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# Evaluation of Groundnut Cultivars for Late Sown Conditions (With New Set of Varieties)

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**A B S T R A C T**

Field experiment was conducted at Agricultural Research Station, Kadiri, ANGRAUto study the influence of sowing windows on growth and yield of groundnut genotypes under rainfed conditions during *Kharif* season of 2011-12, 2012-13 and 2013-14 on sandy loam soil. Four groundnut genotypes *viz.,* Kadiri-5, Kadiri-6, Kadiri-9 and Kadiri Harithandra were evaluated under four sowing windows *viz.,* (D1: onset of monsoon, D2:15 days after onset of monsoon, D3: 30 days after onset of monsoon, D4: 45 days after onset of monsoon). The experiment was laid out in Split plot Design and replicated thrice. Pooled results over three years of study revealed that among four varieties studied higher mean pod yield was recorded with K-9 which was on par with K-5 and Harithandhra and significantly superior over K-6. Among different dates of sowing, pod yields were significantly higher with sowing upto 2nd fortnight of August (D1, D2 & D3) and further delay in sowing time significantly reduced the pod yields. Mean reduction in pod yield among varieties was minimum with K-9 (11.9 %) followed by Harithandhra (14.7 %). Sowing up to August 2nd fortnight the reduction in yield only to the level of 12.5 % but later in the month of September yield was reduced to 32.2 %.

## Introduction

In the agricultural economy of India, oilseeds are important next only to food grains in terms of area, production and value. The diverse agro-ecological conditions in the country are favourable for growing all the nine annual oilseeds, which include seven edible oilseeds, viz. soybean, groundnut, rapeseed-mustard, sunflower, sesame, safflower, niger, and two non-edible oilseeds, viz. castor and linseed. Groundnut shall continue to be an important oil seed crop for the semi-arid regions if the projected demand of oils and fats has to be mat with sustainability. In dry land agriculture, farmers have limited choice for sowing time, but in irrigated situation sowing time is one of the most important non-monetary inputs affecting yield of crops (Sardana and Kandhol 2007). Kabadagi and Bala (2010) worked together in different climatic conditions including present one and sowing time and genotypes responds very well to variant climatic conditions. In southern parts of India, onset of S.W. Monsoon is usually delayed and farmers could not sow the Groundnut crop before 2nd week of July. Sowings will be taken up even

in 1st week of August with the receipt of meagre rains which resulted poor yields. Selection of suitable variety for such late sown conditions may avoid the complete crop loss. Hence this experiment is proposed.

## Materials and Methods

The field experiment was conducted with four varieties (K-5, Kadiri-6, Kadiri-9 and Kadiri Harithandra) sown under four dates (onset of monsoon, 15 days after onset of monsoon, 30 days after onset of monsoon, 45 days after onset of monsoon) in split plot design with 3 replications during *kharif*, 2011 to 2013 under rainfed situation at Agricultural research station, Kadiri. The soil of the experimental site was sandy loam and nutrients were applied @ 20-40-50 kg NPK $ha^{-1}$ in the form of urea, SSP and MOP respectively along with 10 t of farm yard manure. Biometric observations were recorded by selected five plants from each plot randomly and marked with proper rotations. These plants were harvested at maturity separately for assessing individual plant yield. The growth parameters and yield parameters were studied. Pod and haulm yield was recorded from the net plot discarding 60 cm plot at all four sides. The data recorded on various parameters of crop was subjected to statistical scrutiny by the method of analysis of variance as outlined by Panse and Sukhatme (1985). Statistical significance was tested by 'F' value at 5 per cent level of probability and wherever the 'F' value was found significant, critical difference (CD) was worked out at 5 per cent level of probability and the values are furnished. The treatmental difference that were non significant are denoted as NS.

## Results and Discussion

### Kharif, 2011-12

Different cultivars under different dates of sowing exerted significant influence on the economical yield and yield attributes of rainfed groundnut.

