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## Influence of plant spacing and fertilizer levels on growth and yield of summer groundnut

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### Abstract

A field experiment was conducted at Main Agricultural Station, Dharwad during summer 2017-18 under sprinkler irrigated condition to study the influence of plant spacing and fertilizer levels on summer groundnut. The experiment was laid out in split plot design consisting of three spacing in main plot (S<sub>1</sub>: 30cm × 10cm, S<sub>2</sub>: 30cm × 7.5cm and S<sub>3</sub>: 30cm × 5cm) and three fertilizer levels in subplot (F<sub>1</sub>: 100% RDF, F<sub>2</sub>: 125% RDF and F<sub>3</sub>: 150% RDF). The results indicated that, plant spacing did not differ significantly on pod yield. Similarly, Application of 125 per cent RDF (39.20 q ha<sup>-1</sup>) and 150 per cent RDF (38.08 q ha<sup>-1</sup>) did not differ significantly on pod yield, but was significantly higher than 100 per cent RDF (36.47 q ha<sup>-1</sup>). The combination of plant spacing of 30cm × 10cm with 125 per cent RDF recorded significantly higher pod yield as compared to other combination.

**Keywords:** Fertilizer, recommended dose of fertilizer (RDF) and spacing

### Introduction

Groundnut is cultivated in tropical, sub-tropical and warm temperate regions between 40° N and 40° S latitudes. The production is largely confined to Asian and African countries. The major groundnut producing countries in the world are China, India, United States of America, Senegal, Nigeria, Argentina and others. In the world the crop is grown on an area of 25.92 million hectare with annual production of 44.64 million metric tonnes of nut shell (pod) with a productivity of 1,730 kg per hectare (Anon., 2019) <sup>[1]</sup>.

Selection of suitable genotype and maintenance of plant population per unit area were found to be directly correlated with pod yield up to certain level in groundnut (Babu, 1991) <sup>[2]</sup>. Sub optimal plant stand in groundnut has been identified as one of the major constraints to realize full production potential. Hence, optimum plant population is required for better utilization of growth resources like light, moisture and nutrients, which consequently reduces the risk of yield reduction and ensures higher productivity and returns per unit area. Gopal (2004) <sup>[6]</sup> revealed that crop sown under plant density of 3.33 lakh plants per hectare significantly improved dry matter production per plant at all the growth stages and yield attributes viz., pods per plants, weight of pods per plant and 100 seed weight over 4.44 lakh plants per hectare in groundnut. The higher pod (41.79 q ha<sup>-1</sup>), haulm (89.49 q ha<sup>-1</sup>), biological (131.12 q ha<sup>-1</sup>) and oil yield (14.72 q ha<sup>-1</sup>) was recorded under plant density of 4.44 lakh plants per hectare with concomitant increased in pod, haulm, biological and oil yield 21.1, 20.0, 20.3 and 21.5 per cent respectively over plant density of 3.33 lakh plants per hectare.

Similarly, Fertilizer management is another core factor in improving groundnut yield. The optimization of the mineral nutrients is the key to optimize the production of groundnut. It has very high nutrient requirement and applications are based on nutrient uptake of groundnut varieties. Among various levels (100, 125 and 150 %) of N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O, application of 150 per cent of N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O gave highest pod (2052 kg ha<sup>-1</sup>) and haulm yield (2776 kg ha<sup>-1</sup>). The lowest pod (1328 kg ha<sup>-1</sup>) and haulm yield (2398 kg ha<sup>-1</sup>) were noticed with application of 100 per cent of 17: 34: 54 kg N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O per hectare in coastal groundnut as revealed by Elalayaraja and Singaravel (2010) <sup>[4]</sup>. In this way an experiment was conducted with an objective of influence of summer groundnut to spacing and fertilizer levels.

### Material methods

The field experiment was conducted during summer 2017 and 2018 at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad (Karnataka), situated at 15°26' N latitude, 75°07' E longitude and at an altitude of 678m above mean sea level. The research station comes under Northern Transition Zone (Zone-8) of Karnataka. The soil type of the experimental site was medium black (*vertisols*) and clayey in texture.

