 % of the total field crops cultivable area of the district.

Introducing drought tolerant rice cultivar is considered to be one of the most effective and economic approaches to ensure food security (Verma

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and Srivastava, 2004). In india, 70 % of area under rice is drought prone rainfed, but it has not been exploited to full potential due to lack of suitable drought tolerant or resistant varieties (Kumar *et al.,* 2012). The new improved technologies will eventually lead the farmers to discontinue the old varieties and adopt new variety. Similar results were reported by Sharma *et al.* (2011).

Tribal Farmers are cultivating paddy in late *kharif* season because of late onset of monsoon and other cultural barriers and habituated with continuous cultivation of short and medium duration old paddy varieties like MTU-1010, 1001, 1061, 1064,RGL -2624 and PL etc., resulted in low yields, pest and disease incidence. Hence, there is a scope to introduce a short duration high yielding paddy variety in existing rice-based cropping system in agency track of East Godavari district. There remains a scope to replace the continuous cultivation of old paddy varieties by considering the rainfall of less than 1250 mm rainfall during the monsoon season in 11 tribal Mandals of East Godavari district.

After detailed survey, keeping such problems in view, KVK, Pandirimamidi has made an attempt with an objective to evaluate growth and yield performance of newly released promising high yielding paddy variety MTU-1153 (Chandra) through on farm testing for its suitability in the existing farming situation for substitution of old paddy variety MTU-1010 (Cottonport Sannalu) for higher productivity and income.

Materials and Methods

The study was carried out through on-farm trials in 24 locations of 6 adopted tribal villages of Krishi Vigyan Kendra, Pandirimamidi viz., I.Polavaram, Bandapalli, Borugubanda, Tamarapalli, D.V.Kota and Darawada during three consecutive *Kharif* seasons from 2017 to 2019 under rainfed condition. 24 farmers in which four respondents from each adopted village were selected through random sampling method and each having 0.4 hectare of land being used for assessment of new paddy variety MTU-1153 with recommended package of practices under on-farm trials. They were provided with critical inputs like new paddy variety MTU-1153 (Chandra) seed @ 25 kg/ acre, fertilizers like urea, SSP & MoP and plant protection chemicals like chlorpyriphos in order to compare with farmerôs practice of existing old variety MTU-1010. The soils of the study area were slightly acidic in reaction (pH-5.8 ï 6.9), red sandy to sandy loam in texture with low to medium in organic carbon content (0.43-0.62 %), low in nitrogen (194-248 kg ha^{-1}), low in phosphorus (11.6-19.8 kg ha^{-1}) and medium in potassium (146-182.0 kg ha^{-1}) content. Based on soil test values, fertilizers were applied with respect to the RDF (80:60:50 N:P:K kg ha^{-1}) of High Altitude Tribal Zone. Observations on different growth and yield parameters were taken and economic analysis was done by calculating cost of cultivation, gross return, net return and B:C ratio. The gross returns were calculated on the basis of local market price of the produce. The technology gap, extension gap and technological index (%) were calculated by using the following formula as suggested by Samui *et al*., 2000.

1. Percent yield increase

$$= \frac{\text{Demonstration yield-farmers yield}}{\text{Farmers yield}} \times 100$$

2. Technology gap = Potential yield - Demonstrated yield
3. Extension gap
   = Demonstrated yield ï Yield under existing practice
4. Technology index

$$= \frac{\text{Potential yield - Demonstrated yield}}{\text{Potential yield}} \times 100$$

Details of the Technology

The high yielding new paddy variety MTU-1153 (Chandra) was released from RARS, Maruteru, West Godavari district, Andhra Pradesh through Central Variety Release Committee (CVRC) in 2015 for its cultivation in eight states viz., Punjab, Bihar, Chattishgarh, Odisha, Madya Pradesh, Karnataka, Tamilnadu and Kerala. This promising new paddy variety has been introduced for its higher yield potential and short duration (115-120 days) with long bold grains possessing tolerance to blast.