### Effect on pod yield

Among varieties, K-9 has recorded significantly higher mean pod yield (824 kg $ha^{-1}$) over Kadiri Harithandra (679 kg $ha^{-1}$), and on par with K-5 and K-6. Mean pod yield significantly decreased with every 15 days delay in sowing time, the highest being with D1 (1154 kg $ha^{-1}$). Lowest pod yield (421 kg $ha^{-1}$) was recorded with D4 which was on par with D3 (656 kg $ha^{-1}$). The mean reduction in pod yield due to delay in sowing time was 26.2, 41.0 and 62.1% with D2, D3 and D4 respectively, when compared to D1. Kadiri Harithandra and Kadiri-9 showed less reduction (20-30 %) when compared to Kadiri-6 and Kadiri-5. Hence for delayed sowings these varieties are seems to be promising. The interaction effect is also significant.

### Effect on haulm yield

Significantly higher mean haulm yield was recorded with Kadiri Harithandra (1582 kg ha-1) which was on par with Kadiri-9 and both the varieties are significantly superior to K-5 and K-6. Stay greenness of Kadiri Harithandra and drought tolerance of K-9 variety had resulted in higher haulm yields in these varieties. Haulm yields of all the varieties significantly reduced due to every 15 days delay in sowing time. Interaction effect is also significant and KH variety at D1 resulted highest haulm yield.

### Effect on yield attributes

Mean number pods per plant did not vary significantly due to varieties, however varied significantly due to delayed sowings. Higher number of pods per plant was higher with D1 which was on par with D2 and significantly

higher over D3 and D4. Though the number of pods due to varieties is on par, numerically higher numbers of pods were recorded with K-9 which reflects its drought tolerance and suitability to delayed situations. Highest number of pods were recorded with K-9 under D1 and lowest were with K-5 under D4. Other yield attributes viz., hundred pod weight, hundred kernel weight, shelling percentage and SMK percentage were followed the similar trend.

**Kharif, 2012-13**

Among varieties, K-9 has recorded significantly higher mean pod yield (1200 kg $ha^{-1}$) over K-5 and K-6 and on par with Kadiri Harithandra (1108 kg $ha^{-1}$). Among different dates of sowing, mean pod yield did not decrease due to delay (up to 9$^{th}$ September) in sowing time compared to July 24$^{th}$ sowing.

Higher pod yield was recorded with D3 (26-8-2010) which was on par with D2 (10-8-2010) and significantly higher over D1 and D4. 18.1 % increase in mean pod yield was observed with D2 compared to D1, further it was increased up to 23 % with D3 and later on only 7.3 % was increased with D4. Kadiri-9 with D2 (26-8-2010) has resulted significantly higher pod yield (1399 kg $ha^{-1}$) followed by Harithandra with D3.

**Table.1** Pod and haulm yield of groundnut cultivars as influenced by different sowing dates

| Treatments | Pod Yield (Kg $ha^{-1}$) | | | | Haulm yield (Kg $ha^{-1}$) | | | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | 2012 | 2013 | Pooled Mean | 2011 | 2012 | 2013 | Pooled Mean |
| Main Plots: | | | | | | | | |
| V1: K-5 | 777 | 928 | 1037 | 914 | 1305 | 1129 | 1351 | 1261 |
| V2: K-6 | 780 | 774 | 927 | 827 | 1344 | 1142 | 1196 | 1227 |
| V3: K-9 | 824 | 1200 | 1263 | 1096 | 1557 | 1326 | 1640 | 1508 |
| V4: Kadiri Harithandhra | 679 | 1108 | 1135 | 974 | 1582 | 1412 | 1739 | 1578 |
| CV % | 16.8 | 16.1 | 17.4 | 16.7 | 18.2 | 17.4 | 18.5 | 16.8 |
| SEm ± | 54.6 | 51 | 64 | 55 | 76.4 | 74 | 79 | 82 |
| CD at 5 % | 132 | 124 | 155 | 134 | 189 | 178 | 196 | 203 |
| Sub Plots: | | | | | | | | |
| D1: onset of monsoon | 1154 | 885 | 1278 | 1106 | 1687 | 1385 | 1658 | 1577 |
| D2: 15 days to D1 | 830 | 1072 | 1000 | 967 | 1582 | 1394 | 1592 | 1523 |
| D3: 30 days to D1 | 656 | 1138 | 1165 | 986 | 1394 | 1282 | 1428 | 1368 |
| D4: 45 days to D1 | 421 | 915 | 919 | 752 | 1125 | 1048 | 1248 | 1140 |
| CV % | 19.6 | 16.4 | 18.3 | 17.3 | 22.2 | 18.1 | 17.9 | 18.5 |
| SEm ± | 69.5 | 62 | 55 | 58 | 80.1 | 75 | 92 | 80 |
| CD at 5 % | 172 | 149 | 136 | 143 | 198 | 183 | 212 | 198 |
| Interaction (VxD) | 178 | 168 | 171 | 177 | 234 | 214 | 226 | 248 |

