

OBSERVATIONS OF THE FLOWERING AND FRUCTIFICATION OF THE GROUNDNUT, *ARACHIS HYPOGAEA* ¹⁾

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SUMMARY

Plants of the Schwarz 21 variety were grown at Buitenzorg (Java) in pots with sterilised soil and in the open to determine whether these plants would show any differences in behaviour as regards flowering and fruitsetting. It was found that the flowering cycle of the plants was little effected by variations in climatic conditions and by differences in growing space. The last factor, however, did have effect with the incidence of fruiting.

INTRODUCTION

The experiments described below were undertaken with the object of investigating the flowering pattern and incidence of fruiting in the Schwarz 21 variety, a pure strain of the Spanish (bunch) type. Although this variety showed a high degree of resistance to bacterial wilt (*Pseudomonas solanacearum*) there were always a number of plants affected by this disease at the heavily infected site of the Annuals Section of the Buitenzorg General Agricultural Experiment Station. It was found possible to prevent this by growing the plants in pots of soil which had been sterilized with steam. The object was to examine whether these plants would differ appreciably as regards behaviour, flowering and fruiting from plants growing in the open. Three experiments were conducted, each with a series of 10 plants. The first and second series were planted in pots of sterilized soil on 18th November and 12th February respectively, viz. at the beginning and end of the rainy season, and the third series was planted in the open on 25th June, in the middle of the dry season. Every morning at 7 a.m. a count was made of the flowers which had just appeared on each plant. The pods were harvested when most of the plants began to show distinct signs of withering. By this means the growing seasons of the three series were found to be 105, 106 and 101 days respectively.

RESULTS

The plants of all three series were harvested individually, and in the case of each plant we not only made a count, as mentioned above, of the numbers of flowers appearing, but estimated the length of the entire flowering season, the length of the main flowering period, the fruiting percentage and the total numbers of pods. The results are listed in table 1.

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Table 1 Results of individually harvested plants of three series.

First series					
Plant No.	Number of flowers	Length of flowering period in days	Main flowering period in days	Total no. of pods	Fruiting percentage
1	58	28	17	18 (6)	31.0
2	51	19	14	23 (7)	45.1
3	38	22	14	11 (4)	29.0
4	48	15	14	11 (6)	23.0
5	58	21	14	7 (5)	12.0
6	67	27	19	27 (6)	40.3
7	51	16	13	25 (7)	49.0
8	51	17	13	17 (8)	33.3
9	50	14	13	19 (8)	38.0
10	47	17	16	10 (8)	23.0
Average	52	19.6		14.7	32.3
Second series					
1	49	18	16	19 (10)	38.8
2	29	17	17	23 (9)	44.8
3	39	17	17	13 (8)	33.3
4	52	18	18	18 (8)	34.6
5	48	20	20	10 (8)	20.8
6	43	16	13	11 (10)	25.6
7	43	25	14	13 (8)	30.2
8	40	18	15	14 (7)	35.0
9	43	16	16	10 (9)	23.3
10	48	19	19	11 (8)	28.9
Average	43.4	18.4	16.5		31.5
Third series					
1	42	17	14	22 (11)	52.2
2	62	16	16	24 (13)	38.7
3	39	14	14	26 (13)	66.6
4	61	19	15	19 (9)	31.1
5	69	18	15	29 (17)	42.0
6	49	15	12	22 (14)	44.9
7	73	28	18	36 (18)	49.3
8	48	14	14	23 (14)	47.9
9	30	15	15	17 (11)	56.6
10	31	18	14	25 (15)	80.6
Average	50.4	17.4	14.7		51.0

The numbers in () refer to the number of ripe pods.

Inspection of these results reveals that although the three series were grown under very divergent conditions there was no marked difference in their behaviour, which is all the more surprising when it is considered that in the first series there were three plants to a pot and in the second series two plants to a pot, while in the third series planted in the open single plants were grown at the usual 15 × 30 cm interval. Some difference is reflected in the higher fruiting percentage. It is noticeable that in the first and third series there is so little difference between the mean numbers of flowers produced by each plant, and that there is also no spectacular difference in the mean duration of the flowering season in all series. But when we consider the indi-

