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## VARIETAL VARIABILITY IN PRODUCTIVITY AND DEVELOPMENT OF *ARACHIS HYPOGAEA* L.

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Intensity of flowering increases with habit in the order of bunch, semi-spreading and spreading. Efficiency in productivity is conditioned by the interaction of fertility coefficient and flowering intensity at distinct phases in each variety. Bunch and to some extent semi-spreading experience a critical stage at peg formation phase while spreading faces a critical stage at immature pod development.

### INTRODUCTION

The species of *Arachis* are characterised by aerial flowers and subterranean fruits and the nature or exact development of pods cannot be predicted and thus it has earned

the name "unpredictable legume". The research on intervarietal hybridisation have shown the existence of genotypic as well as cytoplasmic differentiation among the varieties of the cultivated species of *Arachis hypogaea* L. The problem of reproductive

efficiency of the cultivars *vis-a-vis* productivity has not been resolved satisfactorily and in this context an understanding of the developmental process of pods from flowering and their inter-relationships in discriminating varieties appear necessary in the choice of parents in programmes of improvement by breeding. The significance of serial flowering and subterranean fruit formation in groundnut has been described in detail by Smith (1950). Muhammad and Dorairaj (1969) studied the reproductive efficiency and reported that TMV 2, a bunch variety, had a greater reproductive efficiency with low fertility co-efficient of 4.1. Muhammad *et al.* (1970) concluded that the yield of pods was high and the reproductive efficiency was also high due to low fertility co-efficiency and more number of flowers. Jayamohan Rao *et al.* (1975) concluded that spreading types have higher number of pods, pod weight than bunch types. Enyi (1977) was of the opinion that pod yield in groundnut depended largely on the number of pegs formed and the proportion of pegs to mature pods.

#### MATERIAL AND METHODS

The experiment was conducted in a red loamy soil at Millet Breeding Station, Tamilnadu Agricultural University, Coimbatore, during the year 1977. Twelve cultivated groundnut varieties representing six bunch

(TMV 2, TMV 9, B 131, Ah 8068, Gangapuri and Pollachi Red,) three in each of semi-spreading and (TMV 8, TMV 6 and TMV 10), and spreading (TMV 1, TMV 3 and TMV 4) were used as the experimental material. The NPK fertilizer was incorporated into the soil by broadcast at the rate of 15:30:45 kg/ha before sowing. The experiment was laid out in a randomized block design provided with three replications. The conventional techniques were followed for the various parameters reported in the results.

#### RESULTS AND DISCUSSION

##### Productivity :

Productivity and development is yet another limb in the aspect of "sink" and the nature of its regulation and consolidation determines yielding potentiality. Flower production changes in its intensity from "gradual" in bunch to "steep" in semi-spreading and to "very steep" in spreading (Table 1). Smith (1950) found in *Virginia* species that not more than 13.5 per cent of flowers formed mature pods. This works out to 7.4 as fertility coefficient namely, the number of flowers to form one pod has been evaluated at close intervals. A low value of fertility co-efficient augers well for pod development and this trend is to be studied in juxtaposition to flower production.

TABLE 1. Progressive Changes in the Number of Flowers per Plant in Six Bunch, Three Semi-Spreading and Three Spreading Varieties of Groundnut.

Variety	Days after sowing						
	50	60	70	80	90	100	110
<b>Bunch</b>							
TMV 2	56	60	70	83	93	96	—
TMV 9	50	59	64	72	88	93	—
B 131	70	77	79	80	92	96	—
Ah 806B	58	64	70	79	91	97	—
Gangapuri	51	56	60	61	65	72	—
Pollachi Red	50	56	57	60	68	71	—
<b>Semi-spreading</b>							
TMV 6	33	63	90	115	141	162	172
TMV 8	53	91	125	160	112	203	213
TMV 10	45	61	77	99	131	164	172
<b>Spreading</b>							
TMV 1	57	103	141	183	223	257	278
TMV 3	44	90	125	163	199	233	253
TMV 4	36	67	93	129	176	224	260

The bunch varieties show a feeble decline in fertility co-efficient showing that the later formed flowers do not contribute to pod formation or development. In contrast, semi-spreading shows a marked decline in fertility co-efficient and coupled with steep increase in flower production points out to be a better and efficient turnover in pod production. In the spreading varieties a low fertility co-efficient though prevails at a later stage only for a short period, the increased flower production augments productivity equally appreciably and recorded a higher yield (Table

2). The efficiency in productivity is thus a function of intensity of flowering and is associated with low fertility co-efficient at a particular point of time and at distinct phases. Fortanier (1957) observes that the presence of fruits has an inhibiting effect on the flowering of *Arachis*.