Results and Discussions

The results obtained through on-farm testing have been discussed in following heads:

On-farm interventions Vs Farmer's Practice:

The promising new paddy variety MTU-1153 was grown in the selected farmerôs fields in adopted villages under the supervision of scientists, KVK, Pandirimamidi and Dept. of Agriculture, Rampachodavaram. Similarly, farmers were not practicing the seed treatment, plant protection

Table 1: Comparison between KVK intervention and existing farmerôs practice in tribal area of Rampachoadavaram, East Godavari district

S.No.	Farming Situation	Intervention	Farmerôs Practice
1	Season	*Kharif*	Late *Kharif*
2	Variety	MTU-1153 (Chandra)	MTU-1010(Cottonport Sannalu)
3	Source of seed	ARS, Maruteru, ANGRAU	Dept. of Agriculture, A.P. or own seed
4	Seed Treatment	Seed treated with Carbendazim @ 3 g/ kg dry seed	No seed treatment
5	Time of Nursery sowing	Second fortnight of July	First week of August
6	Age of seedlings	21 to 22 days old seedlings	25-30 days old seedlings
7	Method of Transplanting	Line sowing with 15X 10 cm spacing	No proper spacing
8	Seed rate	25 kg/ acre	30 kg/ acre
9	Fertilizer dose	Soil test based fertilizer recommendation	75:20:15 (N:P:K Kg/acre)
10	Plant Protection	No Sprayings as this variety is tolerant to blast	Sprayings of Isoprothiolane @ 1.5 ml/ litre for the control of leaf blast
11	Weed Management	Hand weeding for twice at 20 and 40 DAT	Hand weeding for once at 40 DAT

Table 2: Pooled data of three consecutive years on yield attributes obtained under On-farm trial and farmerôs practice

Interventions	Plant height at harvest (cm)	No. of tillers plant^{-1}	No. of effective tillers plant^{-1}	Length of Panicle (cm)	No. of Panicle (m^{-2})	No. of filled grains Panicle^{-1}	No. of unfilled grains Panicle^{-1}	Effectivity of grain filling (%)	1000-grains weight (gm)
On-farm trial	118.2	18.5	12.7	27.2	231.5	197	42	82.42	24.3
Farmerôs practice	113.5	16.3	10.3	25.8	203.6	174	41	80.93	21.6

measures and soil test based fertilizer application which was followed under On-farm trial. Other cultural practices followed in KVK intervention and farmerôs practice are comprised and shown in Table 1.

Growth and yield attributing parameters:

The HYV Chandra has recorded higher plant height (118.2 cm), No. of tillers (18.5), effective tillers panicle^{-1} (12.7), length of panicle (27.25 cm), No. of Panicle m^{-2} (231.5), No. of filled grains Panicle^{-1} (197), grains panicle^{-1} (239), Effectiveness of grain filling (82.42%) and test weight (24.3 g) than the traditional cultivar Cottonport Sannalu (Table 2). The differential response of tillering in the genotype could be attributed to its genetic potentiality. These results are in agreement with Sarker *et al*. (2013) and Mondal *et al*. (2005).

The variety MTU-1153 recorded higher effective tillers (12.7), filled grains panicle^{-1} (197) and test weight (23.5 g) and also recorded highest grain yield of 5.7 t ha^{-1} with minimum of 9.8 % of yield increase as compared to local check (MTU 1010).

Yield performance:

Higher grain yield of 57.10 q ha^{-1} with 11.1 per cent higher yield than local cultivar (MTU 1010) was recorded in new paddy variety Chandra (MTU-1153) (Table 3) in the Tamarapalli village of Rampachodavaram mandal. But, highest percent of yield (15.3%) increase was recorded in D.V. Kota village of Maredumilli Dandal. However, the results indicated the mean grain yield of 5.57 t/ha with an average of 11.90 % of yield increase. This might be due to the production of higher number of effective tillers plant^{-1}, higher number of filled grains panicle^{-1} than traditional variety and native fertility status of soil. Thus, this new variety will have a positive impact on farming community in the district over old variety. Similar results were also reported by Mondal *et al.* (2005) in paddy crop.

