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POLLINATION STUDIES IN PINEAPPLE VARIETIES

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Even though pineapple was introduced in South India as early as in 1550 by the Portuguese (Laufer, 1929) its cultivation on a commercial scale started only recently and is confind to 7800 hectares in India of which 2150 hectares are in Kerala. The pineapple breeding work on scientific basis has been taken up only recently (Webber, 1905). Extensive work on this crop has been done in Hawaii. Collins (1968) has reported that pineapple flowers open and shed pollen during early forenoon and wither out during late afternoon under Hawaii conditions. So far there is no published record on any aspects of the floral biology and breeding of pineapple under Indian conditions.

The present study was undertaken at the Pineapple Research Centre, Vellanikkara, Trichur (Kerala) during the main flowering season (December-January) of 1975-76 with the following objectives:– (1) To find out the time of flower opening and anther dehiscence in 'Kew' variety of pineapple. (2) To find out the time interval between various Stages of flower development. (3) To find out the best time for hand pollination in 'Kew' variety using pollen from three other compatible varieties for maximum seed production.

Materials and Methods

To find out the time of flower opening and anther dehiscence, live inflorescence, along with their peduncles were cut from the parent plant before the first flower opened and kept in conical flasks filled with water to which traces of sulphuric acid were added. It was found that the inflorescence kept in this condition remained in active flowering phase for more than two weeks. By this arrangement, the observations on the inflorescence could be taken conveniently during the night hours also. The observations made on the cut inflorescences were later corroborated with the observations made under field conditions.

To find out the time interval between various stages of flower development, twenty plants of 'Kew' variety of uniform age were selected from the bulk plantings. The time taken for the completion of each stage of flower development was noted for each plant.

To find out the best time of hand polination in pineapple for maximum seed production, a total of 537 flowers were crossed at different time intervals from 4.15 a.m. to 11.30 a.m. with pollen from three different pineapple varieties,

viz. Alexandra, Mauritius and Ripley Queen. Reciprocals were also tried on a limited scale.

The crossing technique in pineapple is very simple since emasculation is unnecessary due to the existence of self incompatibility in most of the varieties (Collins, 1968). The technique consisted of covering the inflorescence of the female plant with a cloth or polythene (punched with a needle all over the surface) bag before the flowers open. On every following morning at the chosen treatment time, anthers were collected from the flowers of protected inflorescence of male parent plants and brushed them on the stigmatic surface of the opened flowers of the female parent using a pair of forceps. In order to facilitate easy and thorough dusting of the pollen on the stigma, one of the three petals is pulled out or bent down, The crossed flowers in an inflorescence is marked by clipping the tips of the subtending bract which will help to locate the position of seeds during seed extraction.

Results and **Discussion**

1. *Time of flower opening and anther dehiscence in 'Kew' variety of pineapple*

Time of flower opening in 'Kew' variety under Trichur condition was found to be between 4-15 a m and 5 a m The flowers were found to remain open till 4 p m and then starts withering. The results from the pollination trials later showed that the time of anther dehiscence coincides with the time of flower opening.

2. *Time interval between various stages of flower development*

The retults are tabutated below:-

Tabie 1

Periods between stages of flower development	Mean duration (days)
1. Colour change around apical bud and inflorescence bud appearance	5.90
2. Bud appearance and first flower opening	17.70
3. Number *of* flowers opened per day	6 54
4. First flower opening to last flower opening (Flowering period)	12.05
5. Last flower opening to fruit harvest	95.96

According to Kerns *et al* (1936) the average duration of flowering in an inflorescence is 26 days and the time interval between last flower opening and fruit harvest is 109 days under Hawaii conditions. In the present study it is seen that the periods between different stages of flower and fruit development is considerably shorter under Trichur conditions.

The first external symptom of flower development is the appearance of a reddish colour at the base of the leaves (inside the cone) near the apical bud. The inflorescence bud appears about one week after this colour change. The interval between bud appearance and the first flower opening is 15-20 days. The number of flowers which open each day vary from 4 to ! 1 and rarely upto 15. The flowering in one inflorescence continued for 10-15 days depending on the total number of flowers in an inflorescence which vary from 100-180. The interval between the opening of the last flower and the fruit harvest was found to be 85-110 days.

3. Best time for hand pollination

The results are summarised in Table-2.

