Plant Archives Vol. 25, No. 1, 2025 pp. 2287-2292 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.1.331

EFFECT OF DATES OF SOWING AND VARIETIES ON GROWTH PARAMETERS OF GROUNDNUT (*ARACHIS HYPOGAEA* L.) DURING SUMMER SEASON

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(Date of Receiving-08-02-2025; Date of Acceptance-11-04-2025)

ABSTRACT

The experiment was carried out during summer season (2024) at College Farm, College of Agriculture, Professor Jayashankar Telangana Agricultural University, Rajendranagar, Hyderabad to evaluate the growth parameters of groundnut varieties under different dates of sowing. The soil was low in available nitrogen and medium in available phosphorus and potassium. Experiment was laid out in split plot design with three replications. Fifteen treatment combinations were taken with three dates of sowing (D1- January 20th 2024, D2- February 05th 2024, D3- February 20th 2024) in main plots and five varieties (V1: GG-37, V2: TMV-13, V3: TAG-24, V4:TCGS-1694, V5: K-6) in sub plots. Row to row spacing of 30 cm and plant to plant spacing of 7.5 cm was maintained. The results revealed that dates of sowing had no significant effect on plant height, leaf area, leaf area index and leaf area duration at physiological maturity stage. Among the varieties, significantly higher plant height at physiological maturity stage was recorded in the variety K-6 (36.06 cm) than the varieties TCGS-1694 (30.43 cm), TAG-24 (27.20 cm), GG-37 (19.23 cm) and was on par with the variety TMV-13 (34.03 cm). Significantly higher leaf area was recorded in the variety K-6 (1272.98 cm^2 $plant^{-1}$) than the varieties TAG-24 (1060.22 cm^2 $plant^{-1}$) and TCGS-1694 (1092.22 cm^2 $plant^{-1}$) while it was on par with TMV-13 (1240.37 cm^2 $plant^{-1}$) and GG-37 (1182.75 cm^2 $plant^{-1}$). Significantly higher leaf area index (LAI) was recorded in the variety K-6 (5.66) than the varieties TAG-24 (4.71), TCGS-1694 (4.86), TMV-13 (5.15) and was on par with GG-37 (5.26). TMV-13 (208.09) recorded significantly higher Leaf area duration (LAD) than the varieties TCGS-1694 (177.48) and GG-37 (175.91) while it was on par with K-6 (203.12) and TAG-24 (195.82).

Key words : Groundnut, Plant height, Leaf area, Leaf area index, Leaf area duration, Varieties.

Introduction

Groundnut (*Arachis hypogaea* L.) is one of the most important oilseed crops originated in Brazil (South America) that can be grown in *Kharif*, *Rabi* and summer seasons. Among the oilseed crops in India, groundnut occupies first position in terms of area and second in terms of production (after soybean) with 44-56% oil and 22-30% protein content. It is a low priced commodity but a great source of nutrients hence called as wonder nut or poor man's almond. Groundnut has a share of approximately 25% in the total Indian oilseed production but this share is constantly decreasing since India got independence and the possible reasons are lack of suitable varieties, high cost of inputs like seed, fertilizer, labour, timely availability of inputs and non-remunerative prices. Nearly 19 percent of world groundnut production is contributed by India which is deplorably low as compared to China's contribution to the world groundnut production which is 34 per cent (indiastat.com, 2021). One of the main reasons for the low yield of groundnut in the country is the poor adoption of improved varieties and their inconsistent performance over range of environments, as the crop is largely cultivated as rainfed crop (Gadgil *et al.*, 2013).

Growing groundnut in summer provides the crop with increased hours of bright sunshine and so the overall plant growth. Higher temperature also promotes faster germination, early vegetative growth and flowering. Kernels obtained are of higher quality and yield more oil comparatively. Growing groundnut in summer also reduces the risk of moisture related diseases and pest infestation and provides the crop with dry weather conditions during harvest giving summer groundnut additional market advantage. Winter and summer groundnut is mainly grown in 7 states of the country *viz.*, Karnataka, Tamil Nadu, Maharashtra, Telangana, Andhra Pradesh, Gujarat and West Bengal accounting for more than 90% in both area and production of total winter, summer area and production of the country.

