***Original Research Article***

**Performance of groundnut genotypes under different sowing windows**

**ABSTRACT:**

 A field experiment was conducted to assess the performance of groundnut genotypes under different sowing windows during *rabi* season under ICAR-AICRP on groundnut at Zonal Agricultural and Horticultural Research Station, Hiriyur during 2023-24. The experiment was laid out in strip plot design with three replications consisting of three sowing windows as vertical factor and four varieties as horizontal factor. Groundnut sown on 48th MW (Meteorological week) recorded significantly higher pod yield (1937 kg ha-1) and at par with 52nd MW (1890 kg ha-1). Among the varieties, ~~variety~~ KL-1812 recorded significantly higher pod yield (2240 kg ha-1) and was at par with K-6 (2061 kg ha-1). Among the interactions the variety KL-1812 sown on 48th MW recorded significantly higher pod yield (2472 kg ha-1) which is found to be on par with KL-1812 sown on 52nd MW (2396 kg ha-1) and variety K-6 sown on 48th MW (2250 kg ha-1).

Key words: ~~MW-~~ Meteorological week, sowing window, ~~vertical factor, horizontal factor,~~                         pod yield, groundnut, genotypes

1. **INTRODUCTION:**

Groundnut (*Arachis hypogaea* L.), known as "King of Oilseeds”, is the third most important edible oilseed crop in India. Groundnut kernels contain 42 to 50 per cent oil, 26 per cent protein, 18 per cent carbohydrates, 5 per cent fiber, ash, and are high in riboflavin, thiamine, nicotinic acid and vitamin E, all of which are lacking in cereals. The groundnut is cultivated on large scale in almost all the tropical and sub-tropical countries. Being a day length insensitive crop, can be grown in all the three seasons *i.e.,* *kharif*, *rabi* and summer. Under Indian conditions, crop sowing time varies according to crop type, variety, and soil moisture availability, the unique reasons for generating large crop yields (Somanagouda *et al*., 2020). The different planting dates had significant effects on morphological characters of the crop yield and the interactions among planting date and cultivar were significant for the evaluation of yield components (Sardana and Kandhola, 2007; Banik *et al*., 2009 and Meena *et al*., 2013). Even though adoptable genotypes are present, expression of their genes are suppressed by the effect of nurture and environment. Many physical and chemical factors are responsible for the evolution of superior genotypes. In order to improve yield, it is necessary to adopt appropriate management methods. As a result, choosing the right genotypes and sowing at the right time is one of the most critical non-monetary inputs for increasing crop yield and productivity.

1. **MATERIAL AND METHODS:**

 The experiment was conducted during *rabi* season 2023-24 on black loam soil at AICRP on Groundnut, Zonal Agricultural and Horticultural Research Station (ZAHRS), Babbur Farm, Hiriyur which is situated in the Central Dry Zone (Zone-4) of Chitradurga, Karnataka at 13057**'** 32**"** North latitude and 700 37**'** 38**"** East longitude with an altitude of 606.1 m above the mean sea level (MSL). The experiment was laid out in strip- plot design with three replications consisting of three sowing windows as vertical factor D1: 42nd MW (15 October- 21 October), D2 : 48th MW (26 November- 02 December), D3 : 52nd MW (24 December- 31 December) and four varieties as horizontal factor V1 : Dh-256, V2 : K-6, V3 : KL-1812 and V4 : TMV-2.

 Treated seeds were sown manually at a spacing of 30×10 cm. Gap filling was done at ten days after sowing of groundnut. Farm yard manure @ 7.5 t ha-1 was applied 15 days before sowing. The nitrogen, phosphorus and potassium were applied in the form of urea, single super phosphate (SSP) and muriate of potash (MOP), respectively. 50 per cent of N, is urea, a full dose of P, is SSP and for K in the form of MOP vice that were mixed and applied at the time of sowing and the remaining 50 per cent of N, is urea was applied at 30 DAS.