The experiment was laid out in split plot design with three replications and comprising nine

treatment combinations with three spacing as main plot and three fertilizer levels as sub plot. Spacings include, S<sub>1</sub>: 30cm × 10cm, S<sub>2</sub>: 30cm × 7.5cm and S<sub>3</sub>: 30cm × 5cm. Fertilizer levels: F<sub>1</sub>: 100 per cent recommended dose (25:75:25 kg N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O ha<sup>-1</sup>), F<sub>2</sub>: 125 per cent RDF and F<sub>3</sub>: 150 per cent RDF. The sources fertilizer used were Urea, single super phosphate and muriate potash.

The cultivar grown was Dh-86 (early maturing in character) and crop was planted on 8<sup>th</sup> February of 2017 and 2<sup>nd</sup> February of 2018. The crop was harvested after attaining the physiological maturity (105 days). The crop was irrigated with sprinkler irrigation at 8 days interval.

## Results and discussion

The two years (pooled) data revealed that growth and yield parameters of groundnut differed significantly due to plant spacing, fertilizer levels and their interaction effects.

Plant height (Table 1) of groundnut at 60 days after sowing (DAS) increased with successive increase in plant population per unit area. Plant spacing of 30cm × 5cm recorded significantly highest plant height in 30cm × 5cm (17.17cm). The lowest was observed in plant spacing of 30cm × 10cm (14.48cm) and was on par with plant spacing of 30cm × 7.5cm spacing (15.76cm). This was apparently because of individual plant from the plots with the narrow spacing did not get opportunity to proliferate laterally due to the less intra row space. Hence plants were compelled to grow more in upward direction for the fulfillment of light requirement for photosynthesis. The results are in conformity with Gadade *et al.* (2018) [5]. Similarly, fertilizer levels did not differ significantly on plant height at various growth stages. However, it was ranged from 15.18 to 16.14cm. The interaction effect due to plant spacing and fertilizer levels differed significantly. Plant spacing of 30cm × 5cm with 150 per cent RDF recorded significantly higher plant height (17.68cm) as compared to plant spacing of 30cm × 10cm with 100 per cent RDF (13.90cm).

Number of branches (Table 2) did not differed significantly as influenced by plant spacing. However it ranged from 6.40 to 6.90. Similar kinds of results were obtained by Ramesh and Sabale (2001) [11]. Application of 125 per cent recommended doses of fertilizer resulted in significantly higher number of branches (6.94) than 100 per cent RDF (6.63). However, 150 per cent RDF (6.83) was on par with both the levels. Plant spacing of 30cm × 10cm with 125 per cent RDF recorded higher number of branches (7.30) than other combinations of plant spacing and fertilizer levels. The lowest number of branches was observed in plant spacing of 30cm × 5cm with 100 per cent RDF (6.40). This might be due to plants at higher densities accumulate less carbon which is not sufficient to support more branching.

Leaf shape, size and thickness are some of the most important morphological features that can directly affect plant yield. Plant spacing of 30cm × 10cm recorded higher leaf area (10.83 dm<sup>2</sup> plant<sup>-1</sup>) and differed significantly over plant spacing of 30cm × 7.5cm (8.13 dm<sup>2</sup> plant<sup>-1</sup>) and 30cm × 5cm (5.68 dm<sup>2</sup> plant<sup>-1</sup>). This might be due to increased plant spread and availability of space for the plant. The results are in conformity with findings of Ramesh and Sabale (2001) [11].

