P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 8; August 2025; Page No. 820-822

Received: 21-05-2025
Accepted: 23-06-2025

Indexed Journal
Peer Reviewed Journal

Drought management strategy: Mechanized sowing in rice production

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DOI: https://www.doi.org/10.33545/26180723.2025.v8.i8l.2359

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Abstract

Drought management in dryland agriculture, when using seed drills, involves soil moisture conservation via techniques like mulching, conservation tillage, and water harvesting. Specific practices for seed drill sowing include using moisture-seeking seed drills to place seeds at optimal moisture levels, employing seed hardening and priming to improve germination and stress resistance, and using drought-resistant varieties of crops. The variety PMK (R) 3 is an early maturing variety maturing in 105 days duration and fits well with the NE monsoon period and monocrop rainfed regions and hence is the best variety suited to rainfed and semidry areas. The variety PMK (R) 3 recorded a grain yield of 3.7 tonnes per ha with 10-15% increase in yield over the other varieties namely MDU 5, ADT 43, IR 50 etc which were cultivated in the village. Number of panicles per square meter (207) was observed to be more in mechanized sowing in this variety, with higher fertile spikelet's (panicle harvest index- 82%) under drought. Hence, the variety PMK (R)3 with mechanize sowing is highly recommended in these areas which improves the crop establishment, reduces the cost of weeding, increases the productive tiller number per plant and ultimately yield enhancement from 2.5 to 3.5 tonnes per hectare.

Keywords: Rice, Seed cum fertilizer drill, yield, economics

Introduction

Farmers in certain regions of Virudhunagar district cultivate rice in Rainfed situation wherein they sow the seeds of paddy in the pre monsoon season. The success of the crop depends upon the North East Monsoon rainfall received during October to December every year. With such an uncertainty they till the soil and they cultivate with the hope of receipt of rainfall. Farmers cultivate land races or paddy varieties that are suited to irrigated transplanted conditions. In case of land races namely Nootripathu, Norungan, Varappukudanchan, Kuliyadichan etc, they hardly reap a tonne per ha undoubtedly, they are tolerant to drought. But in the other case of improved varieties that are suited to irrigated conditions are cultivated as their availability is higher disseminated from the neighbouring districts and from the famers of transplanted areas, the varieties do not tolerate drought and often fails during reproductive stage or flowering stage stress. Farmers practice the broadcast method of sowing and the crop do not have any proper spacing and hence weeding and other intercultural operations are difficult to be done. Hence it was aimed to introduce the manage the drought situation with the cultivation of latest released drought tolerant variety PMK (R) 3 in these areas coupled with mechanised sowing. Tractor drawn Seed cum fertilizer drill is employed for sowing with a proper spacing that eases the weeding and other intercultural operations. Further this also allows mechanization in weeding and also quickens the harvest with combined harvestor.

Materials and Methods

Good quality seed and choice of suitable varieties is essential for obtaining higher yields. Uniform seed size is also important. Certified seed from recognized agencies alone need be used for obtaining good plant stands. For a given area (village) it is necessary to use one kind of seed (hybrid or variety) of a crop to reduce bird damage, incidence of pests and diseases. The new high yielding varieties of crops, as also the hybrids, yield better with higher population levels than local varieties. To obtain good plant stands, higher seed rate, quality seed and method of seeding become important. Normally seed drills give better stands. The two main constraints in crop production in drylands are the moisture and nutrient supply. Fertilizer use at low to medium level pays in these lands. Fertilizer use pays best when other inputs are also well managed. Perse its

efficiency can be enhanced by deep drilling. While phosphates need be basally applied, nitrogen should be applied in 2-3 splits in *kharif*. However, in rabi it has also to be deep placed along with phosphates. The importance of weeding cannot be over emphasized. Timely weed control is important for kharif crops. Totally fifteen small and marginal farmers were selected from Kattangulam village, Aruppukottai Block, Virudhunagar Dt. for assessing the rice variety with seed cum fertilizer drill.

