

FRUIT SET, FRUIT DEVELOPMENT AND FRUIT DROP IN HARD AND SOFT FLAKED TYPES OF JACK (*ARTOCARPUS HETEROPHYLLUS* LAM.)

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Abstract : Studies on fruit set, fruit drop and fruit development in 'Varikka' and 'Koozha' types of jack (*Artocarpus heterophyllus* Lam.) have indicated that the fruit set under natural condition was 83.33%. The post-set drop ranged from 30.40% in the two types studied. The peak period of drop was observed between the 60th and 80th day after emergence of the catkin. The time required for full development of fruit ranged from 100 to 138 days. Growth of fruit showed a sigmoid pattern, the rate being rapid up to the first 80 days and thereafter declined gradually. The two types 'Varikka' and 'Koozha' did not vary significantly in any of the above characters.

Key words: *Artocarpus heterophyllus*, fruit development, fruit drop, jack types.

INTRODUCTION

Studies on fruiting characters generate basic data for any crop improvement or production programme. Comer (1939) has given a brief description of the fruit morphology. Saha (1969) has studied the effect of ringing, scoring and shoot pruning on fruit set. Saha (1970) has studied fruit set in relation to age of branching. This study was initiated in the Department of Botany, College of Horticulture, Vellanikkara with an objective to study fruit set, fruit development and fruit drop, both in 'Varikka' and 'Koozha' types of jack, the crisp and soft flaked forms of jack respectively.

MATERIALS AND METHODS

The materials consisted of fruiting branches from bearing jack trees maintained at the Agricultural Research Station, Mannuthy. Six trees, three 'Varikka' and three 'Koozha' were selected based on the texture of flakes. The trees were of same age group (40 to 50 years) and were maintained under uniform management conditions.

The percentage of fruit set under natural conditions was assessed by tagging ten female catkins each on the six trees of both types. Observations on fruit set were made at weekly intervals. To examine the possibility of any apomictic fruit development, ten female catkins on each tree were bagged on two trees a day before their emergence from the stipules with muslin bags. To study the effect of hand

pollination on fruit set, ten female catkins on each tree were tagged soon after their emergence from the stipules on two trees. Of the ten catkins on each tree, five were covered with muslin bags and five left uncovered. From the second day of emergence of stigma, the catkins were dusted with pollen from freshly dehiscid anthers of male catkins. This was continued until stigmatic surface started fading. For studying the fruit set within a catkin, one thousand flowers were observed in each catkin.

To study the development stages of fruit after set and extent of post-set fruit drop, female catkins were tagged soon after anthesis and were observed at ten days interval. Six trees, three 'Varikka' and three 'Koozha' were observed, tagging ten fruits in each tree. The relative growth rates of perianth parts and peduncle, and number of spines per cm² were also examined at different stages up to harvest by dissecting five fruits in each stage.

RESULTS AND DISCUSSION

The fruit set under different conditions was significant at 1% level (Table 1). The percentage set was nil for catkins which were excluded from pollination by bagging. Open pollination recorded 83.33% set whereas hand pollination gave only 40% set. The percentage set in individual flowers of a catkin however did not differ significantly.

Under different conditions of pollination. The natural set in 'Varikka' and 'Koozha' also did

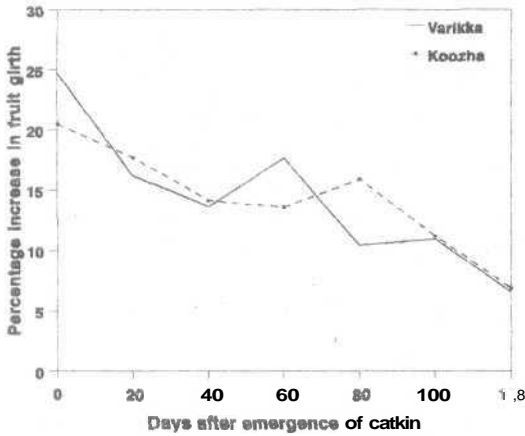


Fig 1. Fruit girth as influenced by days after emergence of catkin

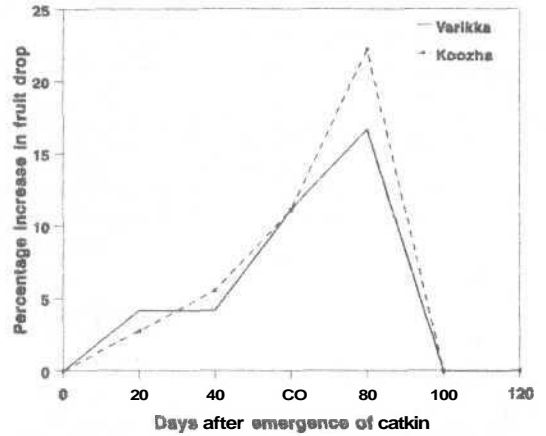


Fig 2. Relationship between fruit drop and days after emergence of catkin

Table 1. Fruit set under different conditions

Sl. No.	Treatments	Fruit set % (whole fruits)	Fruit set in individual flowers within a catkin, %
1	No pollination	Nil	Nil
2	Open pollination	83.33	1.1
3	Hand pollination		
	a) Covered	40.00	0.4
	b) Uncovered	60.00	0.5
	χ^2	6.87*	4.33 ^{NS}

