https://doi.org/10.29321/MAJ.10.A03742

Studies on the Time of Sowing on the Growth and Yield of *Arachis hypogaea* L.

by

S. GOPALAKRISHNAN[1], S. VARISAI MUHAMMAD[2], L. ARUNACHALAM[3] and L. VEERANNAH[4]

Introduction: Many crop plants are sensitive to season and these so-called season-bound crops are grown successfully or otherwise depending on the climatic factors obtainable. In general, the sum total of factors do not vary over a wide range within a season but the weather conditions obtainable during the period of crop growth is of paramount importance in the agronomy of a crop. In the absence of irrigation facilities, there is a shift in the sowing schedule depending upon the receipt of adequate rainfall. With uncertainities of rainfall, there has necessarily to be a delay in sowing and how far the 'late' sowing affects the growth and yield of a crop is an important knowledge in practical agriculture. A systematic study on the varied aspects implied in or consequent on 'late' sowing was taken up in groundnut.

Material and Methods: Two strains *viz.*, spreading (TMV 1) and bunch (TMV 2) were tested in randomized replicated plots, with a spacing of 12″ x 12″ and 6″ x 6″, respectively in a field with a soil pH of 8.5. The field received no manure or fertilizer. Four fortnightly sowings commencing from June 30, 1965 were made. Net assimilation rate (NAR) as devised by Gregory (1917) and West, Briggs and Kidd (1920) and also Watson (1947) were adopted and it was evaluated from plant samples from time to time from the respective treatment plots. Time of flower initiation as well as cessation was assessed out of a sample of 30 plants among the population by Bartlett's index. Duration of flowering was derived from these values. Data on pod production were gathered from these samples (Table 1). Care was bestowed regarding adequate irrigation and removal of weeds. Yield of pods per plot was recorded in all the treatments at the end of the experiment (Table I). Data on the hours of sunshine, rainfall and maximum and minimum temperature were also compiled (Table 2).

---

[1] Plant Physiologist. [2] Oilseeds Specialist, [3] Assistant in Oilseeds and [4] Assistant in Physiology, Agricultural College and Research Institute, Coimbatore - 3.

Received on 25—4—1967.

TABLE 1: *Effect of 'Late' Sowing on Flowering and Pod Development in Groundnut.*

	TMV 1 Date of sowing				TMV 2 Date of sowing			
	30/6	15/7	31/7	15/8	30/6	15/7	31/7	15/8
Number of days for flower emergence	47	47	51	49	36	36	46	45
Number of days for flower cessation	121	107	94	83	70	71	75	69
Flowering duration	74	60	43	34	34	35	29	24
Flower production per plant	297	230	168	111	146	69	92	75
Mean flower production per day	4·02	3·83	3·91	3·26	4·29	2·26	3·40	3·13
Total number of pods per plant	11·3	8·2	6·3	8·0	7·8	7·0	6·2	8·4
Percentage of mature pods	60·2	73·2	57·2	50·0	60·3	38·6	51·6	56·0
Yield in grams/plot	181·6	185·0	180·0	91·0	156·3	211·5	207·0	169·1

TABLE 2: *Data on Factors of Climate.*

Particulars	Total hours of sunshine	Percentage	Rainfall in mm.	Maximum temperature °F (mean)	Minimum temperature °F (mean)
June, 1965 ...	208·6	57·94	1·8	89·6	73·8
July, 1965 ...	174·3	46·86	36·6	87·2	71·6
August, 1965 ...	199·7	53·68	22·1	88·4	71·8
September, 1965 ...	220·6	61·28	51·3	90·2	71·5
October, 1965 ...	204·7	55·00	48·3	89·5	71·5
November, 1965 ...	193·2	53·67	80·8	87·1	70·4
December, 1965 ...	202·6	54·46	120·9	82·2	66·8

Experimental Results: *The effect of time of sowing on net assimilation rate (NAR) with reference to climatic factors in groundnut strains:* Rainfall, hours of sunshine and maximum and minimum temperature comprised the factors of climate examined and are presented along-side the trends of net assimilation rate with varying time of sowing (Fig. 1).

The monthly rainfall gradually increased from 0 to 121 mm during the conduct of experiment between June 30 to December 31, 1965. Hours of sunshine declined from 209 to 174 and gradually rose to a peak value of 221 at the end of September and then again declined. The ranges of maximum and minimum temperatures were 82.2 — 90.2°F and 66.8 — 73.8°F and the difference was on the increase between July and September.