Table 1: Performance of the Technology assessed/ refined with performance indicators

Village	Kattangulam	PMK 3 - Seed drill sowing				Broad casting			
Farmer No	Name of the farmer	Grain yield (q/ha)	Number of panicles	Panicle harvest index	Drought score index	Grain yield (q/ha)	Number of panicles	Panicle harvest index	Drought score index
1	M. Gurusamy	35	223	84.56	3	32	196	77.56	4
2	M. Balamurugan	37.5	202	86.47	3	31	180	80.47	5
3	K. Murugan	37.5	203	80.12	3	34	171	75.12	5
4	R. Gandi	32.5	204	85.43	3	28	167	81.43	5
5	G. Singathurai	42.5	209	83.53	3	38	185	77.53	5
6	R. Vellaichamy	31.2	221	90.2	3	28	191	83.2	4
7	M. S.Panchanathan	37.5	189	84.85	5	31	165	80.85	4
8	A. Periyasamy	47.5	209	87.17	3	42	183	79.17	5
9	P. Raja	32.5	222	83.38	3	29	189	74.38	4
10	P. Veerabadran	31.2	203	85.97	3	28	177	80.97	4
11	C. Jeyakodi	37.5	210	81.7	3	33	188	75.7	4
12	R. Karuppiah	35	205	81.44	3	31	177	74.44	3
13	V. Maruthupandi	33.7	194	84.1	5	29	172	76.1	3
14	M. Kothan	37.5	207	78.92	3	32	181	73.92	4
15	M. Agatheeswaran	40	211	82.12	3	36	181	78.12	4
	Mean	36.6	207.5	84.0	3.3	32.1	180.2	77.9	4.2

Table 2: Effect of seed drill sowing on Yield and Economics of rice production

Farmers' Name	Seed drill sowing					Broad casting				
	Grain Yield (q/ha)	Gross return (Rs./ha)	Cost of cultivation (Rs/ha)	Net return (Rs./ha)	C:B Ratio	Grain Yield (q/ha)	Gross return (Rs./ha)	Cost of cultivation (Rs/ha)	Net return (Rs./ha)	C:B Ratio
M. Gurusamy	35	24500	17819	6681	1.37	30	21000	18914	2086	1.11
M. Balamurugan	37.5	26250	17659	8591	1.49	27.5	19250	18909	341	1.02
K. Murugan	37.5	26250	17839	8411	1.47	30	21000	19074	1926	1.10
R. Gandi	32.5	22750	17199	5551	1.32	27.5	19250	17905	1345	1.08
G. Singathurai	42.5	29750	17179	12571	1.73	35	24500	17714	6786	1.38
R. Vellaichamy	31.25	21875	18059	3816	1.21	30	21000	18674	2326	1.12
M.S. Panchanathan	37.5	26250	17739	8511	1.48	30	21000	18994	2006	1.11
A. Periyasamy	47.5	33250	17819	15431	1.87	37.5	26250	18994	7256	1.38
P. Raja	32.5	22750	18219	4531	1.25	30	21000	19234	1766	1.09
P. Veerabadran	31.25	21875	17659	4216	1.24	28.75	20125	18514	1611	1.09
C. Jeyakodi	37.5	26250	17739	8511	1.48	32.5	22750	19234	3516	1.18
R. Karuppiah	35	24500	17659	6841	1.39	30	21000	19554	1446	1.07
V. Maruthupandi	33.75	23625	17899	5726	1.32	30	21000	19287	1713	1.09
M. Kothan	37.5	26250	17979	8271	1.46	35	24500	19394	5106	1.26
M. Agatheeswaran	40	28000	17579	10421	1.59	30	21000	19524	1476	1.08
Mean	37	25608	17736	7872	1.44	31	21642	18928	2714	1.14

Results and Discussion

The variety PMK (R) 3 is an early maturing variety maturing in 105 days duration and fits well with the NE monsoon period and monocrop rainfed regions and hence is the best variety suited to rainfed and semidry areas. As the saline tolerant variety CO 43 is one of the parents of this variety PMK (R) 3 suits well with the saline patches of rainfed areas. The variety also tolerated the drought that coincided with the reproductive phase with a dry spell of 22 days. The variety PMK (R) 3 recorded a grain yield of 3.7 tonnes per ha with 10-15% increase in yield over the other varieties namely MDU 5, ADT 43, IR 50 etc which were cultivated in the village. The results are substantiating with the Chandrasekhara Rao *et al*., 2013 [5]. Number of panicles per square meter (207) was observed to be more in mechanized sowing in this variety, with higher fertile spikelet's (panicle harvest index- 82%) under drought. Higher Drought score index was observed in this variety and at the same time it also recovered quicker after the dry spell, received with rainfall. Mechanized sowing with the seed drill reduced the weeding cost to a considerable level. This allowed uniform seed germination and proper population was able to be maintained. Efficient tillering and a greater number of panicles per plant was observed in the field with mechanized sowing as the regular spacing between plants and rows were sufficient and uniform. Hence, the variety PMK (R)3 with mechanize sowing is highly recommended in these areas which improves the crop establishment,