 According to the date of sowing and duration of the varieties, the crop was harvested at physiological maturity. Growth and yield observations at harvest and oil content and oil yield were recorded as per the standard procedures. The data collected from the experiment during crop growth period were subjected to statistical analysis as described by Gomez and Gomez (1984).

1. **RESULTS AND DISCUSSION**

**3.1 Effect of sowing windows on growth and yield of groundnut**

 At harvest groundnut sown on 48th MW recorded significantly higher growth parameters like plant height (30.75 cm), number of branches plant-1 (8.24), leaf area (10.58 dm2 plant-1) and total dry matter accumulation (29.71 g plant-1) followed by crop sown on 52nd MW (29.78 cm, 8.01, 10.33 dm2 plant-1, and 28.79 g plant-1, respectively).

 Yield and yield parameters were significantly influenced by sowing windows. Groundnut sown on 48th MW recorded significantly higher pod yield, kernel yield, haulm yield, shelling percentage and harvest index (2805 kg ha-1, 3027 kg ha-1, 69.25% and 38.5%, respectively) which is found on par with crop sown on 52nd MW (1890 kg ha-1, 1311 kg ha-1, 2986 kg ha-1 67.49% and 38.4%, respectively). The increased pod yield and haulm yield was due to higher yield attributing characters viz., number of pods plant-1 and pod weight plant-1, 100 kernel weight (Table 3).

 Increase in the pod yield and yield attributes was mainly due to higher plant height, number of branches, leaf area plant-1 and total dry matter (Table 1). Significantly higher pod yield is due to the higher yield attributing characters and favorable weather condition. Similar results were also reported by Ibraheem *et al*. (2018), Ijaz *et al.* (2021), Ashwni *et al.* (2021), and Kumar *et al.* (2017) in groundnut.

**3.2 Effect of varieties on growth and yield of groundnut**

 Among the four genotypes, KL-1812 recorded significantly higher growth parameters like plant height(30.60 cm), number of branches plant-1 (8.00), leaf area (10.38 dm2 plant-1) and total dry matter accumulation (29.40 g plant-1) and found at par with K-6 (30.32 cm, 7.98, 10.11 dm2 plant-1 and 29.11 g plant-1,respectively).

 The variety KL-1812 recorded significantly higher pod yield, kernel yield, haulm yield, shelling percentage and harvest index (2240 kg ha-1 , 1548 kg ha-1 , 3436 kg ha-1 ,68.53 and 39.3 respectively) and found at par with K-6(2061 kg ha-1 , 1417 kg ha-1 , 3250 kg ha-1 ,68.44% and 38.4%, respectively).

 The increase in pod yield of the varieties was attributed to genetic makeup resulted in better performance of yield. The increased pod yield and haulm yield of the varieties was due to higher yield attributing characters viz., number of pods plant-1 (Table 3), shelling percentage, harvest index (Table 2). Raagavalli *et al*. (2019) attributed significantly higher pod yield to the better morpho- physiological characters of the varieties. Similar results were also reported by Ashwini *et al.* (2021), Chaudhari *et al.* (2018) and Kumar *et al.* (2020) in groundnut.

**3.3 Interaction effect of sowing windows and varieties on growth and yield of groundnut**

 Among interactions variety KL-1812 sown during 48th MW recorded significantly higher growth parameters like plant height(30.60 cm), number of branches plant-1 (8.00) and total dry matter accumulation (29.40 g plant-1) and yield attributes like pod yield, kernel yield, haulm yield and shelling percentage(2472 kg ha-1 ,1778 kg ha-1 , 3732 kg ha-1 and 71.92%, respectively) and found at par with KL-1812 sown during 52nd MW and variety K-6 sown on 48th MW(Table 2).

 The increased pod yield and haulm yield was due to higher growth and yield attributing characters and might be due to genetic potentiality of improved varieties coupled with favorable weather conditions prevailed during the 48th MW. The findings were in conformity with the results of Hussain *et al*. (2019) who attributed significantly higher pod yield to the higher yield attributing characters and favourable weather condition. Similar results were also reported by Ashwini *et al.* (2021), Ibraheem *et al*. (2018) and Kumar *et al.* (2017) in groundnut.