Application of successive fertilizer levels resulted in higher leaf area (8.34 dm<sup>2</sup> plant<sup>-1</sup> at 125% RDF and 8.27 dm<sup>2</sup> plant<sup>-1</sup> at 150% RDF) as compared to 100 per cent RDF (8.03 dm<sup>2</sup> plant). The results might be more supply of nutrient enhanced the leaf numbers and photosynthetic area of the leaf. Similar kinds of results were reported by Kathmale and Kamble (2009) [9]. Interaction effect of plant spacing of 30cm × 10 cm with various fertilizer levels did not differ significantly over other combinations (Table 3). This helped for higher net photosynthetic rates and assimilation, which in turn enhanced the dry matter production. SPAD value (Table 4) did not differ significantly as influenced by plant spacing and fertilizer levels. However, it ranged from 44.83 to 44.75.

The relationship of pod yield with different growth parameters and yield components under variable planting density is very important to understand the basic mechanism of yield-plant density relationship and this would also help in optimizing plant density for improving yield of groundnut. The pooled results indicated that, pod yield (Table 5) did not differ significantly with varied spacings. However, it was numerically higher in plant spacing of 30cm × 10cm (38.88 q ha<sup>-1</sup>) than other spacings. Similar results were obtained by Kushwaha and Mishra (1978) [10] revealed that, plant population ranging from 0.97 to 4.16 lakh plants per hectare did not differ significantly on pod yield. Application of 125 per cent RDF (39.20 q ha<sup>-1</sup>) and 150 per cent RDF (38.08 q ha<sup>-1</sup>) did not differ significantly on pod yield, but was significantly higher than 100 per cent RDF (36.47 q ha<sup>-1</sup>). The results are in conformity with Chitleshwari *et al.* (2007) [3]. Interaction effect due to plant spacing and fertilizer levels differed significantly. Plant spacing of 30cm × 10cm with 125 per cent RDF recorded highest pod yield (39.96 q ha<sup>-1</sup>). However, it was statistically on par with plant spacing of 30cm × 10cm with 150 per cent RDF (39.05 q ha<sup>-1</sup>), plant spacing of 30cm × 7.5cm with 125 per cent RDF (38.78 q ha<sup>-1</sup>) and plant spacing of 30cm × 5cm with 125 per cent RDF (38.86 q ha<sup>-1</sup>). The lowest pod yield was obtained at plant spacing of 30cm × 5cm with 100 per cent RDF (35.36 q ha<sup>-1</sup>). This might be due to synergetic effect of wider spacing between the plants coupled with higher fertilizer levels which helped for efficient use of all the resources. These results are in conformity with Gunri *et al.* (2015) [7].

Plant spacings differed significantly on harvest index. Plant spacing of 30cm × 10cm recorded higher harvest index (0.32) as compared to plant spacing of 30 cm × 7.5 cm (0.30) and 30cm × 5cm (0.29). The results are in conformity with the findings of Jadhav *et al.* (2000) [8]. Similarly, harvest index did not differ significantly as influenced by fertilizer levels and ranged from 0.30 to 0.31. The plant spacing of 30cm × 10cm with application of 125 per cent RDF (0.32) and plant spacing of 30cm × 10cm with 150 per cent RDF (0.32) did not differ significantly. However, these combinations recorded significantly higher harvest index than plant spacing of 30cm × 5cm with any fertilizer levels.

On the basis results obtained in the present investigation concluded that, plant spacing of 30cm × 10cm with application of 125 per cent RDF to summer groundnut enhance the growth and yield attributes as compared to other spacing and fertilizer levels.

**Table 1:** Plant height of summer groundnut as influenced by plant spacing and fertilizer levels at 60 days after sowing

