EFFECT OF TREATMENT OF COLCHICINE, DIMETHYL SULFOXIDE, ETHYLENE GLYCOL, HYDROXYLAMINE AND TRIETHANOLAMINE ON PLANT GROWTH, FLOWERING AND FRUITING IN JUTE (*CORCHORUS OLITORIUS* L.)

The present investigation was undertaken to study the effects of colchicine, EG, HA and TEA on jute and compare them with that of DMSO. Colchicine has been used for the induction of polyploidy in jute (Bhaduri and Chakrabarti, 1948) but so far known there are no reports of the study of the effects of EG, HA and TEA in jute. Dimethyl sulfoxide, which has been found to be a radio-protective agent (Ashwood-Smith, 1961 ; Kaul, 1970), has not also been tried in jute.

Dry seeds of jute (*var. JRO-620*) obtained from the Jute Agricultural Research Institute, were treated with colchicine, DMSO, EG, HA and TEA separately for 24 hours in each case. Concentration of each chemical was 0.2 per cent aqueous solution. The control was kept in distilled water (DW) for the same period. Seeds from all the treatments were thoroughly washed in distilled water and were sown in the field immediately. Because of unavoidable circumstances sowing could not be done earlier than July.

Pollen grains were stained in 1 per cent acetocarmine solution to score sterility.

It could be observed from Table I that germination and survival of plants till maturity was lowest from colchicine treatment and highest from DW. Although germination was second highest from colchicine treatment, plant survival here was equal to HA treatment. Plant height was maximum from EG and lowest from colchicine treatment.

Table I. Effect of different chemicals on jute (*C. olitorius, var. JRO-620*)

Observations	Treatments					
	DW	Col.	DMSO	EG	HA	TEA
No. of seeds per treatment	100	100	100	100	100	100
No. of seeds germinated	58	6	42	36	32	40
No. of plants surviving till maturity	41	6	28	31	28	37
Percent of control	100.0	14.6	68.2	75.6	68.2	90.2
Plant height (cm)	113.28±3.2	88.3±6.7	127.9±3.9	135.4±3.9	112.1±9.1	132.8±4.5
Basal diameter	2.16±0.5	2.12±0.2	2.21±0.5	2.29±0.2	2.20±0.1	2.18±1.9
No. of branches per plant	2.5±0.5	——	3.6±0.6	5.5±1.7	7.0±3.0	3.8±1.9
1st date of flowering	54.2±1.8	57.4±3.3	65.7±2.1	68.4±3.1	61.7±4.4	60.5±2.9
Percentage of pollen sterility	8.3±2.0	12.9±4.8	12.0±1.9	18.1±3.9	19.7±5.9	18.4±3.2
No. of pods per plant	15.2±2.4	9.0±2.1	27.0±3.1	29.1±2.4	21.7±3.9	22.2±2.0
No. of seeds per pod	172.0±2.1	155.5±2.9	201.2±2.0	205.5±2.7	103.3±4.1	177.1±3.1
Weight of 100 seeds (mg)	180.1±1.0	185.0±2.8	206.4±2.4	202.5±1.8	189.3±3.1	168.3±2.1

DW = Distilled water ; Col. = Colchicine (0.2% aqueous soln.) ; DMSO = Dimethyl sulfoxide (0.2% aqueous soln.) ; EG = Ethylene glycol (0.2% aqueous soln.) ; HA = Hydroxylamine (.2% aqueous soln.), TEA = Triethanolamine (0.2% aqueous soln.)

Plant height from DMSO treatment occupied the third position. Basal diameter was more or less the same from all the treatments. Number of branches was highest from HA but those originating from colchicine treatment were unbranched. Lowest number of branches per plant was from DW and those from DMSO had more branches than those from DW. Flowering was earliest from DW but those originating from EG treatment took the longest time. Plants originating from DMSO treatment were next in frequency. Although pollen sterility was lowest from DW, number of pods per plant was highest from EG treatment. Highest percentage of pollen sterility was from HA treatment. Plants originating from DMSO treatment recorded second highest number of pods per plant. Number of seeds per pod was highest in those originating from EG treatment and lowest from HA. Again, plants originating from DMSO treatment showed second highest number of seeds per plant. Weight of 100 seeds was maximum from DMSO treatment and lowest from TEA treatment.

Different types of morphological abnormalities were observed in plants originating from different treatments. Most of these abnormalities affected stem, leaf and pod characters. (Table II).

Table II. Morphological abnormalities observed after treatment with different chemicals in jute (*C. olitorius* L. *var. JRO*-620).

Treatments	Types of abnormalities
DW	One plant showing bifurcation of stem.
Col.	All the six plants having short stature.
DMSO	Three plants showing bifurcation of stem.
	One plant showing curvature at the junction of stem and roots.
EG	Two plants showing profuse branching.
	Two plants showing bifurcation of stem.
HA	Two plants showing bifurcation of stem.
	Three plants showing profuse branching.
TEA	Three plants showing bifurcation of stem.
EG	Three plants having many pods with six septa.
HA	One plant having many pods with six septa.
	One plant having pods with eight, seven and six septa.
TEA	One plant with variegated leaves on the main stem near the basal portion.

The morphological variants observed here must have come through physiological and biochemical disturbances (Gunckel and Sparrow, 1954). Evans and Sparrow (1961) expressed the opinion that genetic loss resulting from chromosomal aberration was responsible for radiation induced growth inhibition. Bifurcation of stem observed in some plants originating from most of the treatments is a common radiation effect and has been observed by many workers. Basu (1962a) found bifurcation of stem in jute originating after treatment with x-rays and P^{32}. Bose and De (1964) detected bifurcation after ethyleneimine treatment and Joseph (1970) found bifurcation of stem after treatment with x-rays in jute. MacKey (1951) pointed out that the origin of bifurcation of stem has been explained on the basis of regeneration of affected meristem by different workers. Bishop and Aalders (1954), on the other hand, explained bifurcation resulting from latent expression of chromosomal effect. Micke (1961) also detected bifurcation of stem after x-ray and thermal neutron treatment on sweet clover and thought that the cause of this was the loss of ability to synthesize DNA in the meristem. D'Amato (Micke, 1961) pointed out that bifurcation, which was one of the aspects of fasciation, was closely related to auxin level and auxin distribution. Bose and De (1964) suggested that ethyleneimine affected auxin synthesis or metabolism resulting in morphological changes and abnormalities in jute.

Morphological variants, such as dwarf plants, those with bushy habit, bifurcation of stem, variegated leaves and those with variation in floral and pod characters have been found in jute by Jacob (1949-51), Kundu *et al.* (1961), Basu (1962a, 1962b, 1965), Joseph (1970) and Joseph and Bose (1972). Recently these have been observed by Bose and Mukherjee (1966), Bose and Hati (1967a, 1967b), Bose *et al.* (1967) and Bose and Basu (1967) in their work with x-rays, colchicine, ethy-

lurethane and diethyl sulphate in some ornamental plants.

ACKNOWLEDGEMENT

Sincere thanks are due to the Director, Jute Agricultural Research Institute, Barrackpore, for kindly supplying the seeds.

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