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STUDIES ON THE INTRODUCTION OF *MOGHANIA MACROPHYLLA* FOR CULTIVATION OF LAC

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SUMMARY

The results of investigations are summarised as follows: (i) The optimum time of seed collection is October-November. (2) Seeds have a dormancy period of 5-6 months. (3) Seeds remain viable for a period of three years. Percentage of germination is not affected much and, on the other hand, old seeds germinate in a shorter period. (4) It is advisable to pretreat the seeds either in boiling water or in cold water before sowing. This treatment improves germination percentage and reduces the period of germination. (5) Transplanting with the balls of earth is the most effective method of propagation. Seedlings should be raised in nursery beds in April for transplantation because these develop larger length of shoots for settlement of lac insects.

Introduction

Krishnaswami et al. (1962) reported that *Moghania macrophylla* (Willd.) O.Ktze, (Vern-Bhalia), a natural bush, has been found to be suitable for introducing intensive cultivation of lac under agricultural conditions, thereby reducing the cost of production of lac. In view of its immense possibilities as a successful and useful host for producing *Kusmi* lac, inquiries are received from various parts of India with regard to its different aspects of introduction. Therefore, certain critical investigations on such aspects as seed production, seed studies and propagation were undertaken for the past few years beginning from 1962 at the Institute's plantation at Namkum, and the results obtained are presented and discussed in this paper.

Phenology

The plant shows considerable variation in its phenological habits. It starts flowering after one year of transplantation. The flowers appear between September and December bearing racemes of purple flowers and the formation of pods begins immediately after flowering. Flowering and pod formation go on simultaneously till the end of December.

Seed collection and yield

The optimum time of seed collection is October-November. The ripe pods are collected from the bushes and dried in the sun. Seeds are then gathered by light thrashing of pods. The clean seeds thus obtained are thoroughly dried in the sun for a week before these are stored in proper containers.

The average yield of seeds per plant from one year old and mature comes to 25 g and 625 g respectively.

Seed studies

(i) **Dormancy of seeds:**—Dormant period of the seeds collected at three different periods, namely, (a) end of October, (b) end of November, and (c) end of December, were determined. Three samples, each of 100 seeds for the respective periods of collection, were taken for germination tests on the 1st week of every month following collection.

The germination tests were carried out under laboratory conditions in petri-dishes lined with moist blotting paper. The counts were continued for 30 days. The data of germination test of all the three periods is presented graphically in Fig. 1 and the laboratory temperatures of the three periods are given in Table I.

