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Irradiation Studies to Bambusa Bambos Willd.

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The response of *Bambusa Bambos* in germination, survival and early growth of plants to various doses of gamma ray under different periods of pre-soaking conditions was studied. Indications are noticed that the long period of culm generations necessary before flowering can be reduced by hastening the growth by irradiation. Seeds soaked in water for six hours germinate and survive better than dry seeds. Based on survival of seedlins, the L. D. 50 dose is indicated to be 6 Kr for hour presoaked seeds.

The paper industry utilizes *Bambusa bambos* willd., one of the major bamboo species as an important raw material for it contains long fibres. Extensive areas under natural stands of bamboo have been periodically cleared by the Paper Industries and proportionate afforestation with this species did not keep pace with the progressive loss in acreage. Much remains to be done on the inheritance of the growth features of this crop, which information may be necessary for the evolution of a desirable plant type. Very little information is available on these lines in the literature. Bamboo, because of the long period of vegetative growth required before flowering, does not lend itself for a programme of breeding generally followed for the annual crops. Further, due attention was not paid in the past particularly to understand the inherent growth habit of the crop and the potential variability available for breeding a desirable plant type. As an initial step in this direction. studies on mutation by gamma irradiation were initiated in the Department of Forestry, Tamil Nadu Agricultural University, Coimbatore-3 to find out the respose of bamboo to mutation particularly on the lines of developing a desirable plant type.

MATERIAL AND METHODS:

Dehusked seeds of *Bambusa bambos* collected from Thunakadavu valley of Top-slip were subjected to gamma irradiation doses to find out the L. D. 50 dose for this tree species and creatla population for intensive study.

Seeds well filled, sun-dried and of uniform size were treated as detailed below, adopting arbitration in the initial dosage selection.

Dosage of gamma rays:

Ist set (*dry seeds*): O Kr, 12 Kr, 14 Kr, 16 Kr, 18 Kr, 20 Kr, 22 Kr, and 24 Kr

2nd Set

Doses :2.5 Kr, 5.0 Kr, 7.5 Kr, 10.0 Kr, 12.5 Kr and 15.0 Kr.

Presoaking in distilled water for { 6 hours, 12 hours, 18 hours and 24 hours with dry seed treatment as control.

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A total of 50 seeds per replication were sown in the polythene bags of the size of 13×25 cm² replicated four times. Observation on the germination 60 days after sowing, number of albino seedlings in each treatment and survival of seedlings 90 days after sowing were recorded. The number of vegetative generation reached by each seedling on the 100th day was recorded. Subsequently 25 seeds for replication were irradiated to a lower ranger of doses. replicated four times to create a population with a larger percentage of seedlings to recover segregants in the subsequent generations with point mutations. Observations were made on the number of seeds germinated on the 60th day of sowing, albinos in the treatments, survival of seedlings on the 90th day and on the number of plants with maximum generations reached on the 130th day.

In Tables I to IV observations made have been pooled in each treatment and the mean of four replications has been presented.

RESULTS AND DISCUSSION

The observation made in the first set of trial on the germination and survival of seedlings revealed a general decreasing trend with increases in doses (Table 1) The differences among the treatments were statistically significant. With regard to survival the effect due to the dose 20 Kr was significantly different from that due to the lesser doses, 12 Kr, 14 Kr, 16 Kr, and 18 Kr which were on a par among themselves. The data on survival of plants indicated a dose around 21 Kr to be the L. D. 50 dose for dry seeds. There was a large percentage of albino seedlings at the lower levels Indicating more of micro-mutation, perhaps at lower doses. From the nature of successive development of culm generations, it was seen that under the higher doses, a few plants were commonly seen very much advanced in their culm development compared with that of control (Table II) While the plants in the control plots showed a range from one to five culm generations, a few plants under the doses from 14 Kr to 24 Kr have gone for ahead producing six generations in 100 days.

From the observation made in the second trial on the germination of seeds, it is seen that a presoaking duration of six hours appeared to have improved the germination and survival of the dry seed (Table III). Dry seeds at lesser doses ranging from 2.5 Kr to 12.5 Kr, recorded increased germination upto 15.07 over that of untreated seeds due to perhaps the stimulatory effect commonly seen in crops. Th edecreasing trend of germination of dry seeds from 10.0 Kr dose level, might support the earlier indication of the L. D. 50 dose to be around 21 Kr. While the rate of decrease in germination and survival is almost linear in the six hours presoaking treatment, it shows variation in the other treatments. However, the tendency to similate a linear effect is indicated more by the soaked seeds than by the dry seeds for both germination and survival under the smaller doses of 2.5 Kr and 5 0 Kr does not deviate much from that of the untreated seeds. However, the existence of variation among the individual doses at a parti-

cular presoaking treatment cannot be ruled out. The heterozygosity of the seed material might have caused such variation in their response to presoaking treatments and various levels of gamma ray irradiation as reported in Amla and Babul (Rathinam *et al.*, 1981). With regard to survival of seedlings, six hour soaking has definitely improved the survival compared with that of the dry seeds, and a L. D. 50 dose of 6 Kr is indicated to be ideal for six hour soaked seeds. The observation recorded (Table V) on the occurrence of albino seedlings in the treatments confirms the probability of micromutations at the lower doses. On the 130th day, the data collected on the maximum generation reached in the treatments (Table VI) ind cated the hastening effect on the culm developtment due to irradiation. Such plants are expected to come to flower much earlier and furnish information on the associated growth habit of the plant, and on the inherent factors that may influence the flowering habit.

