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Effect of sowing date and variety on morphological growth traits of rainfed groundnut

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Abstract
A research study was undertaken in the College Farm, College of Agriculture, Rajendranagar, Professor Jayashankar Telangana Agriculture University during *kharif*, 2024 to evaluate the effect of sowing windows and varieties on growth of groundnut (*Arachis hypogaea* L.). The experimental plot was laid out in Split Plot design with three dates of sowing (second fortnight of June, first fortnight of July and second fortnight of July) and five groundnut varieties (TG 37-A, KDG 128, TAG 24, TCGS 1694 and K6). The data analysis revealed that the crop sown on July I fortnight attained physiological maturity early than the other sowing windows. Days to seedling emergence did not significantly differ between the varieties. K6 achieved physiological maturity in a shorter period among the other varieties under study. The analysis of the data indicated that the crop sown in the June II fortnight had significantly higher plant height, leaf area, and leaf area index at physiological maturity compared to the other two sowing windows. Additionally, it was noted that KDG 128 had the statistically highest leaf area and leaf area index, while K6 had the tallest plants among the varieties studied at physiological maturity. LAD (Leaf Area Duration) values across the three growth phases were unaffected by sowing dates. Among the varieties, TG 37-A and KDG 128 (93 days) recorded significantly higher LAD than TAG 24, TCGS 1694, and K6. During pod formation to maturity, LAD of KDG 128 (132.8 days) was on par with TG 37-A (129.3days) and both exceeded the remaining varieties.

Keywords: Groundnut, plant height, leaf area, leaf area index, leaf area duration, varieties

Introduction
Groundnut (*Arachis hypogaea* L.) is one of the world's most important oilseed crops, often referred to as the "king of vegetable oilseeds," "poor man's cashew nut" and "wonder nut" (Biswas and Bhattacharjee, 2019) [2]. The genus *Arachis* comprises over 70 wild species, but only *A. hypogaea* L. has been domesticated and is widely cultivated (Prasad *et al*., 2010) [3]. It is grown mainly between latitudes 40°N and 40°S, with a growth period of 90–115 days for sequential branching types and 120–140 days for alternate branching types. The crop thrives best at temperatures of 22–28 °C, while yields may decline when temperatures fall below 18°C or rise above 33°C (FAO database).

In India, groundnut covers an area of 4.71 million ha with 10.18 million tonnes production and 2163 kg ha^{-1} productivity. In Telangana, *kharif* area is 10 thousand ha with 28 thousand tonnes of production and 2832 kg ha^{-1} productivity while total area is 92 thousand ha with 225 thousand tonnes production and 2450 kg ha^{-1} productivity. (Indiastat, 2023-24). In India, its yield is majorly influenced by rainfall patterns, making it vulnerable to monsoon fluctuations and drought, with climate change further intensifying these challenges through unpredictable weather (Mukhtar *et al*., 2013) [4]. Consequently, productivity remains unstable. In Telangana, groundnut holds significant importance as an oilseed crop, primarily grown on red sandy loams and alfisols in districts such as Mahabubnagar, Nagarkurnool, Wanaparthy, Nalgonda, and Rangareddy. Despite its significance, the average yield remains limited to about 1.5–2.0 t ha^{-1}, constrained by erratic rainfall, low soil fertility, pest infestations and limited use of advanced farming practices (ICRISAT, 2023).

Although many high-yielding groundnut varieties have been developed, their performance often varies with climatic conditions. Evaluating these varieties under local environments is essential, as temperature, rainfall and humidity play a crucial role in determining yield potential and disease tolerance (Soumya, 2011) [8]. Groundnut pod yield has been shown to follow a curvilinear trend in relation to rainfall and soil moisture availability (Bhatia *et al*., 2009) [6] making weather parameters as one of the major factors to be considered for groundnut production in Telangana. In Telangana, a baseline survey revealed that 98% of farmers rely on informal seed sources, with inadequate access to quality seed being a major constraint to improving yields and farm income (Charyulu *et al*., 2023) [7]. Research further indicates that, in many semi-arid regions, groundnut can deliver higher net returns and benefit–cost ratios than alternative crops under favorable conditions (Nayak *et al*., 2021 and Kamble *et al*., 2023) [5, 9]. Enhancing productivity during the *kharif* season in Telangana will require the adoption of improved varieties along with optimized sowing schedules.