The net assimilation was high in both TMV 1 and TMV 2 during the crop growth when the time of sowing was on 15th July. During other times of sowing the difference cannot be said to be appreciable. The net assimilation rate itself had been of a higher order in TMV 2 than TMV 1 in all sowings.

Effect of time of sowing on flowering and pod-production in groundnut strains: 'Late' sowing had not appreciably postponed flower initiation in TMV 1 compared to TMV 2. It had, however, induced earlier cessation of flowering in TMV 1 while no such effect was seen in TMV 2. Thus TMV 1 and TMV 2 strains are affected differently by 'late' sowing as regards floral initiation and cessation (Table 1, Fig. 2).

'Late' sowing reduced flowering duration from 74 to 34 days in TMV 1 and from 35 to 24 days in TMV 2, and flower production from 297 to 111 and from 146 to 75 in TMV 1 and TMV 2, respectively. Thus the reduction in flowering duration and flower production was more pronounced in TMV 1 than in TMV 2. The mean number of flowers produced per day was however, not affected in TMV 1 but fluctuated wide enough in TMV 2. In the matter of pod production also 'late' sowing depressed the yield particularly in TMV 1. The data of pod-production are presented (Fig. 3). The number of mature pods per plant declined markedly in TMV 1 while no such specific effect was seen in TMV 2. However, in the nature of immature pods in the plant, identical trend was noticed in both TMV 1 and TMV 2 registering a minimum when the time of sowing was on the 15th July. A reciprocal trend in pod yield in grammes per plot was obtained in both TMV 1 and TMV 2, the maximum yield having been obtained in both TMV 1 and TMV 2 with July 15th as time of sowing. 'Late' sowing brought down the value to 50 per cent of the maximum in TMV 1 while it was 80 per cent in TMV 2.

Discussion: The impact of four components of climate on NAR has been wide and varied. Both rainfall and hours of sunshine have modified NAR appreciably compared to maximum and minimum temperatures. The periods of medium rainfall and maximum hours of sunshine coincide with the highest NAR with the time of sowing on July 15th.

