

Assessment and Refinement of Hybrid Rice Seed Production Technology in Farmers Fields

Kanaka Durga¹, K and R Ankaiah²

Seed Research and Technology Center, Rajendranagar, Hyderabad – 30

Abstract— Survey in hybrid rice seed production areas of Karimnagar and Warangal district were collected and the information revealed that major deviations in farmer's practice as compared with the technology being recommended by the ANGRAU/ DRR. The per cent increase over ANGRAU/DRR practice used for hybrid seed production of paddy by farmers practice were 3.39, 31.15 and 28.04 for filled spikelets panicle-1, spikelet fertility and grain yield respectively. Further farmers practice has shown better performance for quality hybrid rice production than ANGRAU practice.

Keywords— Hybrid rice, farmers practice and ANGRAU/DRR practice.

I. INTRODUCTION

Hybrid rice technology is likely to play a pivotal role in increasing the rice production. The success of out crossing rate is poor, and thereby it affects crossability and ultimately reduces hybrid rice seed production. Besides the micro-macro climatic conditions also affect the crop production.

Therefore the technology developed for hybrid rice seed using 3- line system had initial setbacks in view of its knowledge intensive approach. Further, identification of appropriate geographical areas for seed production with optimum climate during crop phenology had a bearing on the productive potential of hybrid seed. Since >80% of the hybrid rice is being produced by the private seed companies, imparting knowledge to the farmer about the flowering behavior of parental lines is of practical significance. Owing to the suitable weather conditions, majority of seed production is centered in and around the districts of Karimnagar and Warangal in Andhra Pradesh. The out crossing rate mainly depends on proper staggering of parental lines, synchronization of flowering, efficient supplementary pollination methods employed besides other management practices followed. In view of this, it is imperative to assess various practices followed by seed producers and refine the practices with appropriate interventions.

II. MATERIAL AND METHODS

Present study is taken up in the farmers field at Pothireddypeta (v) of Metpally division of Karimnagar (d) of AP during rabi, 2008-09. For the assessment of technology of hybrid rice seed production, parental lines (A x R) of rice hybrid, Rallis 706 was selected. Farmers method of hybrid rice seed production technology (T0) will be compared with the DRR / ANGRAU recommended seed production technology (T1) in the hybrid seed production plot (A x R) of rice hybrid, Rallis 706. The management practices followed by the farmer with certain interventions and the recommended package of practices of DRR/ANGRAU being adopted by the farmers for the production of the hybrid rice of RALLIS 706 are presented in Table 1.

The male sterile line (A-line) was sown on 03.12.2008. While the sowing of restorer line (R-line) was taken up in 3 staggers i.e. on every 3rd day (23.11.2008 - First stagger, 25.11.2008 - Second stagger and 27.11.2008 - Third stagger). A and R lines were transplanted on 01.01.2009. The data is collected on yield component characters (total tillers hill-1 (no), plant height at maturity (cm), ear bearing tillers hill-1 (no), productive tillers hill-1 (no), filled spikelets panicle-1 (no), spikelet fertility (%), raw seed yield sq m-1 (g), raw seed yield ha-1 (q), graded seed yield sq m-1 (g), graded seed yield ha-1 (q), 100 seed weight (g) and seed quality characters (germination (%), total seedling length (cm), seedling dry weight (g), seedling vigor index I, seedling vigor index II and field emergence (%)). The data is recorded on 10 randomly selected plants in each treatment replication wise. Average values were calculated and the data was analyzed using students t-test.

III. RESULTS AND DISCUSSION

Initial survey was conducted during 2008-09 in hybrid rice seed production areas of Karimnagar and Warangal district. The results of the survey revealed major deviations in farmer's practice as compared with the technology being recommended by the ANGRAU/ DRR. The deviations were observed with regard to method of seed rate of A line, planting of R line, row ratio of parental lines, dosage of GA3 application to advance flowering, time and method of supplementary pollination and frequency of roguing etc. The details of these deviations are given in Table 1.

The data presented in Table 2 revealed significant differences among the treatments for the characters viz., productive tillers hill-1 (no), filled spikelets panicle-1 (no), spikelet fertility (%), graded seed yield ha-1 (q), seedling dry weight (g) and seedling vigor index II.

Farmers practice resulted in 3.39% increase in filled spikelets panicle-1, 31.15% increase in spikelet fertility and 28.04% increase in yield over DRR/ ANGRAU practice.

Among the seed quality parameters, farmers practice recorded 7.17 % increase in seedling dry weight, 7.72 % increase in seedling vigor index II over DRR/ ANGRAU practice.

Adoption of farmers practice not only resulted in higher seed yield through increased spikelet fertility but also reduced the cost of inputs.