Though yellow revolution in 1990's led to self-sufficiency in production of oilseeds, it could not be maintained in the present millennia. The area under summer sown groundnut is less compared to *Kharif* and *Rabi*. In Telangana, most of the crops are grown as rainfed *Kharif* and *Rabi*, land is mostly left fallow during summers so as to regain the fertility of the soil. In view of the lesser groundnut contribution to the national average during summer season, various groundnut varieties under different sowing dates were evaluated in Telangana.

Materials and Methods

The field experiment was carried out in the College farm, College of Agriculture, Professor Jayashankar Telangana Agricultural University, Rajendranagar, Hyderabad, Telangana, India. The farm is geographically situated at an elevation of 542.6 m above sea level, at the coordinates 17° 19' 18" N latitude and 78° 24' 31" E longitude. Based on Troll's climate classification, the experimental site is situated in a semi-arid tropical region. This experimental site is located within the Southern Telangana Agro Climatic Zone. The initial physico-chemical analysis of the soil indicated a sandy loam texture, with a medium organic carbon content, low available nitrogen, and medium levels of available phosphorus and potassium. The field experiment was carried out using split plot design with three replications. The 15 treatment combinations comprising of three sowing dates D1- 20th January, D2- 5th February, D3- 20th February in main plot and five varieties V1- GG-37 V2- TMV-13 V3- TAG-24 V4- TCGS-1694 V5- K-6 in sub plot treatments. This experiment was carried out in 45 plots, each with a gross plot size of 4.5 m x 3.5 m and net plot size of 3.3 m × 3.2 m. A spacing of 30 cm in between the rows and 7.5 cm in between the plants was maintained. Observations on various growth parameters were recorded at 1st flower bud appearance, 50% flowering, pod formation and physiological maturity stage that includes plant height (cm), leaf area (cm^2 plant^{-1}), leaf area index and leaf area duration.

Results and Discussion

Growth parameters

Plant height

Effect of dates of sowing on plant height

Among the different dates of sowing, crop sown on February 20th (12.15 cm) recorded significantly higher plant height at 1st flower bud appearance stage than the crop sown on February 5th (11.31 cm) and January 20th (10.91 cm). The plant height of the crop sown on January 20th (10.91 cm) was recorded significantly lowest and is on par with the crop sown on February 5th (11.31 cm). The shorter plant height in the crop sown on January 20th can be attributed to shorter day length and cooler temperatures whereas the crop sown on February 20th has been exposed to more sunshine hours and increased temperatures that might have led to the rapid growth of the plants. These results were in line with the findings of Kamble *et al*. (2023) where the plant height of the crop sown on January 30th and February 15th was found to be significantly higher than the crop sown on December 30th and January 15th.

At 50% flowering stage, plant height recorded was significantly higher in the crop sown on February 5th (16.03 cm) than the crop sown on January 20th (14.97 cm) and February 20th (15.35 cm). The plant height of the crop sown on January 20th (14.97 cm) was significantly lowest and is on par with the crop sown February 20th (15.35 cm).

At pod formation stage and physiological maturity stage there was no significant effect of dates of sowing on plant height.

Effect of varieties on plant height

Among the groundnut varieties, TCGS-1694 (13.98 cm) recorded significantly higher plant height at 1st flower bud appearance stage than the varieties K-6 (12.79 cm), TMV-13 (12.23 cm), TAG-24 (11.01 cm) and GG-37 (7.26 cm). Significantly lowest plant height at first flower bud appearance stage was recorded in GG-37 (7.26 cm).

At 50% flowering stage, significantly higher plant height was recorded in the variety TCGS-1694 (17.40 cm) than the varieties TMV-13 (15.78 cm), TAG-24 (15.04 cm), GG-37 (12.37 cm) and is on par with the variety K-6 (16.67 cm). The lowest plant height at 50 % flowering stage was recorded in GG-37 (12.37 cm). This

Table 1 : Effect of different dates of sowing and varieties on plant height and leaf area of groundnut.