A critical evaluation of bunch varieties manifested two distinct groups within the bunch habit with reference to flower production and its association with yielding potentiality. The six bunch varieties comprise four profuse flowering types

(TMV 2, TMV 9, B-131 and Ah 8068) and two (Pollachi Red and Gangapuri) not so profuse flowering types clearly indicated that there was no

direct association between flower production and mature pods production.

TABLE 2. Progressive Changes in the Flower-pod Ratio (Fertility Co-efficient) in Six, Bunch Three Semi-spreading and Three Spreading Varieties of Groundnut.

Variety	Days after sowing						
	50	60	70	80	90	100	110
<b>Bunch</b>							
TMV 2	6.05	4.32	5.41	5.65	3.69	4.64	—
TMV 9	5.60	6.27	4.58	3.43	3.17	3.27	—
B 131	5.35	4.80	5.48	4.89	7.24	3.83	—
Ah 8068	8.73	6.37	8.44	4.47	3.26	4.14	—
Gangapuri	4.15	4.34	4.72	5.91	3.89	3.64	—
Pollachi Red	4.45	4.51	4.16	3.85	3.77	3.38	—
<b>Semi-Spreading</b>							
TMV 6	25.06	31.69	20.77	23.09	6.77	7.82	7.94
TMV 8	39.79	36.51	7.99	7.23	3.51	6.56	5.79
TMV 10	8.49	11.37	7.48	12.89	7.72	7.45	7.47
<b>Spreading</b>							
TMV 1	17.10	44.42	24.83	12.23	8.59	8.48	10.43
TMV 3	6.95	22.57	20.91	15.77	4.48	5.10	4.78
TMV 4	6.91	33.49	13.35	10.77	5.43	6.92	7.03

The variety TMV 9 lowest in rank among 'profuse' flowering group has yielded maximum mature pods. TMV 2 with its rank flowering has not maintained its ranking in pod production. TMV 9 is outstanding when immature pods are also added and the characteristic feature of superiority of TMV 9 is revealing by a break-up-of productivity ratio with

its low peg/pod ratio and low fertility co-efficient. In the semi-spreading group also TMV 6 has yielded more mature pods despite high peg/pod ratio. In spreading group TMV 3 despite low ranking in flower production among the group has yielded largest number of mature pods (Table 3).

TABLE 3. Progressive Changes in Development of Total Pods Per Plant in Six Bunch Three Semi-spreading and Three spreading Varieties of Groundnut.

Variety	Days After Sowing								
	50	60	70	80	90	100	110	120	130
<b>Bunch</b>									
TMV 2	9	14	13	15	25	21	—	—	—
TMV 9	9	9	14	21	28	28	—	—	—
B 131	13	16	14	16	13	25	—	—	—
Ah 8068	7	10	8	18	28	23	—	—	—
Gangapuri	12	13	13	10	17	20	—	—	—
Pollachi Red	11	12	14	16	18	21	—	—	—
<b>Semi-Spreading</b>									
TMV 6	1	2	4	5	21	21	22	27	—
TMV 8	1	2	10	14	37	25	30	35	—
TMV 10	5	5	10	8	17	22	23	28	—
<b>Spreading</b>									
TMV 1	3	2	6	15	26	30	29	43	30
TMV 3	6	4	6	10	44	46	53	45	26
TMV 4	4	2	7	12	32	32	37	46	40