Materials and Methods

The present investigation was conducted during the *kharif,* 2024 at the College Farm, College of Agriculture, Rajendranagar, Professor Jayashankar Telangana Agricultural University, Hyderabad (Telangana, India). The geographical location of the experimental site was 17° 19' 21" N latitude, 78° 24' 36" E longitude, with an elevation of 548 m above mean sea level. The experimental site is positioned in Telangana's Southern Telangana agro-climatic zone, falling under Troll's climate classification as a semi-arid tropic (SAT).

According to the soil analysis results the soil was considered slightly alkaline in reaction and had a loamy texture. It was found to have a medium level of available phosphorus, a high level of available potassium, and a low level of organic carbon and available nitrogen.

The research was conducted to study the impact of three sowing windows and five varieties. The three sowing dates under consideration were June II fortnight (June 20th), July I fortnight (July 5th) and July II fortnight (July 20th) and the varieties under study were TG37-A, KDG 128, TAG 24, TCGS 1694 and K6. The trail was conducted in Split-plot design with three replications, considering sowing dates as main plots and varieties as sub plots. Sowing was done accordingly and all the agronomic practices were followed as per the recommendation. Observations recorded from the investigation included days to emergence of seedling, days to attain physiological maturity, plant height (cm), leaf area (cm^2), leaf area index and leaf area duration at four phenological stages *i.e.*, first flower bud appearance, 50% flowering, pod formation stage and physiological maturity.

Results and Discussion

Effect of sowing dates

Days to emergence of the seedling

Days to seedling emergence were significantly influenced by sowing dates. The crop sown on 20th June 2024 (D_1) recorded the earliest emergence (9.4 days)**,** followed by 5th July (D_2) with 9.7 days, while 20th July (D_3) required the maximum time (10.6 days)**,** significantly higher than D_1. The delayed emergence in D_3 is likely due to reduced bright sunshine hours around the 29th SMW, affecting germination and seedling vigor, corroborating earlier findings that early sowing favors rapid emergence (Yadav, 2023).

Days to physiological maturity

Phenological duration of groundnut was significantly influenced by sowing dates. Early sowing on 20th June (D_1) recorded the longest crop duration (106.95 days) due to congenial temperature and moisture conditions that prolonged flowering and pod filling. 20th July sowing (D_3) recorded 103.38 days, which was statistically on par with D_1, while 5th July sowing (D_2) matured earliest (100.92 days) due to terminal moisture stress and declining temperatures hastening maturity. These results agree with Patel *et al.* (2021) and Reddy *et al.* (2014) [10], who reported that early sowing extends the reproductive phase, while delayed sowing shortens it due to stress. These results were similar to findings of Kanade *et al*. (2015) [9].

Plant height

The results regarding plant height as mentioned in Table 2 conclude that, at the first flower bud stage was not significantly influenced by the dates of sowing. Although statistically non-significant, the tallest plants were recorded in 5th July sowing with a mean height of 16.05 cm**,** followed by 20th June sowing (15.21 cm) and 20th July sowing (15.07 cm). At the 50% flowering stage, dates of sowing did not significantly influence plant height. The highest mean plant height was recorded under D_3 with 23.39 cm, followed by D_2 (22.50 cm) and D_1 (21.27 cm). Similar findings were also reported by Gowda *et al*. (2017), who observed that delayed sowing enhanced stem elongation but did not translate to higher yields. At the pod formation stage, the effect of dates of sowing on plant height was found to be significant. The plants sown on 20th June (D_1) attained a significantly greater height (35.39 cm) compared to those sown on 20th July (D_3, 32.43 cm)**,** while D_2 (5th July) was statistically on par with both. At physiological maturity, plant height was significantly influenced by sowing dates. The tallest plants were recorded in D_1 (41.77 cm)**,** which was significantly superior to D_2 (35.91 cm) and statistically on par with D_3 (40.56 cm). The comparatively shorter plant height in the crop sown in July can be attributed to lower temperatures whereas the crop sown in June II fortnight has been exposed to comparatively higher temperatures that might have led to the rapid growth of the plants. These results are in line with the findings of Kamble *et al.* (2023) [9]. The findings were according to Reddy *et al*. (2014) [12] and Yadavrao *et al*. (2023) [13].