| F<br>S         |  | Plant height (cm)    |                     |                      |                     |                      |                     |                     |                     |                      |                     |                      |                    |
|----------------|--|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|---------------------|---------------------|----------------------|---------------------|----------------------|--------------------|
|                |  | 2017                 |                     |                      |                     | 2018                 |                     |                     |                     | Pooled               |                     |                      |                    |
|                |  | F <sub>1</sub>       | F <sub>2</sub>      | F <sub>3</sub>       | Mean                | F <sub>1</sub>       | F <sub>2</sub>      | F <sub>3</sub>      | Mean                | F <sub>1</sub>       | F <sub>2</sub>      | F <sub>3</sub>       | Mean               |
| S <sub>1</sub> |  | 13.47 <sup>d</sup>   | 13.77 <sup>cd</sup> | 14.30 <sup>b-d</sup> | 13.84 <sup>b</sup>  | 14.33 <sup>c</sup>   | 15.63 <sup>bc</sup> | 15.40 <sup>bc</sup> | 15.12 <sup>b</sup>  | 13.90 <sup>f</sup>   | 14.70 <sup>ef</sup> | 14.85 <sup>d-f</sup> | 14.48 <sup>b</sup> |
| S <sub>2</sub> |  | 14.30 <sup>b-d</sup> | 15.27 <sup>bc</sup> | 14.60 <sup>ab</sup>  | 14.72 <sup>ab</sup> | 16.27 <sup>a-c</sup> | 16.93 <sup>ab</sup> | 17.17 <sup>ab</sup> | 16.79 <sup>ab</sup> | 15.28 <sup>c-e</sup> | 16.10 <sup>cd</sup> | 15.88 <sup>c-e</sup> | 15.76 <sup>b</sup> |
| S <sub>3</sub> |  | 15.83 <sup>ab</sup>  | 17.30 <sup>a</sup>  | 17.00 <sup>a</sup>   | 16.71 <sup>a</sup>  | 16.90 <sup>ab</sup>  | 17.63 <sup>ab</sup> | 18.37 <sup>a</sup>  | 17.63 <sup>a</sup>  | 16.37 <sup>bc</sup>  | 17.47 <sup>ab</sup> | 17.68 <sup>a</sup>   | 17.17 <sup>a</sup> |
| Mean           |  | 14.53 <sup>a</sup>   | 15.44 <sup>a</sup>  | 15.30 <sup>a</sup>   |                     | 15.83 <sup>a</sup>   | 16.73 <sup>a</sup>  | 16.98 <sup>a</sup>  |                     | 15.18 <sup>a</sup>   | 16.09 <sup>a</sup>  | 16.14 <sup>a</sup>   |                    |
| S.V.           |  | S.Em. ±              |                     |                      |                     | S.Em. ±              |                     |                     |                     | S.Em. ±              |                     |                      |                    |
| S              |  | 0.304                |                     |                      |                     | 0.456                |                     |                     |                     | 0.347                |                     |                      |                    |
| F              |  | 0.302                |                     |                      |                     | 0.379                |                     |                     |                     | 0.232                |                     |                      |                    |
| S×F            |  | 0.526                |                     |                      |                     | 0.657                |                     |                     |                     | 0.402                |                     |                      |                    |

**Table 2:** Number of branches of summer groundnut as influenced by plant spacing and fertilizer levels at 60 days after sowing

