

Studies on nut set in artificial pollination of coconut (*Cocos nucifera* L.)

Key words: Coconut, artificial pollination, setting percentage

In the root (wilt) disease endemic areas, in the midst of heavily disease affected coconut palms, a number of disease-free and high yielding coconut palms belonging to different varieties namely, West Coast Tall, Chowghat Green Dwarf and Chowghat Orange Dwarf are found.

Artificial pollination was carried out on these selected mother palms located in farmer's plots in four heavily disease affected districts viz. Alappuzha, Kottayam, Pathanamthitta and Kollam. Parental palms were selected based on strict selection criteria (Nair *et al.*, 1996). The mother palms were serologically tested every year to ascertain their disease free nature (Solomon *et al.*, 1983). The number of palms studied per year varied from 25 to 204. Result of the large-scale studies on artificial pollination carried over a period of 12 years (1988-2000) is summarized in this paper.

Utilizing the artificially pollinated progenies generated from resistant/tolerant mother palms of Tall and Dwarf varieties located in hotspots, five nucleus seed gardens consisting of 6044 seedlings have been established in four districts of Kerala for distributing quality planting materials directly to the farmers in the root (wilt) prevalent tract (Nair *et al.*, 2002).

To facilitate artificial pollination of mother palms located in the four districts viz., Alappuzha, Kottayam, Pathanamthitta and Kollam, spread over a distance of 150 kms, two pollen-processing laboratories were set up at Thiruvalla and Kottayam. During the initial three years, a single team consisting of a technical assistant and climber, travelling by scooter, carried out the pollination work. In the subsequent years, the number of teams increased depending on the need. Each team on an average, used to handle pollination of around 30 palms. During the last five years of the study, five to six teams

have carried out the pollination work (Pillai and Rao 1984) from 7 am to 11 am throughout the year, except during the rainy months of June till October. The following crosses were carried out under the breeding programme:

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| 1. WCT (Self/ <i>Inter se</i>) | 2. WCT X CGD |
| 3. CGD (Self/ <i>Inter se</i>) | 4. CGD X WCT |
| 5. COD (Self / <i>Inter se</i>) | 6. COD X WCT |

Setting percentage was calculated on the basis of number of nuts harvested during April to March of each year under study in relation to the number of buttons pollinated during the previous year (April to March).

The average setting percentage was 26.1 and ranged from 14.8 to 38.5% (Table 1.) It can be seen that setting percentage increased over the years, and after 1995-96, an average setting percentage of above 27% was obtained, except in 1998-99 wherein a low setting percentage of only 23.8% was recorded. This low setting percentage can be attributed to the heavy nut shedding due to sudden and widespread outbreak of Eriophyid mite in Kerala (Sathiamma *et al.*, 1998).

Patel (1938) reported a setting percentage ranging from 14.6-31.1 upon natural pollination. Sholdt and Mitchell (1967) reported that artificial pollination was not found to increase the nut set over that by natural pollination. Bourdeix (1999) had also reported that the yield obtained by hand pollination was generally low (20 nuts/palm/year) compared to natural pollination (100 nuts/palm/year). Contrary to the above reports, Pillai and Rao (1984) reported that artificial pollination gave a setting percentage of 40% in comparison to 20-25% obtained upon natural pollination.

The result obtained in this paper is unique by virtue of the fact that such a high volume of crossing involving large number of palms spread over 12 years has not been reported in any previous works. Moreover, the method of pollination is also unique because of the fact that instead of the usual method of carrying out artificial pollination on palms located within the research institutes, as reported earlier, this paper presents the results of studies on artificial pollination carried out in farmer's plots located 20-70 kms outside the research institute.

Table 1. Details of artificial pollination carried out on coconut

Year of pollination*	Number of palms	Inflorescence	Buttons	**Nuts collected	Setting (%)
1988-89	25	88	2481	366	14.8
1989-90	36	225	4740	791	16.7
1990-91	32	135	3058	747	24.4
1991-92	48	230	3818	1300	34.1
1992-93	82	386	7469	1122	15.0
1993-94	109	464	9218	2107	22.9
1994-95	125	546	12173	2480	20.4
1995-96	109	465	10401	3115	30.0
1996-97	196	549	13973	3782	27.1
1997-98	204	707	13922	4917	35.3
1998-99	159	595	14529	3460	23.8
1999-00	164	565	13769	5300	38.5
Total		4955	109551	29487	
General Mean					26.1
C.V%			32.2		
S.E			2.42		

*Data collected from April to March for each year

**Harvested during the next year after pollination

Present investigation will be highly valuable especially for programmes involving artificial pollination of coconut palms in farmer's plots since no such studies have been reported earlier in coconut.

Conclusion

Root (wilt) is a serious disease of coconut in Kerala and also in certain districts of Tamil Nadu. In the disease endemic areas, in the midst of heavily disease affected coconut palms, a number of disease-free and high yielding coconut palms belonging to different varieties namely, West Coast Tall, Chowghat Green Dwarf and

Chowghat Orange Dwarf are found. Artificial pollination on these selected mother palms located in the districts viz. Alappuzha, Kottayam, Pathanamthitta and Kollam were carried out over a period of 12 years from 1988 to 2000. The number of palms studied per year varied from 25 to 204. Results of artificial pollination of 1,09,551 buttons belonging to 4,955 inflorescences are reported in this paper. Setting percentage varied from 14.8 to 38.5 over the years with an average of 26.1.

Considering the high volume of crossing involving a large number of mother palms and long period of study, the results reported in this paper can be considered as conclusive with regard to setting percentage of seed nuts in coconut.

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