Leaf area

Leaf area varied across sowing dates, though early stages showed no significant differences. At first bud appearance, D_1 (20th June) recorded the highest mean leaf area (126.51 cm²), followed by D2 (123.89 cm²) and D3 (115.68 cm²). A similar non-significant trend persisted at 50% flowering with values ranging from 408.36–418.71 cm². However, at pod formation, sowing date effects were significant, with D_1 showing the highest leaf area (1584.00 cm²), followed by D_2 (1467.15 cm²), while D_3 registered the lowest (1354.75 cm²). At physiological maturity, significant differences continued, with D_1 maintaining the maximum leaf area (1290.89 cm²), whereas D_2 (1201.52 cm²) and D_3 (1200.08 cm²) were statistically on par. These findings align with Raagavalli *et al*. (2019), who reported that early sowing promotes greater vegetative growth and leaf area development.

Leaf area index

At the pod formation stage, LAI showed significant variation across sowing dates, with the highest value recorded in the 20th June sowing (5.28), followed by 5th July (4.89), while the lowest LAI (4.52) occurred in 20th July sowing. The higher LAI in early-sown crops is mainly due to a longer vegetative phase, favorable temperatures, and better solar radiation, which promote canopy expansion and enhance photosynthetic efficiency. Early sowing also allows more biomass accumulation before flowering, ensuring a stronger source–sink relationship during pod development. In contrast, late sowing reduces vegetative duration and often subjects plants to heat and moisture stress, limiting leaf growth and canopy duration.

A similar pattern was observed at physiological maturity, where the crop sown on 20th June maintained the highest LAI (4.30), followed by 5th July (4.01), while 20th July recorded the lowest (4.00). The ability of early-sown crops to retain more green leaves and delay senescence extends the period of active photosynthesis, leading to better assimilate partitioning into pods. Late-sown crops, however, experience faster leaf senescence and a shortened pod-filling period, reducing LAI at maturity. These results are supported by Rathnakumar *et al*. (2013), Kumar *et al*. (2019), and Vyshnavi *et al*. (2023), who emphasized that early sowing favors prolonged canopy duration, better light interception, and higher LAI, ultimately contributing to improved yield potential.Similar observations were recorded by Baliarsingh and Mahapatra (2015).

Leaf area duration

The duration from first flower bud appearance to 50% flowering varied slightly among sowing dates, ranging from 8.7 to 9.4 days, but the differences were statistically non-significant. This suggests that early floral initiation and the transition to peak flowering are primarily governed by inherent genotypic and photoperiodic responses rather than sowing time (Patra et al., 2019). However, environmental conditions around flowering can subtly influence floral development rates.

A significant difference was recorded in the 50% flowering to pod formation period, where the crop sown on 20th June (D1) took the longest duration (124.7 days), followed by 5th July (114.9 days), while the 20th July sowing (D3) recorded the shortest (109.6 days). The longer duration in D1 can be attributed to a favorable photothermal regime and extended vegetative and reproductive overlap under early sowing, which allows better source development and assimilate partitioning (Rathnakumar et al., 2013; Kumar et al., 2019). Conversely, later sowing shortens this phase due to higher post-flowering temperatures and moisture stress during pod initiation.

