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RESPONSE OF ALAR AT DIFFERENT CONCENTRATIONS FOR GERMINATION AND SEEDLING GROWTH OF TEA (*CAMELLIA SINENSIS* L.)

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ALAR (succinamic acid-2,dimethyl hydrazyde) induced 100% germination at 50 μg/ml concentration and the higher concentrations (100–500 μg/ml) were supraoptimal. However, the highest concentration of 1000 μg/ml was detrimental which reduced the process. Higher the concentration greater was the root growth, but the shoot growth was concentration-dependent inducing 6.4 mm growth at 100 μg/ml against 4.3 mm at the untreated control after 18 days of sowing. Alar did not show any malformation at the seedling stage.

Tea seed population exhibits sporadic germination. Thus variability in germination is generally recognised as the major criterion for achieving sizable seedlings during planting time. Although alar is a growth-retardant, yet its promoting effect on germination[1,2] and growth[3,4] has also been worked out. The present study was aimed at investigating the effects of varying concentrations of alar on germination and seedling growth of tea seeds to obtain maximum germination within a specified period of 18 days.

Biclonal tea seeds were collected from the seed bari (Orchard) located in the experimental area of Tocklai Experimental Station (Tea Research Association, Jorhat). The earlier reported[5] experimental procedure was followed and the average maximum and minimum temperature and relative humidity (RH) percentage were recorded (22.86°C, 10.57°C and 76.65% respectively). Alar was applied at a concentration ranging from 10 to 1000 μg/ml and the seeds were subjected to germination tests. The untreated seeds served as a control. The data were recorded and subjected to statistical analysis for interpretation of the results.

Alar strangely enhanced seed germination up to 100% by 50 μg/ml within the stipulated time i.e. 18 days after sowing. All the test solutions except 1000 μg/ml stimulated germination. The higher three concentrations 100, 250 and 500 μg/ml became supraoptimal inducing 92, 89 and 81% germination respectively against 78% at the untreated control while the concentration of 1000 μg/ml inhibited seed germination. The germination was only to the extent of 74% (table 1).

It was observed that alar significantly stimulated ($P < 0.01$) root growth. The magnitude of growth increased with increase in concentrations. Thus a length of 27 mm was recorded at 1000 μg/ml as against 14 mm in the untreated control. For the shoot growth the treated seeds responded to all the concentrations (table 1) but an optimal growth of 6 mm was recorded at 100 μg/ml after which the growth started declining. There was a gradual increase in growth rate with the rise in concentration up to 100 μg/ml. Beyond that all the concentrations were supraoptimal which showed higher shoot elongation as compared to control (4 mm) but lower than 100 μg/ml. After 18 days, the trend of optimal

Table 1 *Germination, root and shoot growth after 18 days of sowing*

Conc. (μg/ml)	Germination (%)	Root growth (mm)	Shoot growth (mm)
0	77.9	14.5	4.3
10	95.5	20.1	5.5
50	100.0	22.1	5.9
100	92.2	22.5	6.4
250	88 8	23.6	5.2
500	81.1	25.2	4.9
1000	74.4	27.1	4.7
CD at 5%	7.4	0.8	0.3
1%	9 7	1.0	0.4
	RH%	76.65	
Maximum temp.		22.86	
Minimum temp.		10.57	

(100 μg/ml) and supraoptimal doses (all concentrations beyond 100 μg/ml) were very clear (table 1).

The variance analysis revealed that the effect of alar on both the parameters viz germination and seedling growth (root and shoot) was highly significant ($P < 0.01$).

The sclerotesta (stony seed coat) of tea seed functions as a mechanical resistance to the protrusion of the radicle. Pre-soaking of tea seed in water and subsequent cracking of the shell markedly enhanced germination of comparatively fresh seeds[6]. Tea seeds pre-soaked in 50 μg/ml alar solution induced germination to the extent of 100%. This finding corroborates the earlier findings[2,5]. It is probable that the retarding effect of some inhibitors present in the sclerotesta was counteracted by alar, thus releasing the embryonic axis from inhibition. This might have resulted in stimulation of germination and subsequent seedling growth. Moreover, growth retarding substances apparently in no way entered into the process of initiating germination[7].

Experimental results revealed that alar promoted root growth gradually from the lower to the higher concentrations. Similarly shoot growth was gradually promoted up to 100 μg/ml beyond which a declining trend appeared. But in all the treatments the shoot elongation was higher than the untreated control. These results are in conformity with the earlier findings on arabica coffee[8] and *Datura metal* L. seeds[9]. Alar may act as an inhibitor of auxin mediated reaction and thus nullify the growth inhibitory response of IAA[10]. Thus alar could be utilized effectively to modify seed germination and seedling growth of tea. In plantation crops, the seeds of which generally bear a hard seed coat, alar can be tried for uniform germination and early seedling growth. Similar results were also found[11] with other growth retardants on tea seed germination.

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INDUCED INTERCHANGE HETEROZYGOTE IN GREEN GRAM (*VIGNA RADIATA* L. WILCZEK)

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TRANSLOCATIONS are among the most productive tools of cytogenetics and are important in establishing linkage groups[1] and serve as a good source of aneuploids in diploid plants[2]. The existing literature on green gram reveals no work on translocations or aneuploids[3]. We have therefore studied the induced interchange heterozygote in this species.

A mutant plant was identified and isolated from a 50 kR gamma-irradiated population of green gram cultiver Pusa 105. Meiotic studies were made following acetocarmine squash technique. The mutant plant exhibited a number of differences from the control plant (figures 1,2). The former had a clustered appearance owing to the aggregation of several pods in a cluster. There was a significant increase in the number of pods/cluster and pods/plant, but the number of seeds/pod and pod length was greatly decreased. Seeds were ovate, large and significantly heavier than those of controls. The data on the mean performance of the mutant and that of the control are presented in table 1.

In normal plants 11 bivalents at diakinesis/metaphase I were observed (figure 3). Association higher than a bivalent was never encountered. The mutant plant showed the presence of $2n = 22$ chromosomes forming either 11 bivalents or 9 biavalents and a quadrivalent (figures 4,5). In the mutant plant 10 II + 2 I were also observed in a few