**Table.2** Pod and haulm yield of groundnut cultivars as influenced by different sowing dates

| Treatments | Number of pods/plant | | | | Hundred pod weight | | | | Shelling % | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2011 | 2012 | 2013 | Pooled Mean | 2011 | 2012 | 2013 | Pooled Mean | 2011 | 2012 | 2013 | Pooled Mean |
| Main Plots: | | | | | | | | | | | | |
| V1: K-5 | 9.0 | 8.7 | 7.6 | 8.4 | 62.8 | 67.4 | 62.4 | 64.2 | 66.0 | 72.0 | 67.5 | 68.5 |
| V2: K-6 | 9.5 | 8.2 | 8.0 | 8.6 | 62.8 | 74.0 | 70.1 | 69.0 | 68.5 | 71.8 | 69.2 | 69.8 |
| V3: K-9 | 10.3 | 11.7 | 9.6 | 10.5 | 62.0 | 61.5 | 54.6 | 59.4 | 70.9 | 77.3 | 77.7 | 75.3 |
| V4: KH | 9.2 | 11.0 | 9.0 | 9.7 | 67.6 | 76.1 | 65.4 | 69.7 | 53.1 | 69.2 | 63.8 | 62.0 |
| CV % | 15.2 | 13.4 | 14.2 | 15.1 | 11.7 | 11.6 | 12.1 | 11.8 | 9.0 | 9.2 | 8.9 | 9.4 |
| SEm ± | 1.0 | 1.1 | 1.2 | 1.3 | 1.82 | 2.0 | 1.9 | 2.0 | 1.3 | 1.3 | 1.5 | 1.6 |
| CD at 5 % | NS | 2.7 | NS | NS | 4.5 | 4.4 | 4.7 | 5.0 | 3.1 | 3.2 | 3.6 | 4.0 |
| Sub Plots: | | | | | | | | | | | | |
| D1: onset of monsoon | 14.4 | 8.7 | 10.0 | 11.0 | 68.6 | 64.5 | 61.2 | 64.8 | 62.0 | 70.4 | 69.4 | 67.3 |
| D2: 15 days to D1 | 11.5 | 11.2 | 7.5 | 10.1 | 65.5 | 70.3 | 64.3 | 66.7 | 68.0 | 72.6 | 69.9 | 70.2 |
| D3: 30 days to D1 | 7.2 | 11.3 | 9.2 | 9.2 | 61.6 | 75.6 | 69.0 | 68.7 | 65.9 | 74.3 | 66.1 | 68.8 |
| D4: 45 days to D1 | 5.0 | 8.3 | 6.6 | 6.6 | 59.4 | 68.6 | 52.0 | 60.0 | 62.6 | 73.1 | 66.8 | 67.5 |
| CV % | 16.2 | 16.1 | 15.5 | 14.8 | 12.5 | 13.4 | 12.8 | 11.3 | 12.8 | 11.5 | 12.1 | 11.6 |
| SEm ± | 1.3 | 1.1 | 1.2 | 1.4 | 1.7 | 1.5 | 1.6 | 1.8 | 1.6 | 1.7 | 1.8 | 1.7 |
| CD at 5 % | 3.2 | 2.7 | 3.0 | 3.4 | 4.2 | 4.4 | 4.0 | 4.4 | 4.0 | NS | NS | NS |
| Interaction (VxD) | 3.4 | 3.4 | 3.2 | 3.5 | 6.2 | 5.3 | 4.6 | 4.7 | 3.8 | 3.6 | 4.6 | 4.2 |

