Madras agric. J. 68 (1) : 24 – 28, January 1981

Improving the Thrashability of Paddy using Preharvest Desiccants

S. SETHURAMAN[1], R. VAIDHYALINGAM[2] and P. PILLAIYAR[2]

Difficulty is experienced in thrashing high moisture paddy either manually or mechanically. Varying quantities of unthrashed paddy, depending on the grain moisture at the time of thrashing, remain sticking to the straw after manual/mechanical thrashing. In this study paddy was thrashed manually and mechanically using a Drum type thrasher after its full maturity as such and after spraying with common salt and Gramoxone sprays as pre-harvest desiccants. Thrashing was found to be easy in chemical desiccated crop, The unthrashed grains sticking to the straw were practically nil in case of the crop sprayed with Gramoxone 0.01%; whereas, upto 4.0% of the grains remained sticking to the panicles of the unsprayed parallel control crop after manual as well as mechanical thrashing. Because of the accelerated field desiccation, maximum grain recovery was possible in cases of crops receiving pre-harvest desiccants.

Harvesting paddy at 20 to 23% moisture content is reported to record maximum field yield (Wikramanayake and Wimberly, 1975 and Bose and Chattopadhyay, 1976). But thrashing of such a high moisture paddy either manually or mechanically poses problems in the complete removal of grains and consequently appreciable quantities of unthrashed paddy are left in the straw (Ahmad Karmari and Nour 1979 and Calverley, *et al.* 1977). To achieve complete removal of the grains during thrashing, crop is allowed to remain in the field for natural desiccation even after its full maturity; but this results in varying levels of pre-harvest losses (Bose *et al.*, 1970) which can be minimised by harvesting the crop earlier by spraying preharvest desiccants on paddy (Pillayar *et al.*1973; Bhole and Thakur, 1976; and Ramanujam, *et al.*, 1979). To determine the extent of improvement in manual and mechanical thrashing of crop in the latter case, a study was undertaken and the results are presented.

MATERIAL AND METHODS

Field trails in both *kuruvai* (1978-Adt 31; 1979-Adt 31 and Adt 34) and *thaladi* (1978-'79-IR 20; 1979-'80-IR 20 and IR 34) seasons were conducted in the fields of the Paddy Experiment Station, Aduthurai adopting randomised block and split plot designs. The recommended cultural practices including the fertilizer application and plant protection measures were followed. At the end of biological maturity (22-, 24- and 23- day of general flowering in cases of *kuruvai*, 1978; *thaladi* 1978-79 and *kuruvai*, 1979, and *thaladi* 1979-80 respectively), common salt solution of 20% and Gramoxone of 0.10% concentration (a.i. basis) were sprayed and the crop harvested after 48 hr. along with unsprayed parallel control crop (Control I). Another set of control plots remained in the field for 6 days more and then harvested (Control II): Immediately after harvest, the sheaves were thrashed manually and mechanically, winnowed

1. Paddy Processing Research centre, Tiruvarur-610 108, India

and the yield recorded to 14% moisture content (air oven). Mechanical thrashing was carried out in a Drum type thrasher (capacity 1 tonne/hr) developed by the Implements workshop, Thiruvarur.

To determine the extent of thrashability, the grains that were still sticking on to the labelled panicles after thrashing were counted and expressed as percentage to total grains in the panicle.

Ten randomly selected panicles were labelled, the total and green grains counted before and after 48 hr of spraying. Random panicles (prime earhead in hills) were clipped off before and after 48 hr of spraying for determining the grain moisture by desiccating in hot air oven at 105° ±1°C for 24 hr.

RESULTS AND DISCUSSION

The grain moisture content at the time of thrashing of the Control. I was ranging from 19.2 to 21.8%; while that in case of sprayed crop was from 16.8 to 19.6% (Table 1 and 2). In cases wherein common salt and Gramoxone solutions were sprayed, appreciable moisture reduction had occurred. Even after allowing the crop to remain in field for 6 days more after harvesting the sprayed plots and control I, the grain moisture as a result of natural desiccation did not reduce to that level of sprayed crop (ranging from 21.1. to 19.5% at the time of thrashing). Pre-harvest spraying resulted in appreciable change in the colour of the glumes from green to yellow (Figure). In case of the crop that received Gramoxone spraying, more or less the entire glumes changed to yellow colour whereas in control I as high as 20.5% of glumes still remained green.

Pre-harvest spraying on paddy rendered both the manual and mechanical thrashing operations easy and resulted in maximum recovery of grains (Table 3). On each day of the harvest, the thrasher was worked for about 2 hr duration. In case wherein pre-harvest chemicals were sprayed, harvested and then thrashed; significant increase in yield over control was observed. Pre-harvest Reglone sprays helped the combine to harvest 20 to 50% more grains in a working day because the drums, sieves and blower did not become blocked as with the non-desiccated crop (Lloyd, 1975). Moreover, increased grain recovery of 400-500 kg/ha was obtained in such cases.

In this study neither the manual nor mechanical thrashing caused any shelling or breakage of grains. Whenever the grain moisture content is below 16% that would result in more field hulling during mechanical thrashing (Khan, 1976).

The quantity of unthrashed paddy remaining in straw was more in cases of controls; whereas in Gromoxone sprayed crop, it was more or less nil (Table 4). A grain loss 2 to 3% that would normally occur as a result of unthrashed paddy while working thrashers (Khan, 1976) was absent in this case. This indicates that pre-harvest spraying on paddy crop facilities the easy thrashability and maximum recovery of grains.

Sincere thanks to late Dr. V. Subrahmanyan for his guidance. to the Department of Agriculture, Govt. of Tamil Nadu particularly to Mr. R. Venkataraman,

Crop Specialist for field facilities and to the Indian Council of Agricultural Research for financial support.