| F<br>S         |  | Number of branches |                    |                    |                    |                   |                   |                   |                   |                     |                     |                     |                   |
|----------------|--|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|---------------------|---------------------|---------------------|-------------------|
|                |  | 2017               |                    |                    |                    | 2018              |                   |                   |                   | Pooled              |                     |                     |                   |
|                |  | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               | F <sub>1</sub>    | F <sub>2</sub>    | F <sub>3</sub>    | Mean              | F <sub>1</sub>      | F <sub>2</sub>      | F <sub>3</sub>      | Mean              |
| S <sub>1</sub> |  | 7.00 <sup>bc</sup> | 7.73 <sup>a</sup>  | 7.33 <sup>ab</sup> | 7.36 <sup>a</sup>  | 6.80 <sup>a</sup> | 6.87 <sup>a</sup> | 6.93 <sup>a</sup> | 6.87 <sup>a</sup> | 6.90 <sup>a-c</sup> | 7.30 <sup>a</sup>   | 7.13 <sup>ab</sup>  | 6.90 <sup>a</sup> |
| S <sub>2</sub> |  | 6.67 <sup>bc</sup> | 7.00 <sup>bc</sup> | 6.87 <sup>bc</sup> | 6.84 <sup>ab</sup> | 6.53 <sup>a</sup> | 6.73 <sup>a</sup> | 6.67 <sup>a</sup> | 6.64 <sup>a</sup> | 6.60 <sup>cd</sup>  | 6.87 <sup>a-d</sup> | 6.77 <sup>b-d</sup> | 6.60 <sup>a</sup> |
| S <sub>3</sub> |  | 6.47 <sup>c</sup>  | 6.73 <sup>bc</sup> | 6.67 <sup>bc</sup> | 6.62 <sup>a</sup>  | 6.33 <sup>a</sup> | 6.60 <sup>a</sup> | 6.53 <sup>a</sup> | 6.49 <sup>a</sup> | 6.40 <sup>d</sup>   | 6.67 <sup>b-d</sup> | 6.60 <sup>cd</sup>  | 6.40 <sup>a</sup> |
| Mean           |  | 6.71 <sup>b</sup>  | 7.16 <sup>a</sup>  | 6.96 <sup>ab</sup> |                    | 6.56 <sup>a</sup> | 6.73 <sup>a</sup> | 6.71 <sup>a</sup> |                   | 6.63 <sup>b</sup>   | 6.94 <sup>a</sup>   | 6.83 <sup>ab</sup>  |                   |
| S.V.           |  | S.Em. ±            |                    |                    |                    | S.Em. ±           |                   |                   |                   | S.Em. ±             |                     |                     |                   |
| S              |  | 0.162              |                    |                    |                    | 0.167             |                   |                   |                   | 0.077               |                     |                     |                   |
| F              |  | 0.130              |                    |                    |                    | 0.117             |                   |                   |                   | 0.081               |                     |                     |                   |
| S×F            |  | 0.226              |                    |                    |                    | 0.203             |                   |                   |                   | 0.139               |                     |                     |                   |

Means followed by the same letter (s) within a column are not significantly differed by DMRT (P = 0.05)

Main plot: Spacing (S): S<sub>1</sub>: 30cm × 10cm S<sub>2</sub>: 30cm × 7.5cm S<sub>3</sub>: 30cm × 5.0cm

Sub plot: Fertilizer levels (F): F<sub>1</sub>: 100 per cent RDF F<sub>2</sub>: 125 per cent RDF F<sub>3</sub>: 150 per cent RDF

RDF: 25:75:25 kg N: P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup>

**Table 3:** Leaf area of summer groundnut as influenced by plant spacing and fertilizer levels at 60 days after sowing

| F<br>S         |  | Leaf area (dm <sup>2</sup> plant <sup>-1</sup> ) |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
|----------------|--|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                |  | 2017   |                    |                    |                    | 2018               |                    |                    |                    | Pooled             |                    |                    |                    |
|                |  | F <sub>1</sub>                                   | F <sub>2</sub>     | F <sub>3</sub>     | Mean               | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               |
| S <sub>1</sub> |  | 10.72 <sup>a</sup>                               | 11.25 <sup>a</sup> | 11.01 <sup>a</sup> | 10.99 <sup>a</sup> | 10.60 <sup>a</sup> | 10.71 <sup>a</sup> | 10.67 <sup>a</sup> | 10.66 <sup>a</sup> | 10.66 <sup>a</sup> | 10.98 <sup>a</sup> | 10.84 <sup>a</sup> | 10.83 <sup>a</sup> |
| S <sub>2</sub> |  | 7.92 <sup>b</sup>                                | 8.34 <sup>b</sup>  | 8.40 <sup>b</sup>  | 8.22 <sup>b</sup>  | 7.86 <sup>b</sup>  | 8.16 <sup>b</sup>  | 8.10 <sup>b</sup>  | 8.04 <sup>b</sup>  | 7.89 <sup>b</sup>  | 8.25 <sup>b</sup>  | 8.25 <sup>b</sup>  | 8.13 <sup>b</sup>  |
| S <sub>3</sub> |  | 5.59 <sup>c</sup>                                | 5.82 <sup>c</sup>  | 5.72 <sup>c</sup>  | 5.71 <sup>c</sup>  | 5.49 <sup>c</sup>  | 5.74 <sup>c</sup>  | 5.71 <sup>c</sup>  | 5.65 <sup>c</sup>  | 5.54 <sup>c</sup>  | 5.78 <sup>c</sup>  | 5.72 <sup>c</sup>  | 5.68 <sup>c</sup>  |
| Mean           |  | 8.08 <sup>a</sup>                                | 8.47 <sup>a</sup>  | 8.38 <sup>a</sup>  |                    | 7.99 <sup>a</sup>  | 8.20 <sup>a</sup>  | 8.16 <sup>a</sup>  |                    | 8.03 <sup>b</sup>  | 8.34 <sup>a</sup>  | 8.27 <sup>a</sup>  |                    |
| S.V.           |  | S.Em. ±  |                    |                    |                    | S.Em. ±            |                    |                    |                    | S.Em. ±            |                    |                    |                    |
| S              |  | 0.213  |                    |                    |                    | 0.080              |                    |                    |                    | 0.130              |                    |                    |                    |
| F              |  | 0.135  |                    |                    |                    | 0.076              |                    |                    |                    | 0.066              |                    |                    |                    |
| S×F            |  | 0.234  |                    |                    |                    | 0.132              |                    |                    |                    | 0.160              |                    |                    |                    |

