

## Influence of varieties and sowing dates on growth and yield of *kharif* groundnut (*Arachis hypogaea* L.)

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### ABSTRACT

A field experiment was conducted to study the Influence of varieties and sowing dates on growth and yield of *kharif* groundnut (*Arachis hypogaea* L.) at Anand Agriculture University, Anand, during *kharif* season of 2019 and 2020. The treatments consisted of three dates of sowing viz; first date of sowing - onset of monsoon, second date of sowing - 10 days after onset of monsoon and third date of sowing - 20 days after onset of monsoon with three varieties viz; GG 20, GJG 34 and TAG 37A. The experiment was replicated four times in randomized block design (factorial). Results showed that first date of sowing (onset of monsoon) proved significantly superior to other dates of sowing in respect of growth and yield characters. Significantly high pod yield (2176 kg ha<sup>-1</sup> and 1862 kg ha<sup>-1</sup>) was recorded during 2019 and 2020 under first date of sowing, respectively which was statistically at par with second date of sowing (1937 kg ha<sup>-1</sup> and 1592 kg ha<sup>-1</sup>) and significantly higher than the third date of sowing (1614 kg ha<sup>-1</sup> and 1369 kg ha<sup>-1</sup>). In case of crop sown at onset of monsoon, rainfall, soil moisture and mean temperature favorable during crop growing period showed significantly higher pod yield. Among the varieties, significantly higher pod yield (2043 and 1701 kg ha<sup>-1</sup>) was recorded under GG 20 over other varieties GJG 34 and TAG 3A during both the years. Hence, variety GG 20 was the promising ones in terms of growth and yield in middle Gujarat agro climatic zone. On an average, onset of monsoon (early sowing) gave 13.4% higher pod yield than 10 days after onset of monsoon sowing. GG 20 was recorded 6.8 % higher pod yield as compared to the GJG 34.

**Key words:** Sowing dates, varieties, *kharif* groundnut, yield, Middle Gujarat.

### INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and subtropical regions of the world. In our country, it is one of the most important cash crops. Sowing, emergence, germination, flowering, vegetative and pod development of groundnut requires well distribution of rainfall. However, well distributed rainfall ensures that the normal growth and development of the pods. Moisture stress affected flowering, pod setting and results in less yields. Temperature in the range of 25 to 30 °C is optimum for plant development. Being a C3 crop, higher temperatures may affect its productivity and to some extent its distribution. India stands second the highest producer of groundnut mainly because of the crop is mostly grown as rainfed in drylands, often subject to the vagaries of the weather and only 14-15 % of groundnut area is under irrigation. In India, groundnut occupies an area of 5.5 m ha producing 9.6 Mt with a productivity of 1750 kg ha<sup>-1</sup> (Shwetha *et al.*, 2017). The principal groundnut growing states are Gujarat, Andhra

Pradesh, Karnataka, Tamil Nadu, Maharashtra, Rajasthan, Madhya Pradesh, Orissa, and Uttar Pradesh which accounts for more than 80 % of the Indian production as well as area. It is grown mainly in rainy season i.e. *Kharif* season which accounts for about 80 % of the total groundnut production. It is predominantly grown in monsoon (June-October) season and Junagadh is the most productive among all the districts in Gujarat. The value of stable and high yielding cultivars has been universally recognized as an important factor for boosting crop production. Optimum time of sowing of groundnut depends upon the type of variety and growing season due to variation in agro climatic zone and agro ecological conditions. Sowing dates determines days of emergence, days of flowering and it has effect on total dry matter production, pod setting and pod yield. Late or delay in the time of sowing results in decreasing total yield of crop. Thus, keeping this point of view, the present investigation was conducted to study the influence of varieties and sowing dates on growth and yield of *kharif* groundnut.

## MATERIALS AND METHODS

The field experiment was conducted during *kharif* season 2019 and 2020 at Anand Agricultural University, Anand, Gujarat, India. Anand is located at the latitude of 22° 35' N and longitude of 72° 55' E and at an altitude of 45.1m above the mean sea level. The soil type is sandy loam soil in texture with water table is more than 10 m deep, with a field capacity of 15.4 to 15.8 at different depth. Bulk density was 1.52 g cm<sup>-3</sup> to 1.55 g cm<sup>-3</sup> in the 15 to 45 cm layer at the experimental site. The treatments consisted of three dates of sowing viz; first date of sowing - onset of monsoon, second date of sowing - 10 days after onset of monsoon and third date of sowing - 20 days after onset of monsoon with three varieties GG 20, GJG 34 and TAG 37A. The experiment replicated with four times in randomized block design (factorial). The crop was sown at a distance of 30 cm X 10 cm. Approximately 60 mm as heavy irrigation and 40 mm for light irrigation was given to the each plot as a life saving irrigations. All the package of practices was followed as per recommended. The statistical analysis was carried out by using "Analysis of variance techniques". The significance was tested by 'F' value at 5 per cent level of significance. The value of critical difference (C. D.) for examining treatment means for their significance was done at 5 % level.