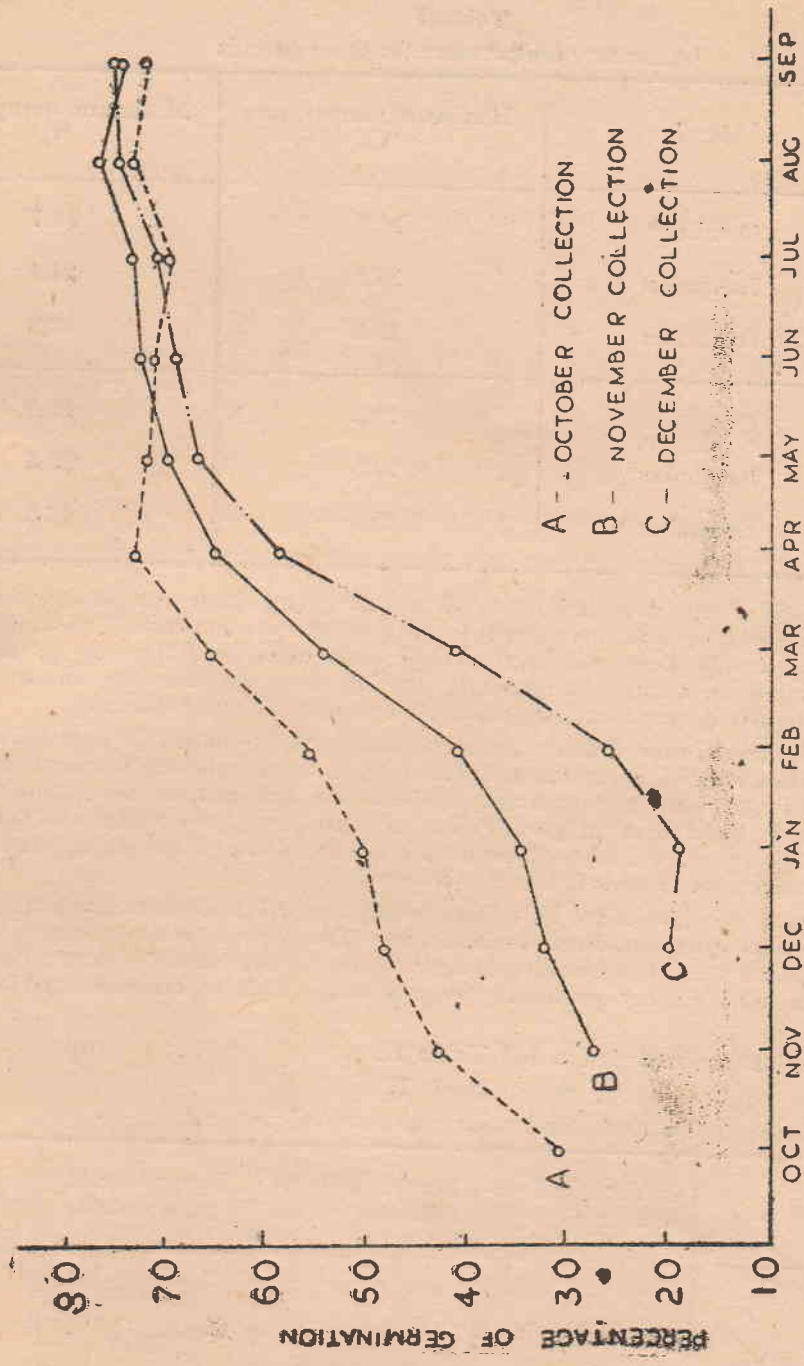

Fig. I. SHOWING THE PERCENTAGE OF GERMINATION OF SEEDS DURING VARIOUS MONTHS OF THE YEAR

Table I

Laboratory temperature for three periods

Year	Month	Maximum temperature °C	Minimum temperature °C
1962	October	26.3	24.7
	November	23.2	21.4
	December	19.3	16.9
1963	October	25.8	23.0
	November	23.5	20.8
	December	20.9	17.5

From the shape of the curve, it is revealed that the germination rate is low in all the three sets at the earlier stage and thereafter it shows a progressive increase. The analysis of the figures indicates that the three different sets of seeds behaved differently as regards the percentage of germination and that the seeds have a dormancy period as they showed favourable germination figures during March-April, i.e., 5-6 months after the harvest.

Moreover, the results show that the seeds collected in *October* shows 75% germination and those of *December* shows 58.6% germination in April which is the optimum sowing time of seeds. The differences in germination percentage between the two sets of seeds appears to be significant and such differences in germination of seeds may be explained as being due to physiological inactivity on account of dormancy of the seeds. Thus it appears that the optimum time of collection of seeds is October-November.

(ii) **Storage of seeds:**—Since 1961, seeds were collected in every season during October and stored in stoppered glass containers for the study. The germination tests were carried out in April and continued for two consecutive seasons. One hundred seeds of each set were sown in three well manured nursery plots and the germination counts were continued for one and half months.

The observations are recorded in the Table II.

Table II

Data on germination and survival per cent

Treatments	Initiation of germination (days)	Period of germination (days)	Percentage of germination	Survival per cent
A. Fresh seeds	13	44	79.1	76.8
B. One year old seeds	9	20	76.5	73.4
C. Two years old seeds	7	18	67.9	60.7
D. Three years old seeds	7	17	61.6	54.0

The data in the above table indicate that the old seeds not only retain their viability for a number of years but also complete germination much earlier than the fresh ones. It is further noted that there has been no significant difference between the treatments A and B as regards germination and survival per cent.