**Table 4:** SPAD value of summer groundnut as influenced by plant spacing and fertilizer levels at 60 DAS

| F<br>S         |  | SPAD value         |                    |                    |                    |                    |                    |                    |                     |                    |                    |                    |                    |
|----------------|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|--------------------|
|                |  | 2017               |                    |                    |                    | 2018               |                    |                    |                     | Pooled             |                    |                    |                    |
|                |  | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean                | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               |
| S <sub>1</sub> |  | 43.53 <sup>a</sup> | 44.40 <sup>a</sup> | 44.13 <sup>a</sup> | 44.02 <sup>a</sup> | 44.73 <sup>a</sup> | 45.27 <sup>a</sup> | 45.47 <sup>a</sup> | 45.16 <sup>a</sup>  | 44.13 <sup>a</sup> | 44.83 <sup>a</sup> | 44.80 <sup>a</sup> | 44.59 <sup>a</sup> |
| S <sub>2</sub> |  | 43.33 <sup>a</sup> | 43.67 <sup>a</sup> | 43.43 <sup>a</sup> | 43.48 <sup>a</sup> | 44.00 <sup>a</sup> | 44.47 <sup>a</sup> | 45.00 <sup>a</sup> | 44.49 <sup>ab</sup> | 43.67 <sup>a</sup> | 44.07 <sup>a</sup> | 44.22 <sup>a</sup> | 43.98 <sup>a</sup> |
| S <sub>3</sub> |  | 42.73 <sup>a</sup> | 43.63 <sup>a</sup> | 43.07 <sup>a</sup> | 43.14 <sup>a</sup> | 43.97 <sup>a</sup> | 44.30 <sup>a</sup> | 44.43 <sup>a</sup> | 44.23 <sup>b</sup>  | 43.35 <sup>a</sup> | 43.97 <sup>a</sup> | 43.75 <sup>a</sup> | 43.69 <sup>a</sup> |
| Mean           |  | 43.20 <sup>a</sup> | 43.90 <sup>a</sup> | 43.54 <sup>a</sup> |                    | 44.23 <sup>a</sup> | 44.68 <sup>a</sup> | 44.97 <sup>a</sup> |                     | 43.72 <sup>a</sup> | 44.29 <sup>a</sup> | 44.26 <sup>a</sup> |                    |
| S.V.           |  | S.Em. ±            |                    |                    |                    | S.Em. ±            |                    |                    |                     | S.Em. ±            |                    |                    |                    |
| S              |  | 0.604              |                    |                    |                    | 0.678              |                    |                    |                     | 0.360              |                    |                    |                    |
| F              |  | 0.480              |                    |                    |                    | 0.417              |                    |                    |                     | 0.301              |                    |                    |                    |
| S×F            |  | 0.832              |                    |                    |                    | 0.771              |                    |                    |                     | 0.522              |                    |                    |                    |