1. **CONCLUSION:**

 It was concluded that sowing of groundnut variety KL-1812 during 48th MW found optimum for higher pod yield and kernel and that leads to ~~higher net returns~~ which was on par with KL-1812 sown on 52nd MW and K-6 sown on 48th MW during *Rabi* season.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatments** | **Plant height (cm)** | **Number of branches plant-1** | **Leaf area (dm2 plant-1 )** | **Total dry matter (g plant-1 )** |
|  **Vertical factor: Sowing window (D)** |
| D1: 42nd MW | 26.30 | 7.78 | 8.83 | 26.82 |
| D2: 48th  MW | 30.75 | 8.24 | 10.58 | 29.71 |
| D3: 52nd MW | 29.78 | 8.01 | 10.33 | 28.79 |
| S.Em. (±) | 0.24 | 0.05 | 0.06 | 0.11 |
| C.D. @ p<0.05 | 0.94 | 0.20 | 0.23 | 0.43 |
|  **Horizontal factor: Varieties (V)** |
| V1: Dh-256 | 26.61 | 7.91 | 9.74 | 27.69 |
| V2: K-6 | 30.32 | 7.98 | 10.11 | 29.11 |
| V3: KL-1812 | 30.60 | 8.00 | 10.38 | 29.40 |
| V4: TMV-2 | 28.24 | 7.86 | 9.41 | 27.54 |
| S.Em. (±) | 0.36 | 0.08 | 0.11 | 0.30 |
| C.D. @ p<0.05 | 1.24 | 0.26 | 0.37 | 1.04 |
| **Interaction (D x V)** |
| D1V1 | 23.05 | 7.84 | 8.74 | 25.14 |
| D1V2 | 27.53 | 7.75 | 8.93 | 28.63 |
| D1V3 | 28.60 | 7.88 | 9.14 | 27.85 |
| D1V4 | 26.03 | 7.65 | 8.49 | 25.64 |
| D2V1 | 29.12 | 8.04 | 10.27 | 27.57 |
| D2V2 | 31.63 | 8.01 | 11.14 | 29.32 |
| D2V3 | 32.67 | 8.06 | 11.02 | 31.04 |
| D2V4 | 29.56 | 7.96 | 9.89 | 28.56 |
| D3V1 | 27.65 | 8.05 | 10.21 | 28.37 |
| D3V2 | 30.54 | 7.96 | 10.27 | 29.03 |
| D3V3 | 31.80 | 8.07 | 10.99 | 29.66 |
| D3V4 | 29.13 | 7.95 | 9.85 | 28.43 |
| S.Em. (±) | 0.43 | 0.15 | 0.05 | 0.31 |
| C.D. @ p<0.05  | 1.33 | NS | NS | 0.95 |

