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POLLEN BIOLOGY IN JACK (*ARTOCARPUS HETEROPHYLLUS* LAM.)

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ABSTRACT

Pollen studies in Jack conducted at the College of Horticulture, K.A.U. revealed that pollen production is abundant in jack and ranged from 1,50,00,000 to 1,70,00,000 per catkin. The percentages pollen fertility ranged from 89 to 93 and the pollen diameter ranged form 16 to 22µ. Ten per cent sucrose and one per cent agar found to be the best germinating media for jack pollen. The storage longevity was very low under room temperature and the viability was lost completely within 24 hours. 'Varikka' and 'Koozha' types did not differ significantly with regard to pollen diameter, fertility and viability.

Jack is a popular, indigenous fruit of India. The pollen biological studies provide some basic information in hybridisation programmes. In this study, different aspects of pollen like pollen morphology and fertility, production, pollen germination and storage studies were dealt in detail in both 'Varikka' and 'Koozha' types, the crisp and soft flaked types of jack respectively.

MATERIALS AND METHODS

To study different aspects of pollen, catkins were collected between 18.00 and 19.00 hrs when anther dehiscence was in peak. To study the pollen morphology the pollen was examined under microscope in a drop of water. To study pollen size and fertility freshly dehisced anthers were collected separately from ten catkins in each type, squashed and mounted in glycerine and stained with 1 per cent acetocarmine. Pollen fertility was studied by counting the well stained pollen grain in about five fields of all ten catkins in each type. Unstained or partially stained pollen and pollen with irregular shape were considered as sterile. The percentage fertility was calculated from total number of well stained pollen grains. The diameter of 100 well stained and well shaped pollen grain from both types were measured by an ocular micrometer and expressed in microns.

The number of pollen produced per anther which is equal to the number of pollen per flower was estimated in both 'Varikka' and 'Koozha' using a haemocytometer as adopted by Oberle and Geortzen (1952). The approximate number of pollen produced per catkin was computed by multiplying together the number of flowers per square centimeter with approximate surface area of a catkin and the number of pollen per flower calculated from the haemocytometer.

To find out a suitable artificial medium for optimum pollen germination five concentrations (0, 5, 10, 15 and 20 per cent) were tried in combination with three combination of agar (0.5, 1 and 1.5). Freshly dehisced pollen grains were dusted on to a drop of the media in cavity slides and mixed with a needle and incubated in moist chamber. To understand the optimum time for incubation for pollen germination and tube growth, observations were made at bihourly intervals in a medium of 10 per cent sucrose and one per cent agar which was found to be the best.

For the storage studies freshly dehisced pollen from mature catkins were dusted on to a watch glass and subsequently transferred to glass vials. The pollen thus collected were subjected to the following storage conditions.

1. Pollen grains at room temperature
2. Pollen grains stored at 4°C in a refrigerator
3. Pollen grains soaked in organic solvents such as pertroleum ether, acetone and benzene. Pollen along with catkin was also tried at 4°C in a refrigerator and in room temperature.

Table 1. Data on pollen fertility and mean diameter of pollen in 'Varikka' and 'koozha' types of jack.

Type	Number of pollen observed	Fertile	Sterile	Percentage fertility	Average diameter of pollen (µ)
'Varikka'	1383	1252	131	90.52	20.2
'Koozha'	1052	958	94	91.07	19.99
		$x^2 = 0.21$		t value = 0.57	

Table 2. Variation in pollen production of 'Varikka' and 'koozha' types.

Jack Type	Number of flowers observed	Number of pollen produced per flower		Mean number of pollen produced per catkin (approx)
		Range	Mean	
'Varikka'	100	110-180	142.19	1,57,93,237
'Koozha'	100	118-188	150.31	1,66,95,660

RESULTS AND DISCUSSION

Morphology and fertility : Pollen grains were microscopic. When observed under microscope it appeared to be greenish in colour, and almost spherical in shape, slightly depressed at the top and bottom. The data on diameter of pollen grain is presented in Table 1. The diameter generally ranged from 15 to 22 with a mean of 20.2 in Varikka and 19.97 in Koozha. The two types did not differ significantly in pollen size.

The data on fertility of jack pollen obtained by stain test is also presented in Table 1. The fertility recorded was 90.52 per cent and 91.07 per cent for 'Varikka' and 'Koozha' respectively. There was no significant difference between 'Varikka' and 'Koozha' with regard to pollen fertility. Teotia and Chauhan (1969) reported the pollen diameter varied from 14-15 and pollen fertility ranged from 86 to 98 per cent, which is in general agreement with the present results.

The data on pollen production is presented in Table 2. Each male flower in a Catkin has only a single anther. The number of pollen produced per anther which is equal to numbers of pollen producted per flower ranged from 110 to 168. The mean number for 'Varikka' was 142.19 and that for 'Koozha' was 150.31. The mean number of pollen produced per catkin in 'Varikka' was worked out to be approximately 1,57,93,000 and in 'Koozha' 1,67,00,000.

Table 3. Data on pollen germination in different concentrations of sucrose and agar in jack.

