

Effect of Some Pre-Harvest Treatments on Grain Yield and Protein Content of Sorghum

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Spraying of 15% or 20% solution of sodium chloride, 3 hours before harvest, reduced the moisture content of sorghum grain by about 3 per cent whereas, dusting carbaryl or chalk powder at the above stage reduced the moisture by 1 to 2 per cent only. The yield of grain and the protein content were not affected by the chemical desiccants tried. Harvesting Co18 and Co21 sorghum on 90th, 95th or 100th day after sowing did not bring about a significant change in grain yields or its protein content.

Desirable seed moisture for storage of sorghum 14 per cent or less. Higher moisture content facilitates insect and fungal infestation leading to decreased seed viability and making the grain unfit for human consumption. Desiccation of sorghum plant will enable the farmer or seed producer to reduce the moisture content of the grain and to harvest it earlier. Leaving the grains to mature and dry in the plant itself, leads to bird damage. Therefore an attempt was made to reduce the moisture content of sorghum grain by the use of some chemicals and the efficacy of the chemicals was assessed when the crop was harvested at different dates.

MATERIAL AND METHODS

An experiment was laid out in split plot design replicated three times in the year 1977. The main plot treatments consisted of harvesting on

different dates and in the sub-plots different chemical desiccants were tried (Table I). In 1978 the same experiment was repeated with two applications and three doses of N viz. 45, 90 and 135 Kg/ha as the main plot treatments. Harvesting on different dates constituted the sub-plot treatment and different chemicals were tried in the sub-sub-plots. P and K were applied to the crop basally at 45 Kg/ha each, along with half the dose of N. The remaining half N was applied on 30th day after sowing. Other cultural operations were common all the plots. The chemicals were sprayed as per the schedule before harvest and grain yields were calculated to 14 per cent moisture. The crude protein content of the grain sample was estimated by Kjeldahl method. The moisture content of the grain is estimated in Osaw Moisturemeter.

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RESULTS AND DISCUSSION

The yield data (Table I) showed that the varieties Co 18 and Co 21 recorded the highest grain yield on 95th day in both years. However, there was no significant difference in grain yield to the different main plot and sub-plot treatments. Studies conducted in Maharashtra with jowar varieties CSH 1 and CSH 4 also indicated that harvesting at different dates did not affect the grain yield (Dahatonde, 1979; Dahatonde and Adhoo, 1978). Normally jowar is harvested when the seed moisture content is 15-18 per cent. Harvesting the grain at a moisture level of 21 - 24 per cent enabled the fields to be ready for the next crop a week earlier (Raj and Krishnamurthy, 1973).

TABLE II Interaction of fertilisers and chemicals on the grain yield of sorghum in 1978.

	M ₁	M ₂	M ₃
C ₁	1329	1950	1538
C ₂	1477	1770	1355
C ₃	1666	1464	1542
C ₄	1386	1557	1501
C ₅	1416	1494	1543

CD (5%) between M at C 275

CD (5%) between C at M 241

Among the three doses of N, 90Kg/ha gave significantly higher yield than 45Kg N/ha. In 1978 the

interaction effect of fertilisers and chemical desiccants showed a significant trend (Table II). At M₁ level of N, C₃ gave higher yields and at M₃ level the treatments were on par with each other. At M₂ level C₁ and C₂ were superior to other treatments. At C₁ and C₂ the M₂ levels of N was significantly superior to other levels of N. The interaction of fertilisers and stages, and chemicals showed a non-significant trend.

The mean grain moisture content is given in Table III. There was a 3 per cent reduction in moisture content due to spraying brine (C₁ and C₂). Fermentation of the cut earheads was not helpful in reducing the moisture content of the grain. Sevin and chalk powder reduced the moisture by 1 to 2 per cent only. Gigax and Burnside (1976) have reported that sorghum plants sprayed with glyphosphate at 30 per cent moisture showed larger moisture reduction than when sprayed at 25 per cent seed moisture. Bovey and McCasty (1965) have observed that some varieties were resistant to desiccant application. In our experiment the varieties Co 18 and Co 21 showed moisture reduction to the same extent only.

In the trial in 1977 there was no significant difference in the protein content of the grain samples from different treatments (Table I). In the samples of 1978 trial the variety Co 18 had significantly higher protein than Co 21. Increasing the dose of N fertiliser

has increased the protein content of the grain significantly. Harvesting at different dates and different chemical desiccants did not affect the protein content of the grain.