REFERENCES

AHMAD KAMARI and DHIAUDDIN MD. NOUR. 1977. Post-harvest handling of paddy in Malaysia, *In:* Report of the Action Oriented Field Workshop, Alor Setar, Malaysia' March, 1977, Food and Agriculture Organisation of the United Nations.

BHOLE, N. G., BAL, S., RAMA RAO, V. V. and Wimberley, J. E. 1970. Paddy harvesting and drying studies, RPEC Publication No. 701. Rice Process Engineering Centre, Kharagpur.

BHOLE, N. G., and THAKUR, T. C. 1976. Salt spray treatment of high moisture paddy for early harvest, *RPEC Reporter* **2**: 38–42.

BOSE, S. P. and CHATTOPADHYAY, P. K. 1976. Harvesting and drying of high moisture paddy *RPEC Reporte,r* **2**: 33–37.

CALVERLEY, D. J. B., CREE T. J. and ARDENDY, D., 1977. Field losses in the second crop harvest in the Muda area of Malaysia, *Ibid.*

KHAN, A, U., 1976. Harvesting and threshing equipment and operation, in: *Rice Post Harvest Technology* (Ed) Araulls E. V. de Padua D. B. and Micheal Graham, International Development Research Centre Ottawa, Canada, pp 99

LIOYD, L. S. 1975. 'Reglone' — a harvest aid in rice and small grain cereals, Imperial Chemical Industries Internal Plant Protection Division Conference, Moscow, March-1975.

PILLAIYAR, P., SETHURAMAN, S., RAMANUJAM, T. and VAIDHYALINGAM, R. 1980 Rice losses in some stages of pre-harvest and harvest operations (unpublished).

PILLAIYAR, P., VASAN, B. S., ANNAPPAN. R. S. and SUBRAHMANYAN, V. 1973. Effect of chemical spray on the ears of paddy on the ripening of grain, loss of moisture from the kernel and yield of crop, *J. agric. Engng-* **12**: 58.

RAMANUJAM, T., NAGARAJAN, M., SETHURAMAN. S. and PILLAIYAR, P. 1979. Desiccation of paddy crop with 'Gramoxone' (paraquat) and' Reglone' (diquat); *Pesticides*, **13**: 40–44:

WIKRAMANAYAKE, V. E. A. and WIMBERLEY, J. E. 1975. The effect of time of harvest on field yield, milling outturn and quantity of rice. *In: Rice Report 1975.* IUoFST: Instituto de Agroquimica Y Technologia de Alimentos, Valencia Spain, pp 119–120.

TABLE 1. Grain moisture content at the time of *Manual* thrashing

Sprays of	Kuruvai 1978	Thaladi 1978-79	Kuruvai 1979		Thaladi 1980	
	Adt 31	IR 20	Adt 31	Adt 34	IR 20	IR 34
Common salt (20%)	16.8	20.9	18.9	18.8	19.6	19.4
Gramoxone (0.10%)	–	19.2	17.7	17.9	18.7	18.3
Control I	19.2	22.7	20.5	20.1	21.8	21.7
Control II	20.1	19.6	21.1	20.9	19.5	19.5

TABLE 2. Grain moisture content at the time of *Mechanical* thrashing

Sprays of	Kuruvai 1968	Thaladi 1978-79	Kuruvai 1979		Thaladi 1980	
	Adt 81	IR 20	Adt 31	Adt 34	IR 20	IR 34
Common salt (20%)	16.8	20.9	18.4	18.4	19.5	19.2
Gramoxone (0.10%)	–	19.2	17.4	17.5	19.1	18.5
Control I	19.2	22.7	20.1	19.7	21.6	21.4
Control II	20.1	19.6	20.8	20.6	19.9	19.7

TABLE 3. Effect of pre-harvest desiccants on the thrashability of rice (kg/ha)

Treatment	Kuruvai, 1978		Thaladi, 78-79		Kuruvai, 1979		Kuruvai, 1979		Thaladi, 1980			
	Manual	Machine	Manual	Machine	Manual		Machine		Manual		Machine	
	Adt 31	Adt 31	IR 20	IR 20	Adt 31	Adt 34	Adt 31	Adt 34	IR 20	IR 34	IR 20	IR 34
Common Salt (20%)	5090	5050	4263	4677	4210	4239	4459	4366	4114	3964	4281	4234
Cramoxone (0 1%)	–	–	4630	4856	4589	4407	4681	4560	4568	4188	4305	4287
Control I	4953	4948	3974	4383	4169	4162	4311	4266	4086	3940	4163	4155
Control II	4465	4372	4043	–	4199	4298	4303	4340	3960	3928	4090	4020
S.E.	38.22		67.78	50.0	37.04		192.58		108.33		58.31	
C.D. (P=0.05)	115.23		216.68	160.56	109.99		N.S.		N.S.		N.S.	

TABLE 4. Extent of unthrashed paddy remaining in panicles (Mean of five replications in percentages)

Treatment	Thaladi, 78-79		Kuruvai, 1979				Thaladi, 79-80			
	Manual	Machine	Manual		Machine		Manual		Machine	
	IR 20	IR 20	Adt 31	Adt 34	Adt 31	Adt 34	IR 20	IR 34	IR 20	IR 34
Common Salt (20%)	1.46	1.29	0.96	0.98	0.61	0.65	1.58	1.29	1.46	0.76
Gramoxone (0.1%)	0.00	0.00	0.46	0.00	0.32	0.00	0.00	0.00	0.00	0.00
Control I	2.51	1.59	2.92	4.08	3.15	2.90	2.26	1.86	2.28	1.41
Control II	0.66	0.48	3.74	4.09	3.28	2.87	1.18	0.79	1.22	1.30