Treatment	Plant height				Leaf area			
	1st flower bud appearance stage	50 % flowering stage	Pod formation stage	Physiological maturity stage	1st flower bud appearance stage	50 % flowering stage	Pod formation stage	Physiological maturity stage
Main factor: Dates of Sowing								
D1- January 20th, 2024	10.91	14.97	24.87	30.01	91.07	125.73	726.57	1169.13
D2- February 05th, 2024	11.31	16.03	23.79	30.58	102.12	129.23	668.47	1182.04
D3- February 20th, 2024	12.15	15.35	22.83	27.58	94.09	130.56	654.88	1157.95
SEm±	0.20	0.16	1.80	1.36	2.15	4.45	28.15	2573
CD (p= 0.05)	0.81	0.64	NS	NS	8.66	NS	NS	NS
Sub factor: Varieties								
V1-GG-37	7.26	12.37	15.90	19.23	109.03	128.39	636.61	1182.75
V2-TMV-13	12.23	15.78	27.89	34.03	112.20	118.91	630.38	1240.37
V3-TAG-24	11.01	15.04	23.70	27.20	93.87	124.06	694.39	1060.22
V4-TCGS-1694	13.98	17.40	24.71	30.43	74.42	134.20	741.06	1092.22
V5- K-6	12.79	16.67	27.26	36.06	89.27	136.98	714.09	1272.98
SEm±	0.30	0.45	0.73	0.96	1.80	4.97	35.88	34.17
CD (p= 0.05)	0.88	1.33	2.14	2.81	5.29	NS	NS	100.33
Interaction (Factor (D) at same level of V)								
SEm±	0.50	0.72	1.58	2.01	3.52	8.89	62.30	58.86
CD (p= 0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (Factor (V) at same level of D)								
SEm±	0.45	0.36	2.45	3.04	4.80	9.95	62.93	57.53
CD (p= 0.05)	NS	NS	NS	NS	NS	NS	NS	NS

variation may be attributed to moderate rise in day temperatures and moisture stress conditions, which could have accelerated the crop growth period and led to earlier flowering, resulting in fewer days to reach 50% flowering among the varieties.

At pod formation stage, significantly higher plant height was recorded in the variety TMV-13 (27.89 cm) than the varieties TCGS-1694 (24.71 cm), TAG-24 (23.70 cm), GG-37 (15.90 cm) and is on par with the variety K-6 (27.26 cm). The lowest plant height at pod formation stage was recorded in GG-37 (15.90 cm).

At physiological maturity stage, significantly higher plant height was recorded in the variety K-6 (36.06 cm) than the varieties TCGS-1694 (30.43 cm), TAG-24 (27.20 cm), GG-37 (19.23 cm) and was on par with the variety TMV-13 (34.03 cm). The lowest plant height at physiological maturity stage was recorded in GG-37 (19.23 cm).

The interaction effect between dates of sowing and varieties on the plant height was found non-significant at all the stages of the groundnut recorded.

Leaf area (cm^2 $plant^{-1}$)

Effect of dates of sowing on leaf area

At 1st flower bud appearance stage the crop sown on February 5th (102.12 cm^2 $plant^{-1}$) recorded significantly higher leaf area than the crop sown on January 20th (91.07 cm^2 $plant^{-1}$) and February 20th (94.09 cm^2 $plant^{-1}$). Significantly lowest leaf area was recorded in the crop sown on January 20th (91.07 cm^2 $plant^{-1}$), which was on par with the crop sown on February 20th (94.09 cm^2 $plant^{-1}$). At 50% flowering stage, pod formation and physiological maturity stage there was no significant effect of dates of sowing on leaf area.

Effect of varieties on leaf area

At 1st flower bud appearance stage, significantly higher leaf area was recorded in the variety TMV-13 (112.20 cm^2 $plant^{-1}$) than the varieties TCGS-1694 (74.42 cm^2 $plant^{-1}$), K-6 (89.27 cm^2 $plant^{-1}$), TAG-24 (93.87 cm^2 $plant^{-1}$) and GG-37 (109.37 cm^2 $plant^{-1}$). Significantly lowest leaf area was recorded in the variety TCGS-1694 (74.42 cm^2 $plant^{-1}$). The leaf area of the varieties K-6 (89.27 cm^2 $plant^{-1}$) and TAG-24 (93.87 cm^2 $plant^{-1}$) was on par with each other. At 50% flowering and pod formation stage there was no significant effect of varieties on the leaf area of groundnut. At physiological maturity stage, significant effect of varieties was observed on the leaf area of groundnut. Significantly higher leaf area was recorded in the variety K-6 (1272.98 cm^2 $plant^{-1}$) than the varieties TAG-24 (1060.22 cm^2 $plant^{-1}$) and TCGS-1694 (1092.22 cm^2 $plant^{-1}$). K-6 (1272.98 cm^2 $plant^{-1}$) is on par with TMV-13 (1240.37 cm^2 $plant^{-1}$) and GG-37 (1182.75 cm^2 $plant^{-1}$). Significantly lowest leaf area was recorded in TAG-24 (1060.22 cm^2 $plant^{-1}$) which was on par with TCGS-1694 (1092.22 cm^2 $plant^{-1}$).