**Table: 1.Growth parameters of groundnut as influenced by sowing windows                and varieties at harvest**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | **Pod yield****(kg ha-1 )** | **Kernel yield****(kg ha-1 )** | **Haulm yield (kg ha-1)** | **Shelling percentage %** | **Harvest index****(%)** |
| **Vertical factor: Sowing window (D)** |
| D1: 42nd MW | 1558 | 962 | 2740 | 61.43 | 35.8 |
| D2: 48th  MW | 1937 | 1352 | 3091 | 69.25 | 38.5 |
| D3: 52nd MW | 1890 | 1311 | 2986 | 67.49 | 38.4 |
| S.Em. (±) | 13.14 | 7 | 15.60 | 0.60 | 0.46 |
| C.D. @ p<0.05 | 51.58 | 26 | 61.23 | 2.37 | 1.83 |
|  **Horizontal factor: Varieties (V)** |
| V1: Dh-256 | 1811 | 1187 | 3155 | 63.73 | 35.8 |
| V2: K-6 | 2061 | 1417 | 3250 | 68.44 | 38.4 |
| V3: KL-1812 | 2240 | 1548 | 3436 | 68.53 | 39.3 |
| V4: TMV-2 | 1068 | 682 | 1914 | 63.53 | 34.9 |
| S.Em. (±) | 17 | 12 | 14.56 | 0.59 | 0.58 |
| C.D. @ p<0.05 | 60 | 41 | 50.39 | 2.06 | 2.00 |
| **Interaction (D x V)** |
| D1V1 | 1725 | 1047 | 3051 | 60.70 | 36.1 |
| D1V2 | 1773 | 1128 | 2813 | 63.63 | 38.7 |
| D1V3 | 1852 | 1150 | 3228 | 62.10 | 36.5 |
| D1V4 | 882 | 523 | 1867 | 59.30 | 32.0 |
| D2V1 | 1958 | 1336 | 3138 | 68.23 | 37.0 |
| D2V2 | 2250 | 1533 | 3349 | 70.96 | 39.1 |
| D2V3 | 2472 | 1778 | 3732 | 71.92 | 39.8 |
| D2V4 | 1156 | 762 | 1924 | 65.90 | 38.2 |
| D3V1 | 1749 | 1177 | 3160 | 62.27 | 34.2 |
| D3V2 | 2160 | 1591 | 3283 | 70.72 | 40.3 |
| D3V3 | 2396 | 1715 | 3368 | 71.56 | 41.7 |
| D3V4 | 1166 | 763 | 1951 | 65.40 | 37.4 |
| S.Em. (±) | 30 | 22 | 50 | 0.96 | 1.35 |
| C.D. @ p<0.05  | 92 | 68 | 153 | 2.96 | NS |

**Table: 2.Yield and yield parameters of groundnut as influenced by sowing                windows and varieties at harvest**

**Table: 3**. **Number of pods per plant and pod weight of groundnut as influenced by                 different sowing windows and varieties**

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatments** | **No. of pods** **plant-1** | **Pod weight** **Plant-1(g)** | **100 kernel weight(g)** |
|  **Vertical factor: Sowing window (D)** |
| D1: 42nd MW | 12.01 | 17.36 | 41.50 |
| D2: 48th  MW | 17.30 | 26.67 | 47.54 |
| D3: 52nd MW | 16.97 | 26.34 | 46.87 |
| S.Em. (±) | 0.10 | 0.16 | 0.15 |
| C.D. @ p<0.05 | 0.41 | 0.65 | 0.58 |
| **Horizontal factor: Varieties (V)** |
| V1: Dh-256 | 14.37 | 21.88 | 45.22 |
| V2: K-6 | 17.21 | 25.82 | 45.26 |
| V3: KL-1812 | 17.23 | 26.00 | 54.49 |
| V4: TMV-2 | 12.89 | 20.28 | 36.25 |
| S.Em. (±) | 0.12 | 0.18 | 0.39 |
| C.D. @ p<0.05 | 0.43 | 0.62 | 1.35 |
| **Interaction (D x V)** |
| D1V1 | 11.34 | 16.25 | 42.96 |
| D1V2 | 14.00 | 19.63 | 39.43 |
| D1V3 | 12.62 | 18.61 | 43.40 |
| D1V4 | 10.07 | 14.97 | 34.23 |
| D2V1 | 16.03 | 25.01 | 46.50 |
| D2V2 | 19.10 | 28.94 | 48.57 |
| D2V3 | 19.64 | 29.71 | 57.50 |
| D2V4 | 14.43 | 23.03 | 38.40 |
| D3V1 | 15.73 | 24.39 | 46.20 |
| D3V2 | 18.54 | 28.90 | 47.77 |
| D3V3 | 19.44 | 29.22 | 56.57 |
| D3V4 | 14.16 | 22.85 | 36.13 |
| S.Em. (±) | 0.24 | 0.41 | 0.56 |
| C.D. @ p<0.05  | 0.75 | 1.27 | 1.73 |

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