Technology gap, Extension gap and Technology index:

In spite of increase in yield due to improved technology, on-farm trials on Chandra recorded the mean value of technological gap of 6.68 q ha^{-1} (Table

Table 3: Pooled data on productivity, technology gap, extension gap and technological index of new paddy variety MTU-1153 under on-farm trial

Location	Yield (q/ha)			% increase in yield over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
	Potential	Trial	FP*				
Bandapalli	62.42	56.05	50.30	11.4	6.37	5.75	10.2
Tamarapalli	62.42	57.10	51.40	11.1	5.32	5.70	8.5
D.V.Kota	62.42	55.70	48.30	15.3	6.72	7.40	10.8
Darawada	62.42	54.10	49.25	9.8	8.32	4.85	13.3
I.Polavaram	62.42	56.58	50.85	11.3	5.84	5.73	9.4
Borugubanda	62.42	54.90	48.78	12.5	7.52	6.12	12.0
Mean	62.42	55.74	49.81	11.90	6.68	5.93	10.70

(Note; *FP-Farmerôs practice)

Table 4: Pooled data of economic impact of new paddy variety MTU-1153 under On-farm trial

Year	Area (ha)	Cost of Cultivation (Rs./ha)		Gross Income (Rs./ha)		Net Returns (Rs./ha)		B:C Ratio	
		Trial	FP*	Trial	FP*	Trial	FP*	Trial	FP*
2017-18	4.8	30000	35000	89680	75450	59680	40450	2.98	2.16
2018-19	2.4	30500	35000	83360	73875	52860	38875	2.73	2.11
2019-20	2.4	28750	28750	78400	75200	49650	46450	2.72	2.61
Mean	-	29750	32916	83813	74842	54063	41925	2.81	2.29

(Note: *FP-Farmerôs practice)

3) ranging from 5.32 to 8.32 q/ha. This may be attributed to variable topographic conditions with the differential soil fertility status and it can be reduced through proper management practices (Mandavkar *et al*., 2012; Sharma and Sharma, 2004). The highest percent of yield increase (15.3 %) with highest extension gap of 7.40 q ha^{-1} was noticed in D.V.Kota village of Maredumilli mandal where as highest technology gap of 8.32 q ha^{-1} with low extension gap (4.85 q ha^{-1}) was recorded in Darawada village of Maredumilli mandal through intervention of this study. These results of new improved technology will eventually lead the farmers to discontinue the cultivation of old varieties and to adopt new variety in order to fill this extension gap. Similar results were reported by Sharma *et al,.* (2011); Sharma and Sharma (2004).

Economics:

The improved technology of HYV Chandra recorded higher gross return of Rs. 89680 ha^{-1} with benefit cost ratio of 2.98 with an average additional net return of Rs.19230 ha^{-1} as compared to local check during 2017-18. However, Results pertaining to pooled data, this variety recorded additional net returns of Rs. 12138 ha^{-1} with mean B:C ration of 2.81 during the study. These finding are similar with the findings of Balai *et al.* (2013).

Conclusion

Due to the intervention of this technology i.e new paddy variety MTU-1153 (Chandra) which is evolved from a cross between MTU-1010 X MTU 1081 has shown higher yields as compared to traditional old paddy varieties in the tribal areas of East Godavari district. Thus, it can be concluded that the cultivation of new improved paddy variety has been found more productive and superiority with respect to all growth and yield attributing characters over old paddy variety MTU 1010. Replacement of old variety with this newly released paddy will increase the production and net income. Results from the on-farm study demonstrated

that the existing HYV of paddy MTU 1010 can be replaced with new promising HYV of paddy-MTU 1153 because of its higher yield potentiality and adoptability. Based on significant results obtained through this on-farm testing, Department of Agriculture, East Godavari district has taken action plan on varietal replacement of old paddy variety MTU-1010 with this new variety and provided seed to tribal farmers on subsidy basis in large scale i.e. up to 12000 ha. Farmers also adopted this new variety in place of old varieties i.e. MTU-1010. MTU-1061 etc. as it fits well to the rainfed condition in tribal areas with higher yield potential advantage.

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