Leaf area index (LAI)

No significant effect of dates of sowing was observed on the leaf area index at various phenophases of the groundnut. Among the varieties, at 1st flower bud appearance stage, there was significant effect of varieties on leaf area index of groundnut. Significantly higher leaf area index was recorded in the variety TMV-13 (0.50) than the varieties TCGS-1694 (0.33), K-6 (0.40), TAG-24 (0.42) and GG-37 (0.48). Significantly lowest leaf area index was recorded in TCGS-1694 (0.33). At 50% flowering stage and pod formation stage there was no significant effect of varieties on the leaf area index of the groundnut. At physiological maturity stage, there was significant effect of varieties on leaf area index of groundnut. Significantly higher leaf area index was recorded in the variety K-6 (5.66) than the varieties TAG-24 (4.71), TCGS-1694 (4.86), TMV-13 (5.15) and was on par with GG-37 (5.26). Significantly lower leaf area index was recorded in TAG-24 (4.71) than K-6 (5.66) but is on par with TCGS-1694 (4.86) and TMV-13 (5.15).

Leaf area duration

Effect of dates of sowing on leaf area duration

Dates of sowing did not have any significant effect on leaf area duration. Leaf area duration ranged from 2.86 to 3.06 from 1st flower bud appearance to 50% flowering stage. LAD at 50% flowering stage to pod formation stage ranged from 75.23 to 88.27. LAD from pod formation stage to physiological maturity stage ranged from 185.25 to 196.59. Comparatively higher LAD was noted in the crop sown on January 20th than the crop sown on February 05th and February 20th.

Effect of varieties on leaf area duration (LAD)

1st flower bud appearance to 50% flowering stage

Varieties had significant effect on leaf area duration from 1st flower bud appearance to 50% flowering stage of groundnut. TCGS-1694 (3.19) recorded significantly higher LAD than the varieties K-6 (2.57) and GG-37 (2.45) while it is on par with TMV-13 (2.95) and TAG-24 (3.02). Significantly lowest LAD was recorded by the variety GG-37.

50% flowering stage to pod formation stage

Varieties did not have any significant effect on leaf area duration from 50% flowering stage to pod formation

Table 2 : Effect of different dates of sowing and varieties on leaf area index and leaf area duration of groundnut.

Treatment	Leaf area index				Leaf Area Duration		
	1st flower bud appearance stage	50% flowering stage	Pod formation stage	Physiological maturity stage	1st flower bud appearance to 50% flowering stage	50% flowering stage to pod formation stage	Pod formation stage to physiological maturity stage
Main factor: Dates of Sowing							
D1- January 20th, 2024	0.41	0.56	3.23	5.20	3.06	88.27	194.41
D2- February 05th, 2024	0.45	0.58	2.98	5.25	2.86	78.81	196.59
D3- February 20th, 2024	0.42	0.58	2.91	5.15	2.88	75.23	185.25
SEm±	0.01	0.02	0.13	0.01	0.05	3.02	4.33
CD (p= 0.05)	NS	NS	NS	NS	NS	NS	NS
Sub factor: Varieties							
V1-GG-37	0.48	0.57	2.83	5.26	2.45	81.07	175.91
V2-TMV-13	0.50	0.53	2.80	5.15	2.95	73.62	208.09
V3-TAG-24	0.42	0.55	3.09	4.71	3.02	79.73	195.82
V4-TCGS-1694	0.33	0.60	3.29	4.86	3.19	86.37	177.48
V5- K-6	0.40	0.61	3.17	5.66	2.57	83.05	203.12
SEm±	0.01	0.02	0.16	0.15	0.14	3.66	6.27
CD (p= 0.05)	0.02	NS	NS	0.45	0.40	NS	18.41
Interaction (Factor (D) at same level of V)							
SEm±	0.02	0.04	0.28	0.26	0.22	6.43	10.64
CD (p= 0.05)	NS	NS	NS	NS	NS	NS	NS
Interaction (Factor (V) at same level of D)							
SEm±	0.02	0.04	0.28	0.25	0.22	6.43	10.64
CD (p= 0.05)	NS	NS	NS	NS	NS	NS	NS

stage of groundnut. However, comparatively higher LAD was recorded in TCGS-1694 (86.37) followed by K-6 (83.05), GG-37 (81.07), TAG-24 (79.73) and TMV-13 (73.62). Lowest LAD was recorded in the variety TMV-13.