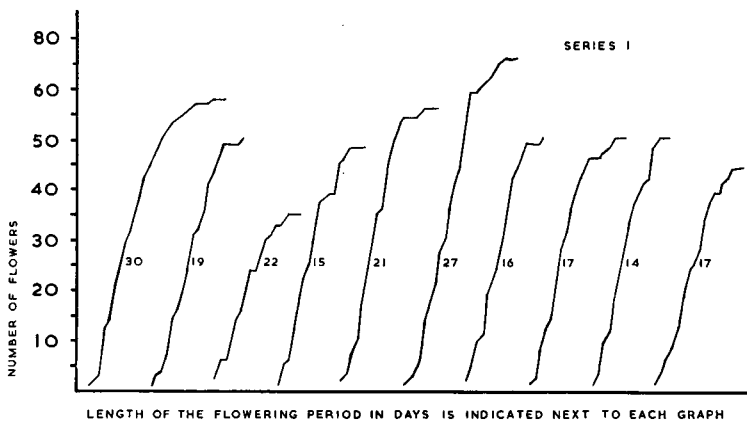


FIG. 1

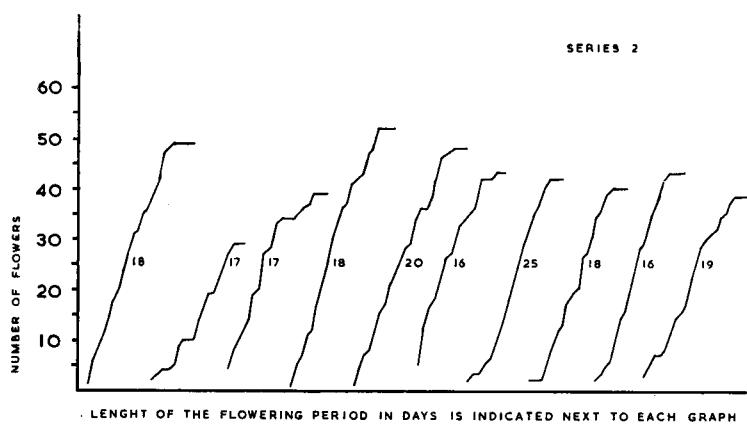


FIG. 2

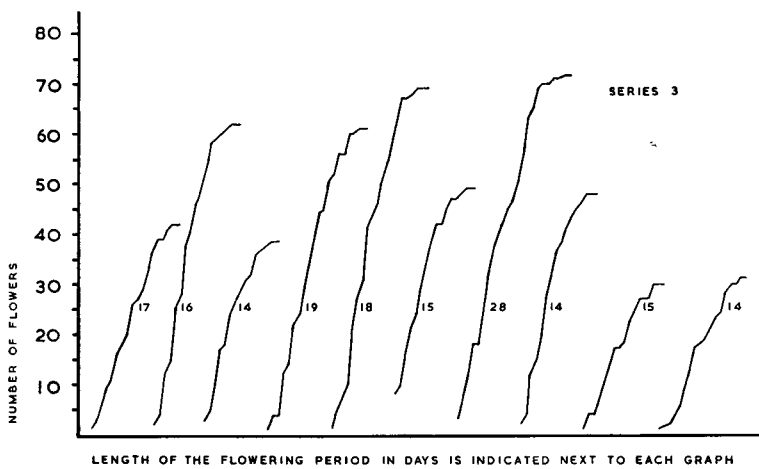


FIG. 3

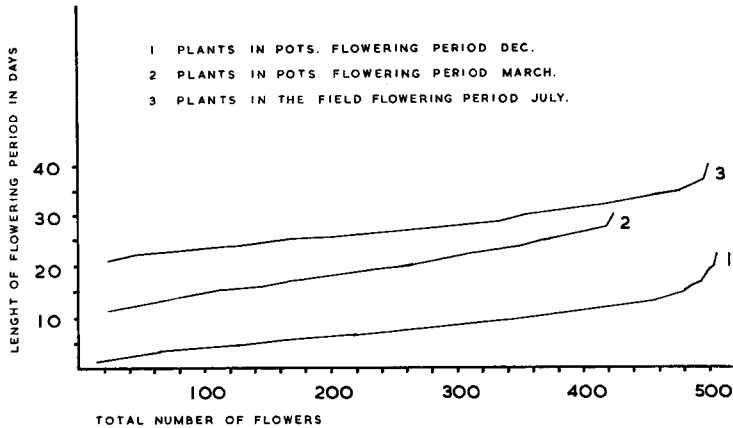


FIG. 4

vidual plants we discover some fairly noticeable differences within the series. No explanation has been found for this.