(iii) **Pre-treatment of seeds:**—The study was undertaken with the following sets of seeds, namely,

(a) Seeds treated in boiling water.
(b) Seeds treated in cold water.
(c) Untreated seeds.

In boiling water seeds were soaked for 2, 4, and 8 minutes, and for 24, 36 and 48 hrs. in cold water. 100 seeds were sown in each treatment with 4 replications. Sowing was done in respective beds in the month of April and the results are given in Table III.

Table III

Data on germination per cent

Particulars	Duration for treatment	Initiation of germination	Period of germination	Percentage of germination
(a) Treated in boiling water	2 minutes	9	15	89.3
	4 ,,	7	18	77.1
	8 ,,	10	16	63.4
(b) Treated in cold water	24 hours	9	20	83.6
	36 ,,	9	18	85.7
	48 ,,	12	24	73.6
(c) Untreated seeds	—	15	36	78.4

Results tabulated above indicate that seeds treated both in boiling water and in cold water show improvement in germination. The treatments also shorten the period of germination to a considerable extent. On an analysis of the data, it is seen that soaking of seeds in boiling water for 2 minutes records highest percentage of germination.

Propagation studies

(i) **Method of raising the plants:**—Three different methods, namely, (a) Direct sowing of seeds in pits (b) Transplanting of seedlings with balls of earth and (c) Crow-bar planting were tried. The resulting plants were compared after one year for their percentage of survivals and height growth and the data are presented in Table IV.

Table IV

Records on height growth and number of shoots

Treatments	Month of operation	Height growth in cm	No. of shoots per plant	P.C. of survival
A. Direct sowing of seeds	May	42.4	3.6	93
B. Transplanting of seedlings with ball of earth	June	145.6	14.6	96.7
C. Crow-bar planting	June	49.0	0.6	48.3

It may be seen from the Table IV that planting of transplants with balls of earth in well manured pits is superior to all other methods. This method has been found to be effective because of its advantage of initial quick growth. The farm-yard manure has been used @ 24 quintals per acre.

(ii) **Optimum time for raising seedlings:**—Following the successful results obtained with transplanting of balls with earth, a study was undertaken to determine the optimum time for raising the seedlings. Treatments included three periods of raising of seedlings, namely, March, April and May. Seeds were sown in nursery beds in drills 4″ apart during the respective periods (15th of every month) and lightly covered with soil. The seedlings thus raised were transplanted towards the end of June into pits spaced 6′× 4′ apart under the respective plots. Each treatment comprises of 15 plants replicated 4 times. The data on the survival and the total length of shoots are presented in Table V.

Table V

Observations on height growth, survival of plants and length of shoots

Treatments	Height in cm		Plants survival per cent	Total length of shoots in cm	
	at planting	at the end of one year		at first inoculation	at second inoculation
March raised seedlings	48.6	147.1	90.8	1339.7	1870.5
April raised seedlings	16.1	159.0	98.3	1690.0	2503.4
May raised seedlings	5.7	123.9	77.5	814.4	1666.5

It is seen from Table V that the plants grown from April raised seedlings attained much greater height and larger length of shoots for settlement of lac insects than those of other two sets. The total length of shoots per plant has been recorded as 16.90 and 25.03 metres at first and second lac inoculations respectively. Further, irrespective of the treatments given the maximum number of shoots (32.2) produced per plant recorded was in the April raised seedlings and minimum (14.9) under the May raised seedlings. Thus it was found that the month of April was the optimum time for raising the planting stock in nursery beds.

The comparative monthly increases in the height have been represented in Fig. II, wherein it is shown that in the early stages the rate of growth in March and April raised