**Development :**

Efficiency in pod production *vis-a-vis* pod development appears to be a specific characteristic of varieties as well. TMV9 and Ah 8068 show high value for number of pods, at the later stage of flowering pollachi Red shows high value beyond 60 days. B 131 shows highest value between 90 and 100 days while TMV 2 shows two peaks one at 60th day and other at 90th day. Such a wide difference attends on bunch habit. In the semi-spreading group TMV 6 and TMV 8 show a higher values between 80 and 90 days while TMV 10

clearly shows a steady and continuous phase of pod development from the beginning. In the spreading type TMV 3 has a short phase between 80 and 90 days for pod development but TMV 4 is quite uneven with a short rise around 70 days. TMV 1 also shows an uneven trend with a reduced tempo compared to TMV 4 (Table 3). Thus, pod development or its failure appears quite complex and fertilization failure may extend for pollen viability to embryo abortion. A critical review by Umen (1976) on biology of peanut flowering is revealing and helps in recognizing

over: simplified understanding of flowering in groundnut. Flowers arranged high on the plant (bushy form) give fertilized ovaries. But the last

ones fail to reach the most soil and therefore do not develop pods; they hang in the air at the tip of the dark violet gynophores.

TABLE 4. Percentage Distribution of Mature, Immature, Total Pods, Pegs Unfertilized and Fertilized Flowers Per Plant in Six Bunch, Three Semi-spreading and Three Spreading Varieties of Groundnut (at harvest stage)

Variety	Pods			Flowers		
	Mature	Immature	Total	Pegs	Unfertilized	Total fertilized
TMV 2	18.02	3.46	21.48	32.79	45.73	54.27
TMV 9	20.01	2.53	22.54	29.67	47.79	52.21
B 131	10.88	1.74	12.62	22.89	64.49	35.51
Ah 8068	14.90	3.21	18.11	40.24	41.65	58.35
Gangapuri	13.38	2.89	16.27	42.44	41.29	58.71
Pollachi Red	14.97	3.33	18.30	34.35	47.35	52.65
TMV 6	9.43	7.23	16.66	47.11	36.23	63.77
TMV 8	5.89	4.73	10.62	36.42	52.96	47.04
TMV 10	8.56	6.68	15.24	33.68	51.08	48.92
TMV 1	4.41	3.40	7.81	31.26	60.93	39.07
TMV 3	5.27	3.40	8.67	39.45	51.88	48.12
TMV 4	4.11	3.49	7.60	41.56	50.84	49.16

Reproductive efficiency considered at harvest stage is yet another criterion which gives a comparative idea of percentage of fertilized flowers and percentage of mature pods irrespective of intensity of flowering. Accordingly bunch gives more percentage of pods (10.8-20.02), semi-spreading low (5.89-9.43) and spreading very low (4.11-5.27). At varietal level more than fifty per cent of flowers are fertilized in bunch with a solitary exception in B 131

presenting a low degree of fertilization. Judged under this criterion TMV 9 is outstanding followed by TMV 2. Semi-spreading shows a comparatively low degree of fertilized flowers except TMV 6 which is unusually high in percentage. Incidentally percentage of mature pods also is high in TMV 6. Spreading varieties shows a low percentage of fertilization and percentage of mature pods is still far less. TMV 3 stands out superior among the groups (Table

4). Judged for many aspects TMV 9 among bunch, TMV 6 among semi-spreading and TMV 3 among spreading possess all desirable features leading to increased yielding poten-

tiality. Yield is thus governed by a complex interaction where by flower production is governed by percentage of fertilization and efficiency in pod development.

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## EFFECT OF PYRITES AND FERTILIZER ON YIELD OF RICE IN A CALCAREOUS ALKALI SOIL\*

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An experiment was conducted on Tirhut Agricultural College Farm, Dholi [Muzaffarpur], Bihar during *kharif* seasons of 1974 and 1975 to find out the effect of pyrites and fertilizers on growth and yield of rice. The treatments consisted of five levels of pyrites [0, 1.5, 3.0, 4.5 and 6.0 tonnes/ha] allotted to main plots treatments and five levels of fertilizers [0, 25, 50, 75 and 100 per cent of the recommended dose of NPK] in the sub-plots. The test varieties were IR 20 during 1974 and Sita in 1975. The maximum grain yield and net return was obtained with the application of 1.5 t/ha of pyrites during 1974 and 1975. Grain yield and net return was maximum with 100 per cent recommended dose [100 N, 60 P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O kg/ha] of fertilizers. Interaction was not significant.

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