For pod formation to physiological maturity, the differences among dates of sowing were statistically non-significant, although numerically D3 exhibited the longest duration (124.6 days) compared to D1 (110.7 days) and D2 (98.9 days). The extended maturity duration in late sowing could be a compensatory response of plants under sub-optimal vegetative growth conditions, attempting to prolong pod filling and physiological maturity (Singh et al., 2020).

Effect of varieties

Day to emergence of seedling

Varietal differences were non-significant, though numerically TG 37-A and TAG 24 emerged in 9.5 days**,** KDG 128 in 9.7 days, and TCGS 1694 and K6 in over 10 days, reflecting inherent genotypic traits. The interaction between sowing dates and varieties was non-significant, indicating consistent emergence trends across varieties.

Days to physiological maturity

Varieties showed significant differences in days to attain maturity (Table 1). TG37-A (107.8 days), TAG 24 (90.8 days) and K6 (98.1 days) were earliest to mature while KDG 128 (110.5 days) and TCGS 1694 (110.6 days) took the longest time. This variation confirms that genetic differences primarily govern crop duration**.**

Plant height

A significant difference among varieties regarding plant height was observed at the 1st flower bud appearance stage. Among the five tested varieties, K6 (V_5) recorded the highest plant height (17.74 cm) followed by TCGS 1694 (17.20 cm), whereas the shortest plants were observed in TAG 24 (13.04 cm). The difference in the plant height among different varieties can be attributed to the genetic differences among the varieties (Wang *et al*., 2021). At the 50% flowering stage, varietal differences remained significant. The tallest plants were recorded in K6 (23.93 cm), followed by TCGS 1694 (22.99 cm) and TAG 24 (21.22 cm). The shortest height was observed in TG 37-A (21.70 cm). During pod formation, the differences among varieties became more pronounced and statistically highly significant K6 (49.73 cm) exhibited an exceptionally high plant height, which was significantly superior to all other varieties. This was followed by TCGS 1694 (33.69 cm), TG 37 A (29.21 cm) and KDG 128 (28.94 cm). The lowest height at this stage was found in TAG 24 (27.34 cm). At the physiological maturity stage, a significant variation was recorded among the varieties. K6 showed significantly maximum plant height of 52.79 cm followed by TCGS 1694 (37.64 cm), KDG 128 (36.50 cm) and TG37 A(6.46 cm). TAG 24 continued to show the lowest plant height (33.69 cm), indicating its dwarf nature. The consistent superiority of K6 throughout the growth stages may be attributed to its higher photosynthetic activity and better partitioning of assimilates towards vegetative organs. Similar results were registered by Sree *et al*. (2020). The data for those arranged in Table 2.

Leaf area

The data of effect of sowing dates and varieties on leaf area has been presented in Table 3.TAG 37-A (134.55 cm²) and KDG 128 (132.33 cm²) recorded significantly higher leaf area compared to TAG 24 (120.78 cm^2), K6 (116.22 cm^2) and TCGS 1694 (106.27 cm²) at the 1st flower bud appearance stage. TG37-A exhibited the highest leaf area (439.10 cm²), significantly superior than K6 (400.80 cm^2) and TCGS 1694 (389.73 cm^2) and significantly on par to TAG 24 (419.50 cm²) and KDG 128 (418.73 cm²) during the 50% flowering stage. The marked increase in leaf area can be linked to accelerated cell division and expansion, coupled with vigorous vegetative growth supported by favorable weather conditions such as optimal temperature, adequate rainfall and sufficient light during the growth period. These outcomes resonate with previous empirical results by Banik *et al.* (2009) [15].

During the pod formation stage, the varietal differences in leaf area were statistically significant, reflecting the inherent genetic potential of each cultivar to develop canopy structure during the critical reproductive phase. TG 37-A exhibited the highest leaf area (1528.95 cm²), demonstrating its superior capacity for canopy expansion and photosynthate production during pod development. TAG 24 followed closely with 1521.80 cm² and was statistically on par with TG 37-A, indicating comparable efficiency in maintaining a broad source area for assimilate supply. KDG 128 and K6 recorded intermediate leaf areas of 1446.82 cm² and 1441.55 cm², respectively, suggesting moderate canopy development that supports adequate pod filling, while TCGS 1694 registered the lowest value (1404.04

cm²), likely due to its relatively limited leaf expansion potential. These findings emphasize the role of genetic makeup in influencing canopy architecture and photosynthetic capacity during reproductive growth. Similar trends were reported by Mohite *et al*. (2017) and Ragavalli *et al*. (2019), who noted that varieties with greater leaf area during pod formation often achieve better assimilate translocation and improved yield potential.