## RESULTS AND DISCUSSION

### Growth characters

The results showed that dates of sowing had significant influence on the plant height in both years and maximum values (55.3 and 49.1 cm) were recorded under first date of sowing (onset of monsoon) (Ahmad *et.al.* 2016). In case of varieties, plant height was significantly high (58.9 and 48.2 cm) under GG 20 over varieties GJG 34 and TG 37 A. Significantly higher plant population (28.3 and 24.2 plants m<sup>-2</sup>) was recorded in first date of sowing during both the years which was statistically at par with second date of sowing and significantly higher than the third date of sowing. The higher plant population was recorded during 2019 compared to 2020. Among the varieties, significantly higher plant population (28.5 and 24.2 plants m<sup>-2</sup>) was recorded under GG 20

over varieties GJG 34 and TAG 37A (Table 1). Significantly higher number of pods (16.6 and 15.6) was measured in first date of sowing which was statistically at par with second sowing. The late sown crop mature earlier, is resulting in a reduced number of pods plant<sup>-1</sup>. Lower number pods plant<sup>-1</sup> was due to decrease in vegetative phase and also shorting in maturation. Result revealed that significantly higher number of pods plant<sup>-1</sup> (16.4 and 14.1) was recorded under GG 20 than the other varieties. The effect of sowing dates on weight of pod was significant during 2019 and 2020. There was significantly high weight of pod (39.5 and 35.8 g plant<sup>-1</sup>) in first date of sowing which was statistically at par with second date of sowing during both years. The higher values of weight of pod were recorded during 2019 compared to 2020. There was significant difference in weight of pod among the varieties during 2019 and 2020. Significantly higher weight of pod (36.9 and 32.1 g plant<sup>-1</sup>) was recorded under GG 20 over variety GJG 34 and TAG 37A (Table 1). Differences in growth parameters among varieties might be due to variation in their genetic milieu agronomic interventions, and environmental situation during cropping seasons. Similar results were reported by Sardana and Khandola (2007). Enlargement of plant height, plant population and number pods of variety GG 20 may be due to absorption, interception and utilization of more radiant energy lead to larger accumulation photosynthesis and subsequently maximum values of these parameters.

### Yield attributes and yield

Significantly higher test weight (53.0 g) was recorded in first date of sowing which was statistically at par with second date of sowing and significantly higher than third date of sowing during first and second year. The highest test weight decreasing trend with delayed sowing (Table 2) (Sardana and Kandhola, 2007). There was significantly higher test weight (63.4 and 58.0 g) under GG 20 over variety GJG 34 and TAG 37A.

Significantly high pod yield (2176 and 1862 kg ha<sup>-1</sup>) was recorded during both years of the experiment under first date of sowing (Onset of monsoon) which was statistically at par with

Table 1: Influence of varieties and dates of sowing on growth characters of groundnut

Treatments	Plant height (cm)		Plant population (m <sup>-2</sup> )		Number of pod plant <sup>-1</sup>	
	2019	2020	2019	2020	2019	2020
Date of sowing						
Onset of monsoon	55.3	49.1	28.3	24.2	16.6	15.6
10 days after onset of monsoon	54.4	48.9	27.4	23.0	15.6	14.3
20 days after onset of monsoon	51.4	43	26.3	19.3	14.4	12.2
Variety						
GG 20	58.9	48.5	28.5	24.2	16	14.4
GJG 34	53.0	46.8	27.2	21.9	15.5	14.0
TG 37A	49.2	45.7	26.3	20.4	15.1	13.6
SEm ±	0.4	0.1	0.2	0.3	0.2	0.2
CD at 5%	1.3	0.4	0.6	0.8	0.5	0.6
CV %	2.8	0.9	2.7	4.0	3.5	4.7

second date of sowing (10 days after onset of monsoon). It was significantly higher than the third date of sowing (20 days after onset of monsoon). The pod yield significantly higher in onset of monsoon mainly due to higher plant population (Table 1 and Table 2). The higher pod yields were recorded during 2019 compared to 2020. The present study revealed that first date of sowing is the better time for getting higher pod yield of groundnut during *kharif* season under middle Gujarat agroclimatic condition. The higher pod yield in first date of sowing i.e. onset of monsoon was recorded due to fact that crop sown at onset of monsoon made maximum utilization of rainfall, soil moisture and sufficient bright sunshine hours available for crop. Whereas delay sown crop yielded lesser due to low temperature and dry weather conditions for considerable