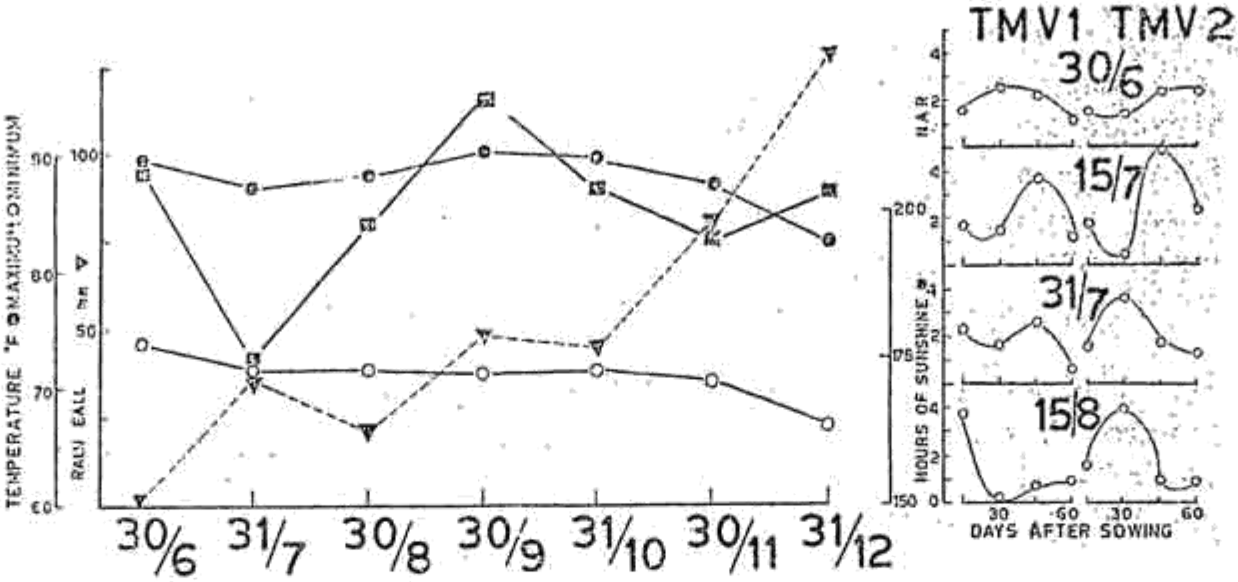

FIG.1 FACTORS OF CLIMATE AND NAR

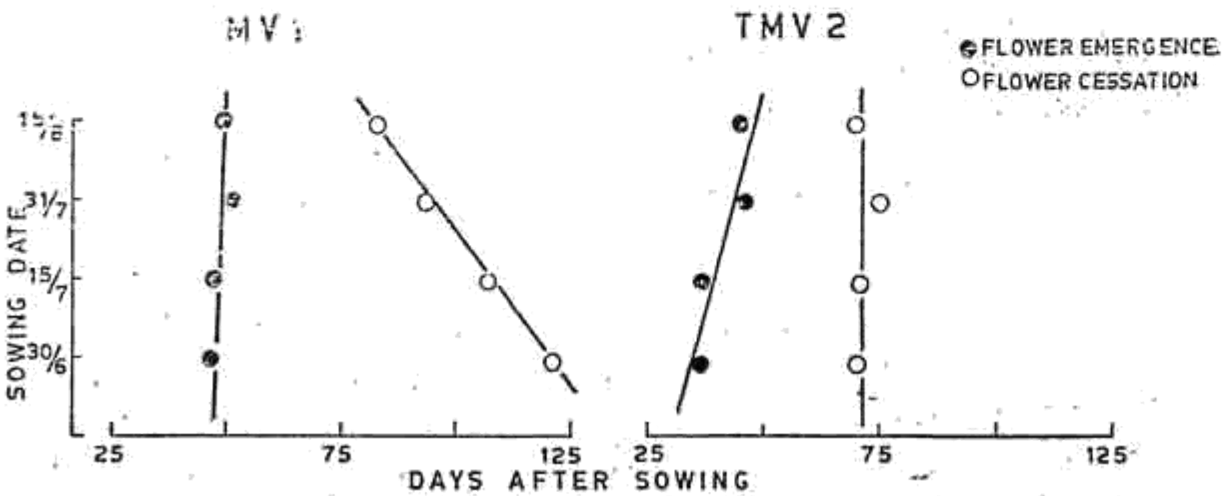

FIG.2 EFFECT OF LATE SOWING ON FLOWERING IN GROUNDNUT

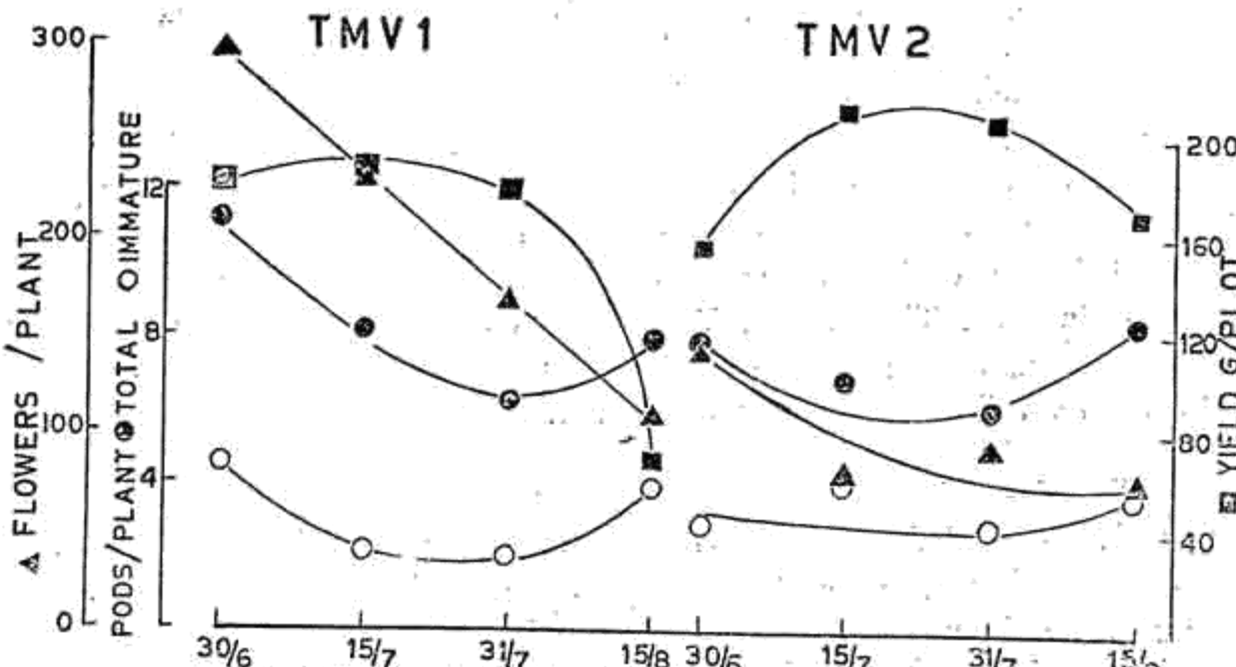

FIG.3 EFFECT OF LATE SOWING ON GROUNDNUT YIELD

Groundnut is susceptible to wide ranges of daily mean temperature (Fortanier, 1957). A combination of high nycto-temperature (35°C) and day temperature (30°C) produces maximum dry matter and stem length while a similar combination with low nycto-temperature (20°C) with the same day temperature (30°C) is not so effective showing the essentiality of high nycto-temperature for groundnut. Again, the minimum range of temperature as a factor in the maximum dry matter production is established in these studies. That the range of temperature affects NAR differently with different species has been demonstrated by Watson (1947) in potatoes where NAR increased with increasing daily temperature range. It is to be noted that in these studies despite a fair constancy of range of temperature NAR fluctuation is indicated in all the four sowings.

TMV 2 has however, a greater NAR than TMV 1 in all the four sowings. That the varietal difference rather species difference affects NAR and in this aspect the dicotyledons, sugarbeat and potatoes behave in marked contrast to cereals, barley and wheat was shown by Watson (1947) lending support for this finding in groundnut.

The influence of 'late' sowing on floral initiation is seen in TMV 2 but not in TMV 1. Also earlier cessation of flowering with 'late' sowing is noticed in TMV. 1 but not in TMV 2. Thus the delayed on-set of flowering in TMV 2 and shortened flowering duration in both TMV 1 and TMV 2 are two factors independent of their flowering response. With a fairly steady temperature range and constant day length, the reduction in flowering duration common to both the varieties is to be traced to 'late' sowing and in this respect TMV 1 gained 40 days in contrast to TMV 2 which gains only 11 days. The flower initiation, cessation and the resultant shortening of flowering duration are to be traced to the photoperiodic sensitivity. Varietal response and associated factors to the physiology of flowering call for a seperate and intensive study.