At physiological maturity, marked differences in leaf area per plant were evident among the groundnut varieties, reflecting the strong genetic control over canopy development. The leaf area ranged from 1190.25 cm² to 1276.85 cm², with variety V1 recording the highest value (1276.85 cm²), followed closely by V3 (1261.82 cm²), while the lowest was observed in V4 (1190.25 cm²). These variations are primarily attributed to inherent genotypic traits that influence leaf expansion, photosynthetic efficiency, and canopy retention during the later stages of crop growth. Varieties with broader leaf area at maturity tend to maintain higher assimilate production and delayed senescence, which in turn supports better dry matter accumulation and efficient pod filling. Such genotypic differences in leaf area have been widely reported in groundnut due to variations in leaf morphology and growth habit. Vyshnavi et al. (2023) also observed that K6 retained a significantly higher leaf area at physiological maturity compared to other cultivars, confirming that canopy size at this stage is largely governed by genetic potential rather than external factors. Thus, selecting varieties with superior leaf area retention can enhance photosynthate supply during reproductive growth and ultimately improve yield potential.

Leaf area index

The effect of sowing dates and five varieties is presented in Table 4. Groundnut leaf area index was significantly impacted by the types in the first stage of flower bud appearance. The variety TG 37A (0.45) had a much greater leaf area index than the other types, TAG 24 (0.40) and K-6 (0.39) (0.42), and was in line to KDG 128 (0.44). TCGS-1694 had the significantly lowest leaf area index (0.33).

At 50% flowering stage, there was significant effect of varieties on leaf area index of groundnut. Significantly higher leaf area index was recorded in the variety TG 37A (1.46) than the varieties KDG 128 (1.40) which was on par with TAG 24 (1.40) and significantly higher than K6 (1.34) and TCGS 1694 (1.30).

At pod formation stage there was no significant effect of varieties on the leaf area index of the groundnut.

Similarly, at physiological maturity stage higher leaf area index was reported in TG 37A (4.19) variety which was on par to TAG 24 (4.14) and significantly higher than KDG 128 (4.00), K6 (3.95) and TCGS 1694(3.90).

The observed varietal differences can be linked to genetic diversity in canopy architecture, leaf retention capacity, and growth period. According to Deshmukh *et al.* (2020), KDG 128 is characterized by its ability to sustain a higher leaf area index under rainfed and terminal stress conditions, whereas TG 37-A is noted for its pronounced early growth vigour.

Leaf area duration

Varietal differences were non-significant for the first flower bud to 50% flowering and 50% flowering to pod formation intervals, indicating that genetic factors controlling floral initiation and pod set are relatively stable across environments (Patra *et al*., 2019). However, pod formation to physiological maturity exhibited significant variation among varieties, reflecting strong genetic control over pod filling and seed maturity periods.

The maximum duration was observed in TG 37-A (165.1 days)**,** followed by TCGS 1694 (138.7 days) and KDG 128 (132.2 days), while TAG 24 (82.4 days) and K6 (38.5 days) matured much earlier. Varieties with extended pod filling phases like TG 37-A tend to accumulate more assimilates, which often translates into higher pod and kernel yields (Vyshnavi *et al*., 2023). In contrast, early maturing varieties like K6 have a short reproductive window, making them suitable for late sowing or rainfed conditions but with limited yield potential (Rathnakumar *et al*., 2013). These differences align with earlier reports that pod filling duration and maturity are highly genotype-specific and influenced by growth habit and canopy duration (Reddy *et al*., 2017; Singh *et al*., 2020).