**Table.3** Two way table showing the pod yield of groundnut cultivars as influenced by different sowing dates (Pooled for 3 years)

| | D1 | D2 | D3 | D4 | Mean |
|---|---|---|---|---|---|
| V1: K-5 | 1083 | 896 | 933 | 744 | 914 |
| V2: K-6 | 1058 | 846 | 733 | 671 | 827 |
| V3: K-9 | 1203 | 1135 | 1171 | 874 | 1096 |
| V4: KH | 1079 | 992 | 1107 | 717 | 974 |
| Mean | 1106 | 967 | 986 | 752 | -- |
| CD(P=0.05) : V=108, D=123, VxD=168, DxV=176 | | | | | |

**Table.4** Reduction in pooled pod yield (%) of groundnut cultivars due to delay in sowing time (Pooled for 3 years)

| | D1 | D2 | D3 | D4 | Mean |
|---|---|---|---|---|---|
| V1: K-5 | -- | 17.2 | 13.8 | 31.3 | 20.8 |
| V2: K-6 | -- | 20.0 | 30.7 | 36.5 | 29.1 |
| V3: K-9 | -- | 5.7 | 2.7 | 27.3 | 11.9 |
| V4: KH | -- | 8.1 | 2.6 | 33.5 | 14.7 |
| Mean | -- | 12.8 | 12.5 | 32.2 | -- |

Significantly higher mean haulm yield was recorded with Kadiri Harithandra (1412 kg $ha^{-1}$) which was on par with Kadiri-9 (1326 kg $ha^{-1}$) and both the varieties are significantly superior to K-5 and K-6. Stay greenness of Kadiri Harithandra and drought tolerance of K-9 variety had resulted in higher haulm yields in these varieties. Haulm yield of all the varieties reduced due to every 15 days delay in sowing time. Interaction effect is also significant and K-9 variety at D2 resulted highest haulm yield. Kadiri-9 has recorded higher mean number of pods per plant which was on par with Harithandra and significantly superior over K-5 and K-6. While, mean number of pods per plant was at par among D1, D2 and D3. Higher numbers of pods with K-9 reflects its drought tolerance and suitability to delayed situations. Other yield attributes viz., hundred pod weight, hundred kernel weight, shelling percentage and SMK percentage were followed the similar trend.

## Kharif, 2013-14

Among varieties, K-9 has recorded significantly higher mean pod yield (1263 kg $ha^{-1}$) over K-5 and K-6 and on par with Kadiri Harithandra (1135 kg $ha^{-1}$). Among different dates of sowing, higher mean pod yield was recorded with first date of sowing (25-7-2011) which was on par with third date of sowing (25-8-2011) and significantly superior over other dates of sowing. Significantly higher mean haulm yield was recorded with Kadiri Harithandra (1739 kg $ha^{-1}$) which was on par with Kadiri-9 (1640 kg $ha^{-1}$) and both the varieties are significantly superior to K-5 and K-6. Stay greenness of Kadiri Harithandra and drought tolerance of K-9 variety had resulted in higher pod and haulm yields in these varieties. Mean number of pods per plant was also higher with K-9 and Harithandhra but statistically on par with K-5 and K-6. Other yield attributes viz., hundred pod weight, hundred kernel weight, shelling percentage and SMK percentage were followed the similar trend.

Pooled results over three years of study revealed that among four varieties studied higher mean pod yield was recorded with K-9 which was on par with K-5 and Harithandhra and significantly superior over K-6. Among different dates of sowing, pod yields were significantly higher with sowing upto 2$^{nd}$ fortnight of August (D1, D2 & D3) and further delay in sowing time significantly reduced the pod yields. The interaction effect is also significant. Mean reduction in pod yield among varieties was minimum with K-9 (11.9 %) followed by Harithandhra (14.7 %). Sowing up to August 2$^{nd}$ fortnight the reduction in yield only to the level of 12.5 % but later in the month of September yield was reduced to 32.2 %. These results are also in close agreement with the findings of Gouri *et al.,* (2005). Hence from this study, it can be concluded that K-9 and Kadiri Harithandhra varieties are promising for late sown conditions and July 2$^{nd}$ fortnight is the best time for sowing.

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