REFERENCE

RATHINAM, M., P. BOOMIKUMARAN and C. SURENDRAN 1981 Response of white Babul (*Acacia leucophloea* Willd) to gamma irradiation. *S. Ind. Hort* 1981.

RATHINAM, M., M. LEENAKUMARI C. SURENDRAN and J. WILSON 1981 Studies on gamma irradiation to Amla (*Phyllanthus emblica* Linn.) National seminar on Tree improvement, Trichy. P. 118.

TABLE 1 : Dosage Effects of Germination and Survival *(Pambusa bambos)*

Dose	Mean of four replications		Survival percentage	percentage of albinos seedlings
	Germination on 60th day	Survival on 90th day		
0 Kr	32.00	28.50	89.06	0.5
12 Kr	30.75	25.00	81.30	2.5
14 Kr	31.00	24.50	79.83	3.0
16 Kr	31.50	23.75	75.39	0.5
18 Kr	29.00	22.00	75.86	1.0
20 Kr	26.25	17.50	66.67	-
22 Kr	23.50	12.75	54.25	-
24 Kr	20.75	8.50	40.96	-
C. D. at 5% level	2.56	2.74	-	-

TABLE II : Number of seedlings under various culm generation on the 100th day of sowing

Dose	Name of plants under different clum generation on the 100th day						Percentage of plants under iour to six generations to the totai
	One	Two	Three	Four	Five	Six	
0 Kr	17	41	44	6	1	–	6.42
12 Kr	28	35	36	–	–	–	Nil
14 Kr	11	25	46	12	2	1	15.46
16 Kr	9	33	43	5	2	1	8 57
18 Kr	5	33	28	19	2	1	24.14
20 Kr	5	10	30	13	1	1	25.00
22 Kr	4	9	20	9	2	1	26 67
24 Kr	3	5	10	8	2	1	37.93

TABLE III: Particulars of germination on the 60th day under different treatments (Mean of 4 replications)

Pre-soaking duration	Gamma ray dose levels							Mean	of Seed germination
	0 Kr	2.5 Kr	5.0 Kr	7.5 Kr	10.0 Kr	12.5 Kr	15.0 Kr		
0 hour	18.25	21.00	20.25	18.00	20.50	19.50	16.50	19.14	76.57
6 hour	20.75	19.25	15.50	10.00	7.00	2.50	0.50	10.79	43,14
12 hour	16.00	20.25	14.75	18.00	6.00	2.75	1.25	11.29	48.00
18 hours	18.00	16.25	17,25	13.50	1.50	0.25	–	9.54	38,14
24 hours	17.50	17.25	16.70	8.25	0.75	0.50	0.25	8.74	35.00
Mean	18.10	18.10	16.89	13.55	7.15	5.00	4.62		

C. D. at 1% level; 2.46

TABLE IV: Particulars of survival on the 90th day under different treatments (Mean of 4 replications)

Pre soaking duration	Gamma ray dose levels							Total
	0 Kr	2.5 Kr	5.0 Kr	7.5 Kr	10.0 Kr	12.5 Kr	15.0 Kr	
0 hours	15.50	17.00	16.25	15.00	19.00	16.75	14.00	113.50
6 hours	18.00	18.25	10.00	3.50	3,75	1.00	0.25	54.75
12 hours	14.75	17.50	15.25	15.25	1.75	0.75	0.50	65.75
18 hours	15.00	15,25	15.00	6.75	0.25	0.25	–	52.50
24 hours	16.00	15.50	14.75	3.00	0.75	–	0.25	50.25
Total	79.25	83.50	71.25	43.50	25.50	18.75	15.00	336.75
Mean	15,85	16.70	14,25	8,70	5,10	3.75	3.00	

C. D. at 1% level : 1.98

TABLE V. Number of albino seedlings observed under different treatments.

Pre-soaking duration	Gamma ray dose levels							Total
	0 Kr	2.5 Kr	5.0 Kr	7.5 Kr	10.0 Kr	12.5 Kr	15.0 Kr	
0 hour	4	5	—	2	3	1	5	20
6 hour	6	3	14	12	10	6	—	51
12 hours	6	1	4	4	—	1	—	16
18 hours	7	3	4	—	—	—	—	14
24 hours	2	1	2	—	—	1	—	6
Total	25	13	24	18	13	9	5	
Percentage on seed germinated	6.91	3.46	6.70	6.64	9.09	8.82	6.76	

TABLE VI. Details on the number of plants with maximum generation reached on the 130th day in each treatment.

	0 Kr		2.5 Kr		5.0 Kr		7.5 Kr		10.0 Kr		12.5 Kr		15.0 Kr	
	G	N	G	N	G	N	G	N	G	N	G	N	G	N
0 hour	7	2	7	2	7	3	8	2	8	2	15	1	11	2
6 hours	7	2	7	2	9	2	7	4	8	1	7	5	8	1
12 hours	7	2	7	3	12	1	7	1	10	1	7	5	8	1
18 hours	7	1	7	2	7	6	12	1	8	2	10	2	8	3
24 hours	7	1	7	3	8	2	17	1	7	2	9	1	9	1

G-maximum generation

N-Number of plants