Table 1: Effect of different dates of sowing and varieties on phenology of groundnut

Treatment	Phenology				
	Emergence stage	**1st Flower bud appearance stage**	**50% flowering stage**	**Pod formation stage**	**Physiological maturity stage**
Main factor: Dates of Sowing (D)					
D1- 20th June 2024	9.4	30.1	40.6	77.70	106.95
D2- 5th July 2024	9.7	29.7	39.7	76.39	100.42
D3- 20th July 2024	10.6	28.5	38.6	75.67	103.38
S.Em ±	0.2	0.4	0.08	0.38	1.2
CD (p=0.05)	0.9	NS	0.30	1.50	4.16
Sub factor: Varieties (V)					
V1- TG 37-A	9.5	29.3	38.08	72.40	107.8
V2- KDG 128	9.7	29.5	40.46	80.49	110.5
V3- TAG 24	9.5	30.2	39.40	72.66	90.8
V4- TCGS 1694	10.5	29.4	39.74	78.45	110.6
V5- K6	10.3	28.8	40.45	78.93	98.1
S.Em ±	0.40	0.50	0.51	1.25	1.37
CD (P=0.05)	NS	NS	1.48	3.66	4.01
Interaction (Factor (D)at same level of V)					
S.Em ±	0.6	0.9	0.88	2.17	2.9
CD (P=0.05)	NS	NS	NS	NS	NS
Interaction (Factor(V)at same level of D)					
S.Em ±	0.6	0.9	0.79	1.98	2.8
CD (P=0.05)	NS	NS	NS	NS	NS

Table 2: Plant height (cm) of groundnut varieties at different growth stages as influenced by sowing dates

Treatment	Plant height (cm)			
	1st Flower bud appearance stage	50% flowering Stage	Pod formation stage	Physiological maturity stage
Main factor: Dates of Sowing (D)				
D1- 20th June 2024	15.21	21.27	35.39	41.77
D2- 5th July 2024	16.05	22.50	33.53	35.91
D3- 20th July 2024	15.07	23.39	32.43	40.56
S.Em ±	0.3	0.66	0.47	0.62
CD (P=0.05)	NS	NS	1.83	2.45
Sub factor: Varieties (V)				
V1- TG 37-A	13.35	21.70	29.21	36.46
V2- KDG 128	15.89	22.10	28.94	36.50
V3- TAG 24	13.04	21.22	27.34	33.69
V4- TCGS 1694	17.20	22.99	33.69	37.64
V5- K6	17.74	23.93	49.73	52.79
S.Em ±	0.39	0.57	1.39	1.70
CD (P=0.05)	1.13	1.66	4.06	4.97
Interaction (Factor (D) at same level of V)				
S.Em ±	0.67	0.98	2.41	2.95
CD (P=0.05)	NS	NS	NS	NS
Interaction (Factor(V) at same level of D)				
S.Em ±	0.67	1.10	2.21	2.71
CD (P=0.05)	NS	NS	NS	NS

Table 3: Leaf area per plant (cm^2) of groundnut varieties at different growth stages as influenced by sowing dates

Treatment	Leaf area (cm2)			
	1st Flower bud appearance stage	50% flowering Stage	Pod formation stage	Physiological maturity stage
Main factor: Dates of Sowing (D)				
D1- 20th June 2024	126.51	418.71	1584.00	1290.89
D2- 5th July 2024	123.89	408.36	1467.15	1201.52
D3- 20th July 2024	115.68	413.69	1354.75	1200.08
S.Em ±	2.24	8.71	17.20	16.97
CD (P=0.05)	NS	NS	67.55	66.63
Sub factor: Varieties (V)				
V1- TG 37-A	134.55	439.10	1528.95	1276.85
V2- KDG 128	132.33	418.73	1446.82	1219.10
V3- TAG 24	120.78	419.57	1521.80	1261.82
V4- TCGS 1694	106.27	389.73	1404.04	1190.25
V5- K6	116.22	400.80	1441.55	1206.12
S.Em ±	3.21	10.99	32.64	21.13
CD (P=0.05)	9.37	32.06	95.28	61.67
Interaction (Factor (D)at same level of V)				
S.Em ±	5.56	19.03	56.54	36.60
CD (P=0.05)	NS	NS	NS	NS
Interaction (Factor(V)at same level of D)				
S.Em ±	5.56	19.03	56.54	36.60
CD (P=0.05)	NS	NS	NS	NS