Pod formation stage to physiological maturity stage

Varieties had significant effect on leaf area duration from pod formation stage to physiological maturity stage of groundnut. TMV-13 (208.09) recorded significantly higher LAD than the varieties TCGS-1694 (177.48) and GG-37 (175.91), while it was on par with K-6 (203.12) and TAG-24 (195.82). Significantly lowest LAD was recorded by the variety GG-37.

Conclusion

Plant height of groundnut was significantly affected by dates of sowing at 1st flower bud stage and 50% flowering stage and showed no significant effect at pod formation and physiological maturity stage. Among the varieties significant variation in plant height was observed at all crop growth stages. K-6 recorded significantly higher plant height than the varieties TCGS-1694, GG-37, TAG-24 and TMV-13 at physiological maturity stage. No significant effect on the leaf area, leaf area index, leaf area duration of groundnut was observed due to different dates of sowing. Varieties had significant effect on leaf area of groundnut. K-6 recorded significantly higher leaf area than TCGS-1694 and TAG-24 but was on par with the varieties GG-37 and TMV-13. K-6 recorded significantly higher leaf area index than TCGS-1694, TAG-24 and TMV-13, but was on par with the variety GG-37 at physiological maturity stage. TMV-13 (208.09) recorded significantly higher LAD than the other varieties. Significantly lowest LAD was recorded by the variety GG-37.

References

Ashwini, G.S., Duragannavar F.M., Yenagi B.S and Hebbar M. (2022). Effect of sowing windows and varieties on growth, yield and oil content of groundnut (*Arachis hypogaea* L.) during *rabi* season in Northern Transition Zone of Karnataka. *J. Farm Sci.*, **35(01)**, 63-66.

Baliarsingh, A. and Mahapatra P.K. (2015). Effect of date of sowing and moisture regime on growth and yield of summer groundnut (*Arachis hypogaea* L.). *Environ. Ecol.*, **33(1)**, 167-170.

Caliskan, S., Caliskan M.E., Arslan M. and Arioglu H. (2008). Effects of sowing date and growth duration on growth and yield of groundnut in a Mediterranean-type environment in Turkey. *Field Crops Res.*, **105(1-2)**, 131-140.

Chandru, S., Lakshman K., Luther M.M. and Subbiah P.V. (2021). Growth and Yield of Groundnut in Coastal Agro Ecosystem of Guntur district in Andhra Pradesh. *The Andhra Agricult. J.*, **68(1)**, 10-14.

Chaudhari, P.G., Chaudhari P.P. and Chaudhari M.K. (2018). Response of summer groundnut (*Arachis hypogaea* L.) to date of sowing and spacings. *Int. J. Chem. Stud.*, **6(2)**, 1504-1506.

Gadgil, M. (2013, November). What would a swadeshi approach to science and technology imply in India of 2013 In: *23rd SWADESHI SCIENCE CONGRESS*.

Jagtap, P.B., Mate S.N., Deshmukh D.V. and Amolic V.L. (2014). Physiological analysis of growth and yield variation in summer groundnut (*Arachis hypogaea* L.). *J. Agricult. Res. Technol.*, **39(2)**, 183-189.

Jangilwad, B.D., Pagar R.D., Warkad K.V. and Patel S.K. (2015). Effect of dates of sowing, varieties and growth regulator on growth and yield attributes on summer groundnut (*Arachis hypogea* L.) under north Gujarat agro-climatic conditions. *Int. J. Agricult. Sci.*, **11(2)**, 257-263.

Janila, P., Variath M.T., Pandey M.K., Desmae H., Motagi B.N., Okori P., Manohar S.S., Rathnakumar A.L., Radhakrishnan T., Liao B. and Varshney R.K. (2016). Genomic tools in groundnut breeding program: Status and perspectives. *Front. Plant Sci.*, **7**, 289.

Kamble, D.J., Pacharne D.P., Danawale N.J., Deshmukh P.H., More S.R. and Patil M.R. (2023). Response of groundnut (*Arachis hypogaea* L.) cultivars to sowing dates under summer season.