Glyphosphate (Baur *et al.*, 1977) sodium chlorate, paraquat (Bovey *et al.*, 1975) magnesium chlorate (Bovey and McCasty, 1965) and urea-ammonium nitrate solution (Donnelly *et al.*, 1977) have been tried as desiccants for sorghum. None of them were found to affect the protein content of the grain. However, the grain yield was decreased when the desiccant spray was done before the grain attained physiologic maturity (Donnelly *et al.*, 1977). In the present work the spraying of desiccants was done when the grain reached physiologic maturity and not before. Palaniappan and Vijayakumar (1976) have reported that the grain yield and protein content of CSH 4 and CSV 4 sorghum cultivars decreased when the grain was harvested on or before 90th day after sowing. In this study grain was harvested at 90 days and at 5 days interval thereafter and therefore the protein content of the grain was not affected.

REFERENCES

- BAUR, J. R., F. R. MILLER and R. W. BOVEY, 1977. Effect of preharvest desiccation with glyphosphate on grain sorghum seed. *Agron. J.* 69: 1015-18.
- BOVEY, R. W. and M. K. McCASTY, 1965. Effect of preharvest desiccation on sorghum. *Crop Sci.* 5: 123-26.
- BOVEY, R. W., F. R. MILLER and J. R. BAUR, 1975. Preharvest desiccation of grain sorghum with glyphosphate. *Agron. J.* 67: 618-2
- DAHATO DE, B. N. 1979. Studies on optimum harvesting period of jowar variety CSH 1. *Indian J. Agron.* 24: 82-84.
- DAHATONDE, B. N. and S. H. ADHAOO, 1978. Studies on optimum harvesting period of jowar variety CSH 4. *J. Maharashtra Agric. Univ.* 3: 184-86.
- DONNELLY, K. J., R. V. VANDERLIP and L. S. MURPHY, 1977. Desiccation of grain sorghum by foliar application of nitrogen solution. *Agron. J.* 69: 33-36.
- GIGAX, D. R. and O. C. BURNSIDE, 1976. Chemical desiccation of grain sorghum. *Agron. J.* 68: 545-49.
- PALANIAPPAN, Sp. and M. R. VIJAYAKUMAR, 1976. Note on the effect of time of harvest on the nutritional quality of grain in two sorghum cultivars. *Indian J. Agric. Res.* 10: 136-38.
- RAJ, P. and K. C. KRISHNAMURTHY, 1978. RSH-1 sorghum has better threshing ability at higher moisture level. *Curr. Res.* 7: 95-7.

TABLE I Effect of pre-harvest treatments on yield and protein content of sorghum.

Treatment No	Treatment	Yield		Protein (%)	
		1977	Kg/ha 1978	1977	1978
M ₁	N at 45 Kg/ha	—	1455	—	9.42
M ₂	N at 90 Kg/ha	—	1652	—	9.55
M ₃	N at 135 Kg/ha	—	1508	—	9.96
	CD (5%)		163		0.28
S ₁	CO 21 harvesting on 80th day	1389	1534	9.84	9.81
S ₂	CO 21 harvesting on 95th day	1696	1690	10.28	9.84
S ₃	CO 21 harvesting on 100th day	1494	1453	9.95	9.67
S ₄	CO 21 stopping irrigation on 80th day and harvesting on 95th day	1439	—	9.94	—
S ₅	CO 18 harvesting on 90th day	1503	1541	9.73	9.31
S ₆	CO 18 harvesting on 95th day	1757	1660	10.01	9.51
S ₇	CO 18 harvesting on 100th day	1685	1349	10.28	9.74
S ₈	CO 18 stopping irrigation on 80th day and harvesting on 95th day	1630	—	10.28	—
	'F' test	NS	NS	NS	NS
C ₁	Spraying 15% NaCl 48 hours before harvest	1492	1626	10.22	9.54
C ₂	Spraying 20% NaCl 48 hours before harvest	1579	1529	10.19	9.67
C ₃	Dusting carbaryl (12.5Kg/ha)	1606	1557	9.79	9.56
C ₄	Dusting chalk powder (12.5Kg/ha)	1677	1494	10.13	9.59
C ₅	Allowing fermentation of the cut earheads for 48 hours	1484	1484	9.82	9.86
	'F' Test	NS	NS	NS	NS

NS: Not Significant

TABLE III Moisture content of sorghum grain at harvest in 1978

	C ₁	C ₂	C ₃	C ₄	C ₅
90 th day harvest	27	27	28	28	30
95 th day harvest	19	19	21	21	23
100 th day harvest	16	16	17	17	18