Table 4: Leaf area index of groundnut varieties at different growth stages as influenced by sowing dates

Treatment	1st flower bud appearance stage	50% flowering stage	Pod formation stage	Physiological maturity stage
Main factor: Dates of Sowing (D)				
D1- 20th June 2024	0.42	1.40	5.28	4.30
D2- 5th July 2024	0.41	1.36	4.89	4.01
D3- 20th July 2024	0.39	1.38	4.52	4.00
S.Em ±	0.01	0.03	0.06	0.06
CD (P=0.05)	NS	NS	0.23	0.22
Sub factor: Varieties (V)				
V1- TG 37-A	0.45	1.46	5.10	4.26
V2- KDG 128	0.44	1.40	4.82	4.06
V3- TAG 24	0.40	1.40	5.07	4.21
V4- TCGS 1694	0.35	1.30	4.68	3.97
V5- K6	0.39	1.34	4.81	4.02
S.Em ±	0.01	0.04	0.11	0.07
CD (P=0.05)	0.03	0.11	0.32	0.21
Interaction (Factor (D)at same level of V)				
S.Em ±	0.02	0.06	0.19	0.12
CD (P=0.05)	NS	NS	NS	NS
Interaction (Factor(V)at same level of D)				
S.Em ±	0.02	0.06	0.17	0.12
CD (P=0.05)	NS	NS	NS	NS

Table 5: Leaf area duration of groundnut varieties at different growth stages as influenced by sowing dates

Treatment	1st flower bud appearance to 50% flowering	50% flowering to pod formation	Pod formation to physiological maturity
Main factor : Dates of Sowing (D)			
D1- 20th June 2024	9.4	124.7	110.7
D2- 5th July 2024	8.7	114.9	98.9
D3- 20th July 2024	8.9	109.6	124.6
S.Em ±	0.4	1.5	5.3
CD (P=0.05)	NS	6.0	NS
Sub factor : Varieties (V)			
V1- TG 37-A	8.4	112.6	165.1
V2- KDG 128	9.9	126.0	132.2
V3- TAG 24	8.2	108.2	82.4
V4- TCGS 1694	8.5	116.0	138.7
V5- K6	10.1	119.1	38.5
S.Em ±	0.6	4.7	8.7
CD (P=0.05)	NS	NS	25.5
Interaction (Factor (D)at same level of V)			
S.Em ±	1.0	8.1	15.1
CD (P=0.05)	NS	NS	NS
Interaction (Factor(V)at same level of D)			
S.Em ±	1.0	8.1	15.1
CD (P=0.05)	NS	NS	NS

Conclusion

In groundnut, plant height was not significantly influenced by sowing dates at the first flower bud and 50% flowering stages, but the effect became significant during pod formation and physiological maturity. Across varieties, significant differences in plant height were recorded at all growth stages, with K6 attaining the greatest height at physiological maturity, surpassing TCGS 1694, KDG 128, TAG 24 and TG 37A.

Sowing dates had a significant impact on leaf area, leaf area index (LAI). However, varietal differences were evident for leaf area. TG 37-A exhibited a significantly larger leaf area than TCGS 1694 and K6, while being comparable to TAG 24 and KDG 128. At physiological maturity, TG 37A also recorded a significantly higher LAI than TCGS 1694 and K6, but was statistically similar to KDG 128 and TAG 24. For LAD, KDG 128 recorded significantly higher values than TAG 24 and K6, while remaining at par with TCGS 1694 and TG 37-A.

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