Sucrose concentration	Agar concentration (%)	Percentage germination	Mean tube length (μ)
0	0	18.69	29.8
5	0.5	57.0	13.41
	1.0	69.34	31.62
	1.5	56.74	18.17
10	0.5	70.16	11.14
	1.0	77.63	56.41
	1.5	63.59	15.3
15	0.5	62.64	31.62
	1.0	68.17	34.99
	1.5	58.76	21.57
20	0.5	50.60	25.5
	1.0	55.08	11.37
	1.5	48.07	29.89

Pollen germination studies : The data on pollen germination in different sucrose agar concentrations are given in Tabel 3. Maximum germination (77.63 per cent) and tube growth (56.51) was observed in a medium of 10 per cent sucrose and one per cent agar and the least in the control (18.69 per cent).

The percentage germination and tube length in 10 per cent sucrose one per cent agar media at bihourly interval is presented in Table 4. The optimum duration of incubation for maximum germination of pollen is six hours which gave 76.6 per cent germination. The tube length however was found to increase upto eight hours.

Monthly variation in pollen germination and tube length were found to be significant. Maximum germination and tube growth was observed in November (77.62 per cent and 56.41). The percentage pollen germination of 'Varikka' was found to be 60.67 per cent and that for 'Koozha' was 59.16 per cent. No signficant difference was observed in these two types regarding pollen germination.

Pollen storge : Fresh pollen soon after its collection recorded 57.45 per cent germination. The longevity of pollen, once detached from the

Table 4. Percentage pollen germination and tube length in 10 per cent sucrose-one per cent agar medium at bihourly intervals.

Hours after pollen planting	Percentage germination	Tube length (μ)
2	34.28	7.55
4	52.43	20.66
6	76.60	49.73
8	76.48	49.88
10	76.53	48.20

catkin was reduced considerably. At room temperature after 12 hours the germination percentage was reduced to 18.98 per cent and after 24 hours the pollen grains were completely nonviable. Pollen grains stored in galss vials in a refrigerator at 4°C gave only 19.76 per cent germination after 12 hours and 8.83 per cent after 24 hours of storage. Of all the treatments pollen grains along with the catkin at 4°C gave the best results i.e., 55.35 per cent germination after 12 hours and this gradually decreased to 5.55 per cent after 48 hours of storage. Among the organic solvents tried petroleum ether gave the best result with 42.8 per cent germination after 12 hours and 27.9 per cent after 48 hours of storage.

REFERENCES

KHADER ABDUL, J.B.M. Md. and RAO, MADHAVA, V.N. (1694). Pollen morphology of some cultivated fruits. **Madras Agri. J., 51**(2): 54-56.

OBERLE, G.D. and GOERTZEN, K.L. (1952). A method for evaluating pollen production of fruit varieties. **Proc. Amer. Soc. Hort. Sci. 59**: 263-265.

TEOTIA, S.S. and CHAUHAN, R.S (1969). Studies on flowering habits, sex behaviour, floral biology and fruit development in Jack fruit (**Artocarpus heterophyllus** Lam.). **Hort. Sci., 1** (2): 29-37.

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GENETICS OF QUANTITATIVE CHARACTERS ASSOCIATED WITH CAPSULES IN *SESAMUM INDICUM* L.

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ABSTRACT

The gene effects for four quantitative characters were studied in ten crosses of sesame. The additive component was significant and present in sizable proportions for the characters studied. Dominance was higher in magnitude than additivity. Epistatic effects were negligible for first capsule bearing node while dominance x dominance effect was in higher magnitude for capsules per plant and additive x additive effect was predominant for capsule bearing nodes to total nodes per plant. For volume of the capsule, additive x additive and additive x dominance interactions were observed. To exploit all these genetic effects characters associated with capsules can be improved through the use of recurrent selection to ultimately improve seed yield in sesame.

Yield is a complex character but its component traits are relatively less complex, therefore an estimation of the components of genetic variance is essential to formulate effective breeding procedure for the improvement of desired attributes. It depends mostly upon the nature and relative magnitude of the components of genetic variances and gene action involved. So the present investigation was undertaken to study the genetics of attributes relating to capsules in sesame.

MATERIALS AND METHODS

The meterial consisted of ten crosses generated by crossing five morphologically and genetically diverse varieties of sesame viz., CO 1, TSS 4, Si 1484, Si 1003 and Si 1125 in all possible internatings excluding reciprocals. In each cross, six generations viz., P_1, P_2, F_1, F_2, B_1 and B_2 were developed. The material was raised in a randomized block design with three replications adopting a spacing of 45 x 30 cm during kharif season of 1988 at Tamil Nadu Agricultural University, Coimbatore. The data were recorded on 15 random plants in F_1s as well as parents and 60 plants in F_2s and backcrosses. For capsule volume, five capsules per plant was selected and length, breadth and thickness were measured. Scaling tests were performed to detect deviation due to non-allelic interactions. The gene effects (m,d,h) were estimated according to the weighted least squares of Cavalli (1952). The genetic parameters on digenic model m, (d), (h), (i), (j) and (l) were obtained by the perfect fit method from the equations formulated by Mather and Jinks (1971).

RESULTS AND DISCUSSION

The scaling tests and components of generation means for four characters of ten crosses are presented in the Table.1. Simple additive dominance model was adequate in four crosses for first capsule bearing node, one crorss viz., Si 1484 x Si 1003 for capsules per plant and CO 1 x TSS 4 for volume of the capsule.