reduces the cost of weeding, increases the productive tiller number per plant and ultimately yield enhancement from 2.5 to 3.5 tonnes per hectare (Table 1 & 2). Farmers realized 75.69% increase in net income due to increased grain yield by 14.74% with reduction of cost of cultivation by 17.10%, as reported by Tejeswara *et al*., 2020. Direct seeding of Rice with Ferti Cum Seed Drill technology with reduction of cost of cultivation Rs.3100 ha-1 realized over normal transplanting (Paladugu *et al*., 2004 and Gupta *et al*., 2006) [4, 2].

Constraints identified and feedback for research

The variety PMK (R) 3 is found to be drought tolerant but the grain is long bold while the farmers want medium slender grains for their consumption and marketing. Hence rice varieties with medium slender varieties like ADT 43 or ADT 36 may be developed which may improve their consumer preference. The variety has good keeping quality after it is cooked and is highly suited for water rice which the famers consume in this track. The cost of seed drill is quite high and not affordable to the resource poor peasants of rainfed single cropping situations. Even though seeds can be applied along with fertilizers at a certain spacing farmer are reluctant to apply fertilizers as the crop is sown as a pre monsoon. So, they feel that the fertilizers applied may go on waste. Seed drill helps in reduction the cost of cultivaton by avoiding hand weeding. The spacing created by the seed drill sowing also offers scope for mechanical weeding namely with the use of cono weeder, rotary weeder or mechanized cono weeder. Farmers felt that the fields sown with seed drill were very easy to be harvested with the combined harvestor. The variety is semidwarf and non-lodging and hence easy for harvest with combined harvestor and no grains were shattered and wasted

Conclusion

Farmers came to know that the variety PMK (R) 3 is drought tolerant and can yield better than the other rice varities they cultivate. Farmers were very eager to see the seed drill as this is the first of its kind for paddy sowing. Farmers were almost fed up with the cost spent for hand weeding. Effective Rainfall makes the seeds to germinate but the intermittent scarce rainfall makes the field weedy and often makes the process of hand weeding more frequent. Chemical herbicides are also found to be ineffective as they do not get required moisture levels at early stages of crop germination. Seed drill demonstrated the way for reduction in weeding cost. Farmers felt that the seed drill provided with the structures that are difficult to be drawn by the present-day tractors today as the tractors are provided with a handle to pull trucks along with it that disturbs the easy movement of seed drill in the field. Seed drill may be used only when the soil is fully pulverised and without any clods so as to make the seeds to fell freely in the field.

References

1. Chandrasekhararao C, Jintendra S, Murthy TGK. Resource Optimization in Rice through Direct Seeding by Drum Seeder. International Journal of Agriculture and Food Science Technology. 2013;4:239-46.
2. Gupta RK, Ladha JK, Singh S, *et al*. Production technology for directseeded rice. Technical Bulletin 8. Rice-Wheat Consortium for the Indo-Gangetic Plains; 2006.
3. Krishnaiah K. Rice production in India-CREMNET status and future concerns. Paper presented at: 2nd CREMNET Workshop-cum-Group Meeting; August 24-27, 1999; SWMRI, Thanjavur, India.
4. Paladugu S, Thati S, Lekhi M, Yadla S, Poli R, Alapati S. Studies on varietal performance under SRI and non-SRI. In: World Rice Research Conference; November 5-7, 2004; Tsukuba, Japan. p. 553.
5. Rao KT, Rao DU, Kumar PB, Chandrayudu E. Resource Optimization in Rice through Direct Seeding with Ferti Cum Seed Drill. Int. J Curr. Microbiol. App. Sci. 2020;9(12):1053-1058.