period after cessation of monsoon rains in middle of September. Similar results were reported by Patel *et al.*, (2010) and Chandrika *et al.*, (2008). Also, in early sowing, there was a sufficient time to exploit the soil and environmental resources for their vegetative development compared to late sowing that shortens the crop duration. Similar results were reported by Sogut *et al.* (2016), Canavar and Kaynak (2008). Among the varieties, significantly higher pod yield (2043 and 1701 kg ha<sup>-1</sup>) was recorded under GG 20 over GJG 34 and TAG 3A. Hence, variety GG 20 is the promising ones in terms of growth and yield in middle Gujarat agro climatic zone. Guled *et al.* (2012) recorded similar results. The harvest index was not affected significantly with different dates of sowing and varieties of the groundnut in both years.

Table 2: Influence of varieties and dates of sowing on yield attributes and yield of groundnut

Treatments	Weight of pod (g plant <sup>-1</sup> )		Test weight (g)		Pod yield (kg ha <sup>-1</sup> )		Harvest index (%)	
	2019	2020	2019	2020	2019	2020	2019	2020
Date of sowing								
Onset of monsoon	39.5	35.8	53	48.9	2176	1862	26.9	28.8
10 days after onset of monsoon	34.9	30.8	50.6	47.0	1937	1592	29.0	30.3
20 days after onset of monsoon	30.2	22.0	48.5	45.9	1614	1369	26.5	30.8
Variety								
GG 20	36.9	32.1	63.4	58.0	2043	1701	27.6	29.8
GJG 34	35.3	30.5	49.3	46.5	1915	1612	27.3	30.0
TG 37A	32.5	27.0	39.3	37.3	1769	1511	27.4	30.1
SEm ±	0.6	1.0	0.6	0.7	46.7	47.9	0.4	0.5
CD at 5%	1.8	3.0	1.9	2.1	135.3	138.7	NS	NS
CV %	6.1	12.0	4.4	5.4	8.5	10.3	5.4	5.5

It could be concluded from these results that the varieties and sowing dates had significant influence on growth and yield of groundnut. Thus, to obtain higher pod yield of

groundnut GG 20 variety should be sown earlier at onset of monsoon particularly in middle Gujarat agro climatic zone.

## REFERENCES

- Ahmad, F., A. Amjad, M. Khan and Hussain, A. (2016) Yield performance of groundnut varieties as affected by sowing dates in lower khyber pakhtunkhwa. *Journal of Biology, Agriculture and Healthcare* www.iiste.org 6:3.
- Canaver, O. and Kaynak, M.A. (2008) Effect of different planting dates on yield and yield components of Peanut (*Arachis hypogaea* L.). *Turkish Journal of Agriculture and Forestry* **32**:521-528.
- Chandrika, V., Parameswari, P. and Sreenivas, G. (2008) Effect of sowing time and rainfall distribution on yield of rainfed groundnut (*Arachis hypogaea* L.) in southern agro-climatic zone of Andhra Pradesh. *Legume Research* **31** : 54-56
- Guled, P. M., Shekh, A. M., Patel, H. R., Pandey, V. and Patel, G. G. (2012) Validation of CROPGRO-peanut model in middle Gujarat agroclimatic region. *Journal of Agrometeorology* **14** (2): 154-157.
- Patel, G.G., H.R. Patel, V. Pandey, A.M. Shekh, J.S. Patel, R.P. Vadodaria, B.K. Bhatt and J.C. Shroff, J.C. (2010) Influence of weather parameters on pod yield of groundnut in middle Gujarat agro-climatic region. *Journal of Agrometeorology* **12** (1): 74-76.
- Sardana, V. and Kandhola, S. S. (2007) Productivity of semi-spreading and bunch type varieties of groundnut as influenced by sowing dates. *SAT ejournal* **5**:1-4.
- Shwetha, Sreenivasa, A. G., Ashoka, J., Nadagoud, A. and Kuchnoor, P.H. (2017) Effect of climate change on growth of groundnut (*Arachis hypogaea* L.). *International Journal of Pure Applied Bioscience* **5** (6): 985-989.
- Sogut, T., Ozturk, F and Kizil, S. (2016) *Effect of sowing time on peanut (Arachis hypogaea L.) cultivars: Fatty acid composition*. In 5<sup>th</sup> International Conference "Agriculture for Life, Life for Agriculture" Agriculture and Agricultural Science Proceeding 10:76-82.