The yield potential consequent on 'late' sowing finds an interesting parallel with NAR. July 15, sowing has the lowest number of immature pods with the complementary maximum in the yield of mature pods represented by pod weight while the mature pod number per plant do not find an exact parallel.

The association of NAR with maximum production of economic end-product of mature pods as yield and the influence of seasonal time-trend represented by various factors of climate help to explain the appropriate time of sowing as July 15, irrespective of varieties.

Summary and Conclusion: NAR was maximum with July 15, as time of sowing and among the factors of climate medium rainfall and maximum hours of sunlight were noteworthy. TMV 2 had a higher NAR than TMV 1. 'Late' sowing reduced flower production and flowering duration. The parallel between NAR and mature pod weight with the associated feature of lowest production of immature pods per plant formed a significant aspect. July 15, was the suitable time of sowing for both TMV 1 and TMV 2.

REFERENCES

Fortainer, E. J. 1957 Doctoral thesis in Meded. Land Hogesch., Waganingon.

Gregory, F. G. 1917 Physiological conditions in Cucumber Houses. Third Annual Report, Experimental and Research Station, Cheshnut.

West, C., G. E. Briggs and F. Kidd 1920 Methods and Significant Relations in the Quantitative Analysis of Plant Growth. *New Phytol.*, **19** : 200.

Watson, D. J. 1947 Comparative Physiological Studies on the Growth of Field Crops. Variation in net assimilation rate and leaf area, between species and varieties and within and between years. *Ann. Bot.*, **11** : 41-76.

A Preliminary Study on the Relation Between Soil Nutrients and Yield of Irrigated Cambodia Cotton

by

L. MOHAMED GHOUSE [1] and P. MUTHUSWAMY [2]

Introduction: Efforts to evolve a quantitative relationship between the final yield and growth factors were made from time to time by soil investigators. In Mitscherlich's equation $\log (A-Y) = \log A - C (b+x)$ where $A =$ maximum yield, $Y =$ yield obtained when 'b' units of the nutrient are originally present in soil and 'x' units of it are added as fertilizers while 'C' is the efficiency factor of 'b' and 'x' the soil growth factor 'b' was not analysed, but was calculated in terms of 'x' Spillman's modified equation $Y = A(1-10^{-Cx})$ also falls in the same line of conception. Balmukand (1928)

[1] and [2] Chemistry Assistants, Agricultural College and Research Institute, Coimbatore-3.

Received on 25—10—1966.