Table 2. Fruit set and fruit drop in 'Varikka' and 'Koozha' types of jack

Jack type	Fruit set %	Fruit drop % after set
Varikka	85	40
Koozha	90	30
χ^2	0.457 ^{NS}	1.31 ^{NS}

not differ significantly (Table 2). Saha (1970) reported 90.3% fruit set in jack which did not deviate appreciably from this report.

Sambamurthy and Ramalingam (1954) reported that hand pollination gave heavier fruits with fuller compliment of flakes contrary to present study where hand pollination gave small irregularly shaped fruits with few flakes. It was observed that stigma of jack was very easily injured by a slight disturbance resulting in browning and drying up of it.

The length and girth of the fruit in 'Varikka' and 'Koozha' at ten days intervals are presented in Table 3. The two types did not differ significantly for the above characters. The time required for the full development of fruit in all the trees studied ranged from 100 to 138 days. The catkin had already attained 20 to 24 per cent girth before emergence, inside the stipules. The growth showed a sigmoid pattern, the rate was rapid up to 80th day, after emergence and thereafter decreased gradually up to harvest (Fig. 1). Measurements of fruit axis, perianth parts and mean number of spines per cm² during stages of development are given in Table 4. The percentages of fruit drop for 'Varikka' and 'Koozha' were found to be 30 and 40 respectively (Table I). The drop was observed

Table 3. Mean fruit length and girth at ten days intervals in 'Varikka' and 'Koozha' types of jack during the development of fruit

Days after emergence of spike	Length, cm			Girth, cm		
	Varikka	Koozha	t* value	Varikka	Koozha	t* value
0	7.80	6.47	2.66	14.10	12.33	0.72
10	11.53	11.20	0.42	18.03	17.40	0.37
20	15.06	13.83	1.06	23.33	22.98	0.69
30	18.93	17.73	0.69	25.76	27.03	1.02
40	21.76	20.93	0.41	31.07	31.53	0.63
50	24.48	23.36	0.50	35.12	54.98	0.15
60	26.18	25.17	0.55	41.14	39.66	0.57
70	30.50	30.50	0.00	45.07	47.93	0.87
80	32.50	33.25	0.48	47.08	49.22	0.69
90	35.55	36.25	0.42	51.38	55.79	1.70
100	39.55	39.12	0.54	53.33	55.96	0.64
110	40.50	42.30	0.42	56.95	59.46	0.66
120	43.00	45.40	0.59	56.95	60.10	0.85

*Not significant

Table 4. Measurement of fruit axis and perianth parts and mean number of spines per cm^2 during stages of development of fruit in jack

Days after anthesis	Maximum diameter of fruit axis, cm	Mean length of perianth, cm				Mean number of spines per cm^2
		Total	Edible portion, flake	Fused portion, rind	Upper free portion, spine	
10	2.2	1.1	0.1	0.5	0.5	13.2
20	2.6	1.4	0.2	0.6	0.6	12.8
30	3.1	2.5	1.0	0.9	0.6	10.8
40	3.8	3.1	1.6	0.9	0.6	9.1
50	6.2	4.0	2.5	0.9	0.6	8.4
60	7.0	4.7	3.0	1.0	0.7	7.4
70	8.0	5.5	3.8	1.6	0.7	7.2
80	9.2	6.5	4.6	1.2	0.7	6.8
90	10.0	7.9	6.0	1.2	0.7	5.8
100	10.0	8.4	6.5	1.2	0.7	5.2

from 30th to 90th day after emergence, with a peak between 60 to 80 days after emergence (Fig. 2). The fruit stalk first showed slight colour change and signs of shrinkage. Later the fruit got detached at the base of the stalk leaving a large scar at the leaf axil.

The competition for nutrients might be held as a possible reason for drop as the peak time for fruit drop and growth rate of the developing fruits were found to coincide. The dropped fruits showed very poor set. Failure of fertilization can also be considered as one of

the reasons for drop. Chandler (1925) while studying the waves of drop in deciduous trees also recognised failure of fertilization and competition for nutrients as the reasons for drop.

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