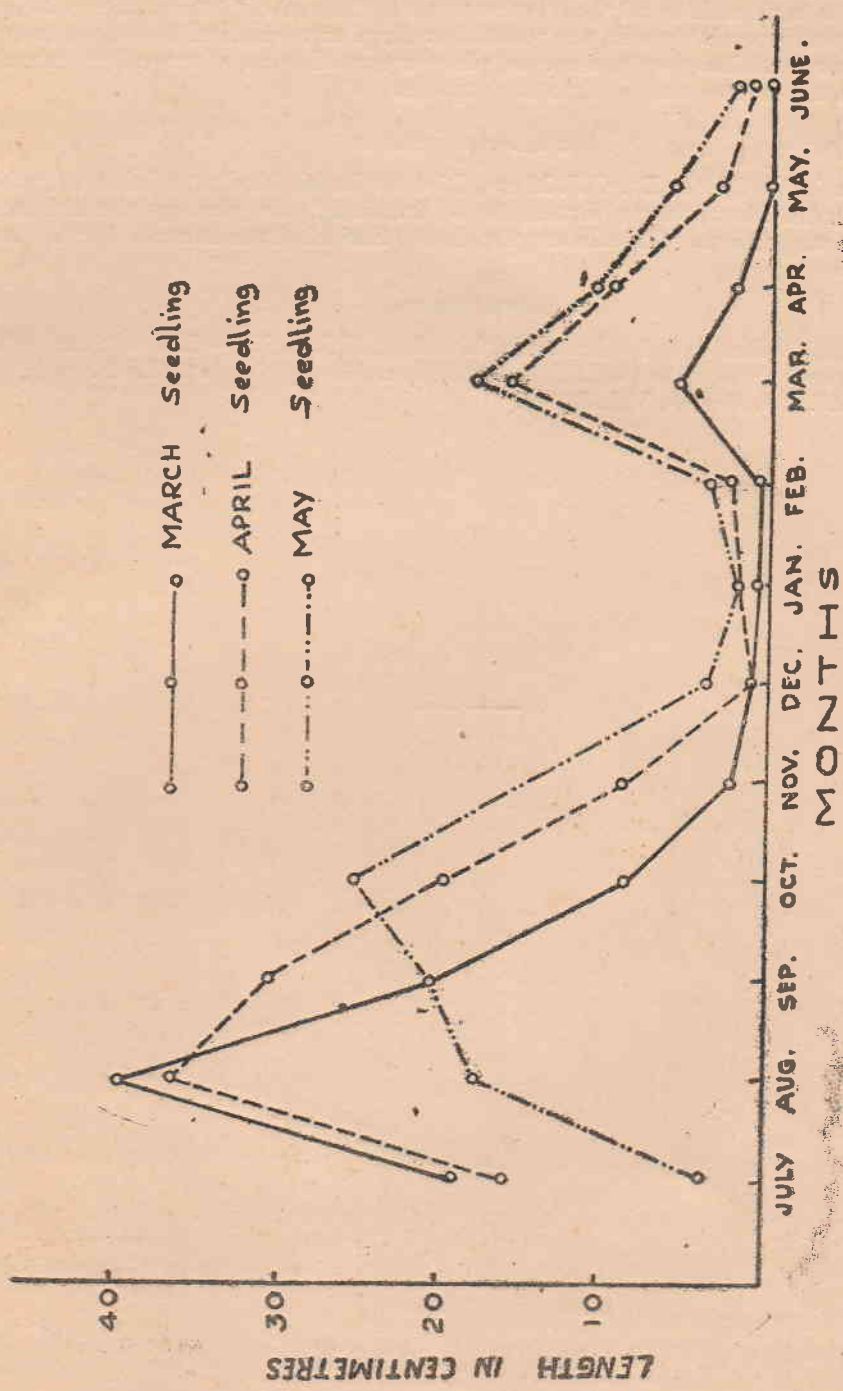

Fig. II - MONTHLY INCREASE IN HEIGHT GROWTH

seedlings showed an increased rate of growth in height as compared to other treatment. Active rate of growth was noticeable in all the treatments up to the end of October after which the rate of growth fell down appreciably with the result that the plants remained in a dormant state till the end of February. Subsequently, a second phase of growth was observed in March when dormancy breaks due to favourable climatic conditions.

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Reference

1. Krishnaswami, S., Purkayastha, B.K. and Chauhan, N.S. (1962)—Lac cultivation trials on *Moghania macrophylla* (Willd.) O.Ktze (Syn. *Flemingia congesta* Roxb. var. *semialata* Bak.). *Ind. Forester*, Vol. *88* (4).