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Short Communication

MALE GAMETOCIDAL EFFECT OF SYNTHETIC DETERGENT IN RICE

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AKS (Kh 95) 1 rice (*Oryza sativa* L.) strain was transplanted in 8 plots, with a spacing of 20 cm between plots during *kharif*, 1996. Each plot had 3 m long 3 rows having 20 × 15 cm spacing. All recommended cultural practices were followed for raising a good crop. Four aquous concentrations of Nirma synthetic detergent (Nirma Chemicals Works Pvt. Ltd., Ahmedabad) (3, 4, 5 and 6%, w/v) were sprayed on rice plants at tillering (47 days before date of 50% heading) and initial booting (19 days before date of 50% heading) stage in separate plots. Spraying was done under clear, sunny and hot day. Randomly selected 10 plants of the middle row of each plot were used for the spraying. Randomly selected one spike per sprayed plant was covered with a spider thin paper bag before its emergence. After physiological maturity all the bagged spikes were harvested and threshed in bulk separately for each treatment spraying for estimating spikelet sterility (%). Randomly selected 10 open-pollinated (unbagged) spikes per treatment/spraying (one spike/treated plant) were used for estimating seed set (%) in natural open- pollination. Male sterility (%) was calculated as :

Male sterility (%) = Seed set (%) in open-pollination – seed set (%) in bagged spike.

The lowest concentration (3%) of the detergent induced the highest spikelet sterility (93.3%) (Table 1), followed by 6, 5 and 4% concentration under the spraying at tillering stage; whereas, during the spraying at initial booting stage the highest spikelet sterility (73.4%) was observed for the highest concentration (6%), followed by 3, 4 and 5% concentration. General mean indicates comparatively higher spikelet sterility under spraying at initial booting stage.

With respect to male sterility the highest score (85.8%) was recorded for the lowest concentration (3%), followed by 5, 6 and 4% concentration in the spraying at tillering stage; whereas, under the spraying at initial booting stage the maximum

male sterility (37.4%) was induced by 4% concentration, followed by 3, 6 and 5% concentration. Comparatively higher male sterility was induced under the spraying at tillering stage (Table 1).

Table 1. Spikelet sterility, male sterility and seed set induced by Nirma detergent spraying at different growth stages in rice

Concentration of Nirma (%, W/V)	Spikelet sterility (%)		Male sterility (%)		Seed set (%)	
	Tillering stage	Initial booting stage	Tillering stage	Initial booting stage	Tillering stage	Initial booting stage
3	93.3	68.7	85.8	27.5	92.5	58.8
4	14.1	56.8	4.7	37.4	90.6	80.6
5	44.5	48.2	33.5	4.4	89.0	56.2
6	52.7	73.4	20.0	26.3	67.3	52.9
General mean	51.1	61.8	35.9	23.9	84.8	62.1
Control	-	-	-	-	-	89.8

Seed set in the natural open-pollination was the highest (92.5%) for 3 % concentration, followed by 4, 5 and 6 % concentration under the spraying at tillering stage; whereas, during the spraying at initial booting stage 4% concentration recorded the highest seed set (80.6%), followed by 3, 5 and 6% concentration., All the concentrations, except 6 %, under the spraying at tillering stage recorded about equal seed set as that of untreated control (89.8 %). However, all the spraying at initial booting stage recorded lower seed set than that of control. The spraying at tillering stage was comparatively more effective for inducing high seed set in natural open-pollination. Spike emergence in all the cases was complete.

The present studies indicate that the detergent had the male and female gametocidal effects in rice, which was highly influenced by its concentration and stage of the spraying. The highest degree of male sterility, coupled with the maximum seed set in natural open-pollination suggests that spraying of 3% of the detergent at tillering stage may be used as an effective, cheap and convenient chemical method for producing seed of hybrid rice. Seed set maximum upto 92.5% shows that the pollen load was sufficient in the experimental plot and weather was favourable for seed set in open-pollination. Various degree of seed set for different spraying may be explained mainly due to induction of varying degree of female sterility. However, to some extent, some induced bio-chemical and physiological changes and modifications in floral morphology, favourable for open-pollination, may also influence the seed

set. The spikelet sterility, created by the detergent, may be caused by disturbances in the cell-division during the development of reproductive cells due to mitotic inhibitory property of some synthetic detergents in other crops [1-4].

REFERENCES

1. M. Kumar and S. P. Sinha. 1984. Changes in mitotic index in roots of *Allium cepa* exposed to detergents. Biol. Bull. Ind., **6**: 296-300.
2. M. Kumar and H. Kumar. 1987. Inhibition of germination and mitosis in *Vigna radiata* by some laundry detergents. J. Curr. Biosci., **4**: 135-138.
3. H. Kumar and M. Kumar. 1990. Effect of some detergents on germination and mitotic index in *Vigna radiata*. Ann. agric. Res., **11**: 316-318.
4. M. Kumar. 1991. Effect of synthetic detergents on interphase nuclei in *Allium cepa* L. Indian J. Genet., **51**: 306-310.