The cumulated mean numbers of flowers produced by each plant were shown in the form of curves, following the method adopted by SMITH. The curves for the three series are shown in Figs. 1, 2 and 3. It can be seen at a glance that the curves of the first series are much more consistent than those of the second and third. Apparently the more restricted space in which the plants have to grow allows them less opportunity to develop their individual differences. But in all series the curves are substantially of the same pattern, viz. a rapid rise, followed by a certain moment at which there is an abrupt decline in the numbers of flowers produced and flowering comes to an end. It would seem that the inhibition of flowering by fruiting (cf. FORTANIER) is then felt to the fullest extent.

Curves were also drawn representing the cumulative totals for each series of plants. These are shown in Fig. 4. It can be clearly seen that in these three series the flowering pattern is practically the same, except that in the second series the total numbers of flowers produced are less than those of the other two series.

The mean, daily numbers of flowers produced in each series, calculated over the entire flowering season, are 2.6, 2.4 and 2.9 respectively, and 3.5, 2.6 and 3.4 respectively when calculated during the peak flowering period. In this respect the second series is clearly inferior to the others.

DISCUSSION

Comparison of the results with those obtained by other writers is hardly possible as the latter worked either in different climates or with other varieties. They drew no curves representing cumulative totals, nor is it possible to construct such curves in the absence of detailed statistical material.

THEUNE found, however, that in a temperate climate his flowering plants produced 3-4 flowers a day, but he obtained no ripe pods. According to this

writer, Richter established by means of counts that his plants flowered for an average period of 62 days, the mean flower production being 60.6.

SHIBUYA planted a bunch type in Japan on 23rd April and 23rd May. His first planting flowered for 87 days, his second 93 days, and in the following year he found that the flowering season lasted 69 days with a daily average of 4.68 flowers per plant. Unfortunately no cumulative curves can be constructed from his data. He found a fruiting percentage of about 30. According to BOUFFIL flowering begins three weeks to a month after planting and continues until harvest-time. At Buitenzorg it was normal for flowering to begin 30 days after planting; the possibility of prolonged flowering was present, but generally only realised at the peak of the rainy season. BOUFFIL also distinguishes four stages of flowering, viz. a gradual beginning, followed by a rapid increase, and then a high flowering frequency followed by a rapid decrease. These four stages could not be recognized at Buitenzorg. After a brief starting period floral production rapidly reaches its peak, and in the final stage decreases again rapidly. Hence not more than three stages are to be distinguished at the most. On the basis of experiments carried out at Paris and in Sénégal BOUFFIL comes to the conclusion that "climatic conditions have no effect whatever on the flowering of *Arachis*". This conclusion is, in fact, confirmed by the results given in support. It is to be regretted that BOUFFIL did not present his flowering curves in the form of cumulative curves, as this would have enabled a better comparison to be made. No correlations were found by BOUFFIL between numbers of flowers, duration of flowering and fruiting percentage. At Buitenzorg a correlation was only found between the numbers of flowers produced by a plant and the length of its flowering time.

As indicated earlier, SMITH was the first to draw curves showing the cumulative flower production of *Arachis*. Since, however, he worked with a Runner variety his curves are not comparable with those of Buitenzorg. The gradual rise in these curves is more in agreement with the observations made by BOUFFIL. According to SMITH 13.5 per cent of the flowers produced mature pods, a figure which agrees with BOUFFIL's data but which is greatly exceeded by the Buitenzorg plants even when the latter were planted three to a pot.

CONCLUSIONS

In common with what is stated in the literature on the subject, it was also found at Buitenzorg that the flowering cycle of the groundnut was little affected by variations in climate or differences in growing space, although the latter did have an effect on the incidence of fruiting. Hence in order to study the flowering phenomena it was possible at Buitenzorg to grow plants in pots of soil which had been sterilized with steam. This prevented any losses from bacterial wilt and at the same time the plants could be observed under considerably better conditions.

A gradual onset of flowering such as was observed by BOUFFIL and SMITH in the varieties employed by them was not noticed at Buitenzorg in the Schwarz 21 variety.

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