Maximum number of crosses were done on 'Kew' variety using pollen from Ripley Queen. Eleven different time intervals varying from 4.15 a m to 11-30 am were tried in these crosses. The mean seedset per cross obtained for different time intervals of pollination tried are summarised in Table 3

Table 2

Cross combination	Time of pollnation	No. of flowers crossed	No. of seeds obtained	Mean Seed set per cross
Alexandra x Kew	10 15 a m to 11.30 a m	14	30	2.14
Kew x Alexandra	10.15 a m to 10.30 a m	25	55	2.20
Mauritius x Kew	9.15 a m to 9.30 a m	19	38	2.00
Kew x Mauritius	4.30 a m to 9.30 a m	129	260	2.01
Ripley Queen x Kew	7.10 a m	11	6	0.54
Kew x Ripley Queen	4.15 a m to 11.30 a m	339	522	1.54

Table 3

Time Interval	Mean number of seeds obtained per cross
4.15 a m to 1,30 am	1.73
6.30 a m to 6.45 am	1.97
7.00 a m to 7..15 am	2,46
7.30 am to 7.45 a m	1.06
8.00 a m to 8, 15 a m	1.70
X. 10 am to 8,45 a m	1.12
9.00 a m to 9. 15 a m	1.68
9.30 a m to 9 45 a m	1.67
10.00 a m to 10 15 a m	1.81
10.30 a m to 10 45 a m	2.49
11.00 a m to 11,30 a m	0.54

C. D, (.05) for comparison between the mean values = 1.68.

The statistical analysis of the data showed that there is no significant difference in seed production due to time intervals chosen for hand pollination upto 10-45 a m But the seed production was significantly reduced when hand pollination was done after 10.45 a m So it is concluded that hand pollination in pineapple can be done conveniently at any time during morning hours from 4.15 a m to 10.45 am for maximum seed production.

Summary

A study was undertaken using four varieties of pineapple to find out the time of anther debiscence and flower opening, time interval between various stages of flower development and best time of hand pollination for maximum seed production. i he time of flower opening and anther dehiscence in 'Kew' pineapple was found to be between 4.15 a m and 5 a m The time interval between various stages of flower development was studied and found to be much shorter than those observed under Hawaii conditions. The results from the pollination trialshave shown that hand pollination in 'Kew' variety of pineapple using pollen from three other compatible varieties can be successfully done at any time between 4.15 and 10.45 a m.

സംഗ്രഹം

കേരള കാർഷിക സർവ്വകലാശാലയുടെ ആസ്ഥാനമായ വെള്ളാനിക്കരയിലെ കൈതച്ചക്ക ഗവേഷണ കേന്ദ്രത്തിൽ കൈതച്ചക്കയുടെ പരാഗണത്തെക്കുറിച്ചുള്ള പഠനം 1975–76-ാം ആണ്ടിൽ നടത്തപ്പെട്ടു.

rnoej" കൈതച്ചക്ക ഇനങ്ങളിലെ പൂക്കളിൽ ഫുല്ലന്നം, വിടരൽ, പുങ്കലവികാസം പരമാവധി വിത്തുല്പാദനത്തിന യോജിച്ച കൃത്രിമ പരാഗണ സമയം എന്നിവ നിരീക്ഷിച്ചതിൽനിന്നും താഴെ കൊടുത്തിട്ടുള്ള നിഗമനങ്ങൾ ലഭ്യമായി.

'ക്യൂ' ഇനത്തിൽ ഫു ം 4.15 മുതൽ 5 മണി വരെ നടക്കുന്നു. ഏറ്റവും കൂടുതൽ കൈതച്ചക്കകൃഷിയുള്ള ഹവായ് ദ്വീപിനെ അപേക്ഷിച്ച് പുങ്കലവികാസ സമയത്തിന്റെ കാലദൈർഘ്യം കേരളത്തിൽ കുറവാണ്. കൃത്രിമ പരാഗണം രാവിലെ 4.15 മുതൽ 10.45 വരെ നടത്തുകയാണെങ്കിൽ കൂടുതൽ വിത്തുകൾ ലഭ്യമാക്കാം. വിത്തുൽപ്പാദനത്തിൽ ക്യൂ × മൊറീഷ്യസ്, ക്യൂ × റിപ്പ്ളീക്യൂൻ എന്നീ സങ്കരണങ്ങൾ മികച്ചതായിക്കണ്ടു.

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