Farmers practice used only 60 g ha⁻¹ of GA₃ application as against 60-90 g ha⁻¹ of GA₃. Similarly supplementary pollination methods like number of times of rope pulling per day were reduced to 3 times as against 4-5 times in university recommendation.

It is evident that, the recommended package of practices of DRR/ANGRAU with the slight intervention of farmers practice enhanced the crossability rate by following row ratio of 2:6, R line planting methodology, spacing adopted for R-A lines, 60 g ha⁻¹ GA₃ application thrice on consecutive days and supplementary pollination method followed in peak hour of spikelet opening thus resulted into overall 28.40% graded hybrid rice seed. Besides this, the adoption of farmers practice minimizes the cost of inputs viz., male and female seed cost, cost of GA₃ and the amount spent towards labor. The improved superiority of the farmers practice over DRR/ANGRAU practice might be due to better awareness programme, effective transfer of technology by the seed firms and variation in the hybrids. Further the growers have systematic awareness on the production technology. Thereby trained growers produced quality hybrid seed effectively duly adopting the technology practices in time.

Since the above work has been carried out on one hybrid viz., Rallis 706 in two centers i.e. at Karimnagar and Warangal districts, there is a need of comprehensive study on different rice hybrids grown in these districts, their cross ability rate and the overall graded seed yield results and is should be correlated with the mean and maximum temperature provided in the region more so specifically at primordial to maturity stage. There is a need to develop a comprehensive hybrid seed production technology keeping in view with the interventions made by the farmers of Warangal and Karimnagar seed growers.

TABLE 1: DIFFERENCE IN TECHNOLOGY BEING ADOPTED BY THE FARMER AND THE TECHNOLOGY BEING RECOMMENDED BY THE ANGRAU/DRR

Package		Farmers practice	DRR/ANGRAU recommendation
Seed rate (kg ha ⁻¹)	A	5 kg	15 kg
	R	2.5 kg	5 kg
Row ratio (R:A)		2 : 6	2 : 8
Number of seedlings hill ⁻¹	A	1	1
	R	1	3
Method of planting		3 staggers of R planted separately with a specific mark within a row (red, green and	3 staggers of R mixed thoroughly and planted
Spacing (cm)	R-R	30	30
	R-A	15	20
	A-A	15	15
GA ₃ application (g/ha)		60 (thrice on 3 consecutive days)	60-90 (at 5-10% heading twice on consecutive days)
Supplementary pollination		3 times/day between 9-11AM for 15 days	4-5 times/day at peak anthesis for 10-12 days
Roguing		4-5 times at flowering, 3-4 times at maturity	3 times during crop period

TABLE 2A: YIELD COMPONENT CHARACTERS OF HYBRID RICE, RALLIS 706 DURING RABI, 2008 – 09

S. No.	Treatment	Total tillers hill ⁻¹ (no.)	Plant height at maturity (cm)	Ear bearing tillers hill ⁻¹ (no)	Productive tillers hill ⁻¹ (no.)	Filled spikelets panicle ⁻¹ (no.)
1	Farmers practice	9.10	94.2	8.93	8.18	128.2
2	DRR / ANGRAU Practice	9.00	94.2	8.88	8.53	124.0
G. Mean		9.05	94.2	8.91	8.36	126.1
Difference % over DRR/ ANGRAU practice		1.11	0.00	0.56	-4.10	3.39
t value		0.527	0.000	0.427	4.06**	3.632**

- *Significant at 1%*

TABLE 2B: YIELD AND YIELD COMPONENT CHARACTERS OF HYBRID RICE, RALLIS 706 RABI, 2008 – 2009

S. No.	Treatment	Spikelet fertility (%)	Yield of graded seed (g m ²)	Yield of graded seed (q ha ⁻¹)	100 seed weight (g)
1	Farmers practice	63.15	498.19	49.82	22.23
2	DRR / ANGRAU practice	48.15	389.09	38.91	22.01
G. Mean		55.65	443.64	44.37	22.12
Difference % over DRR/ANGRAU practice		31.15	28.04	28.04	1.00
t value		10.07**	9.18**	9.185**	0.429

- *Significant at 1%*

TABLE 2C: SEED QUALITY PARAMETERS OF HYBRID RICE, RALLIS 706 DURING RABI, 2008 - 09

S. No.	Treatment	Germination (%)	Total seedling length (cm)	Seedling dry weight (g)	Seedling vigour index I	Seedling vigour index II	Field emergence
1	Farmers practice	99.13	18.28	0.1957	1811.93	19.40	96.2
2	DRR / ANGRAU Practice	98.66	18.25	0.1826	1800.62	18.01	93.0
G. Mean		98.90	18.265	0.1892	1806.28	18.71	94.6
Difference % over DRR/ANGRAU practice		0.48	0.16	7.17	0.63	7.72	3.44
t value		0.499	0.093	2.007*	0.266	2.194*	1.339

- * *Significant at 5%*