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Short Communications

Induction of Pollen Sterility in *Sorghum bicolor* (L.) Moench

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Emasculation by hand is expensive and time consuming process for large scale hybrid/seed production in sorghum. Similarly, maintennce of male sterile lines involves isolation and related problems.

Use of Ethrel (2-chloro ethyl phosphonic acid) for inducing male sterility has been reported by Fairey and Stoskopt (1974) in wheat, Parmar *et al.*, (1979) in rice and Verma and Kumar (1977) in barlay. Successful results with Ethrel depend on the concentrations that are employed and the time of application (Dotlacil and Aplatauerova, 1978).

The experiment was laid out at N. M. College of Agriculture, Gujarat Agricultural University, Navsari using three genotypes, viz., M1, M27 and M28 adopting randomised block design with three replications during *kharif* and thereafter it was repeated during hot weather, 1980-81.

Ethrel at three concentrations, viz., 600, 1200 and 1800 ppm was sprayed after the emergence of earheads two times at an interval of 24 hours followed by with and without polytheline bagging. The polytheline bags were used for covering the earhead after spraying the gamatocide. In all 24 treatment combinations were taken for the study.

The size of the experimental plot was 1.35 x 3.00 m and the plants were spaced at a distance of 0.45 x 0.15 cm. The gamatocide spraying was done on each newly emerged earhead uniformly with hand automizer.

Further, confirmation regarding Pollen sterility was done by examining the same under microscope after staining with Muntizing's mixture of glycerol and one percent acetocarmine solution as prescribed by Sharma and Sharma (1965).

All the data for two consecutive crop seasons were statistically analysed to find out the error variance and critical difference for evaluating various treatment combinations in inducing male sterility.

Data presented in Table-1 indicated that the effect of spraying of Ethrel, covering the earheads with polytheline bag and combination of both, vary to a significant extent so far as the induction of sterility in male gamates of different sorghum genotypes is concerned. A linear response due to various concentrations of Ethrel in case of all the three genotypes of sorghum during both the seasons suggested that Ethrel in high concentrations works well as a male gamatocide.

However, combination of spraying of Ethrel @ 1800 ppm two times before anthesis followed by covering the earhead by

TABLE 1

Effect of ethrel and polytheline bag on male and female sterility on sorghum.

(*Kharif* 1980-81 and *Hot weather* 1980-81).

Treatments	*Kharif* (Mean of three genotypes) Sterility		*Hot weather* (Mean of three genotypes) Sterility	
	Male (%)	*Female (%)*	*Male (%)*	*Female (%)*
600 ppm	66.56	1.85	62.45	1.56
	(55.80)		(54.07)	
1200 ppm	70.48	2.97	65.39	6.21
	(67.45)		(62.31)	
1800 ppm	87.93	5.17	89.09	7.39
	(77.80)		(76.35)	
Average	75.01	3.34	72.31	5.05
	(67.00)		(64.24)	
600 ppm +*	95.12	8.67	94.77	7.61
	(81.38)		(80.30)	
1200 ppm +*	97.75	8.14	97.17	6.95
	(87.30)		(85.08)	
1800 ppm +*	98.67	8.43	97.56	7.70
	(92.81)		(91.43)	
Average	97.18	8.41	96.49	7.42
	(87.16)		(85.60)	
*	74.74	8.10	71.97	8.36
	(29.29)		(27.80)	
Control	-	-	-	-
SE	0.46	0.27	1.06	0.18
CD (5%)	1.32	0.79	3.04	0.46
CV %	9.11	7.31	2.20	4.80

* = Covering of earhead with polytheline bag.

() = Figures in parenthesis indicate percentage of nonstained pollen.

polytheline bag induced male sterility to a maximum extent (more than 95%) in all the three genotype during both the seasons. The additive effect in inducing male sterility due to covering of earhead with polytheline bag might be due to high humidity inside the bag which not only retards the dehiscence of pollen grain but reduces the rate of transmission of pollen to stigma.

The results were further confirmed by examining the pollens under microscope after staining them with glycerol and acetocarmine. Earheads were grouped into three main categories according to the porportion of stained and nonstained pollen grains.

(1) Untreated earheads and the earheads covered with polytheline bag had normal male fertile pollens (NMF) as more than 95 per cent of the pollens were stainable.

(2) In case of low concentration of Ethrel, the earheads were found to be partial male sterile (PMS) as the proportion of non-stainable pollens was to an extent of 50-70 per cent.

(3) The treatments having high concentration of Ethrel, produced normal male sterile earheads (NMS), because the pollens of such earhead were nonstainable to an extent of 95 per cent. Such cytological results have been reported earlier by Chauhan (1976).

Thus, from these results it could be concluded very emphatically that the combine treatment of Ethrel spray @ 1800 ppm two times at earhead emergence followed by covering it by polytheline bag induces male sterlity to an extent of more than 95 per cent which may be useful for successful crossing programme among different male fertile genotypes of sorghum.

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REFERENCES

Chauhan, S.V.S. 1978. Morphological and histochemical studies in natural and chemically induced male sterile plants *Curr. Sci.* 45 : 274-275.

Dotlacil, L. and M. Aplatauerova 1978. Pollen sterility induced by Ethrel and its utililzation in hybridization of *wheat*. *Euphytica*, 27 : 353-360.

Fairey, D.T. and N.C. Stoskopt 1974. Effect of granular Ethrel on male sterility in Wheat *Crop Sci.* 15 : 29-33.

Parmar, K.S., E.A. Siddiq and M.S. Swaminathan 1979. Chemical induction of male sterility in rice. *Indian J. Genet.* 39 : 529-541.

Sharma, A.K. and Archana Sharma, 1965. "Chromosome Technique Theory and Practice". Butterworths, London.

Verma, M.M. and J. Kumar, 1977. Ethrel-a male gamatocide that can replace the male sterility in barley. *Euphytica.*, 27 : 865-868.