Means followed by the same letter (s) within a column are not significantly differed by DMRT (P = 0.05)

Main plot: Spacing (S): S<sub>1</sub>: 30cm × 10cm S<sub>2</sub>: 30cm × 7.5cm S<sub>3</sub>: 30cm × 5.0cm

Sub plot: Fertilizer levels (F): F<sub>1</sub>: 100 per cent RDF F<sub>2</sub>: 125 per cent RDF F<sub>3</sub>: 150 per cent RDF

**Table 5:** Pod yield of summer groundnut as influenced by plant spacing and fertilizer levels

| F<br>S         |  | Pod yield (q ha <sup>-1</sup> ) |                    |                     |                    |                     |                     |                     |                    |                     |                     |                     |                    |
|----------------|--|---------------------------------|--------------------|---------------------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|---------------------|--------------------|
|                |  | 2017                            |                    |                     |                    | 2018                |                     |                     |                    | Pooled              |                     |                     |                    |
|                |  | F <sub>1</sub>                  | F <sub>2</sub>     | F <sub>3</sub>      | Mean               | F <sub>1</sub>      | F <sub>2</sub>      | F <sub>3</sub>      | Mean               | F <sub>1</sub>      | F <sub>2</sub>      | F <sub>3</sub>      | Mean               |
| S <sub>1</sub> |  | 39.10 <sup>ab</sup>             | 41.56 <sup>a</sup> | 40.06 <sup>a</sup>  | 40.24 <sup>a</sup> | 36.16 <sup>ab</sup> | 38.35 <sup>a</sup>  | 38.03 <sup>a</sup>  | 37.52 <sup>a</sup> | 37.63 <sup>bc</sup> | 39.96 <sup>a</sup>  | 39.05 <sup>ab</sup> | 38.88 <sup>a</sup> |
| S <sub>2</sub> |  | 38.09 <sup>ab</sup>             | 40.38 <sup>a</sup> | 38.51 <sup>ab</sup> | 39.00 <sup>a</sup> | 34.72 <sup>b</sup>  | 37.18 <sup>ab</sup> | 36.86 <sup>ab</sup> | 36.25 <sup>a</sup> | 36.40 <sup>cd</sup> | 38.78 <sup>ab</sup> | 37.69 <sup>bc</sup> | 37.62 <sup>a</sup> |
| S <sub>3</sub> |  | 36.43 <sup>b</sup>              | 41.03 <sup>a</sup> | 38.62 <sup>ab</sup> | 38.69 <sup>a</sup> | 34.29 <sup>b</sup>  | 36.70 <sup>ab</sup> | 36.38 <sup>ab</sup> | 35.79 <sup>a</sup> | 35.36 <sup>d</sup>  | 38.86 <sup>ab</sup> | 37.50 <sup>bc</sup> | 37.24 <sup>a</sup> |
| Mean           |  | 37.87 <sup>b</sup>              | 40.99 <sup>a</sup> | 39.07 <sup>b</sup>  |                    | 35.06 <sup>b</sup>  | 37.41 <sup>a</sup>  | 37.09 <sup>a</sup>  |                    | 36.47 <sup>b</sup>  | 39.20 <sup>a</sup>  | 38.08 <sup>a</sup>  |                    |
| S.V.           |  | S.Em. ±                         |                    |                     |                    | S.Em. ±             |                     |                     |                    | S.Em. ±             |                     |                     |                    |
| S              |  | 0.588                           |                    |                     |                    | 0.896               |                     |                     |                    | 0.471               |                     |                     |                    |
| F              |  | 0.444                           |                    |                     |                    | 0.544               |                     |                     |                    | 0.378               |                     |                     |                    |
| S×F            |  | 1.019                           |                    |                     |                    | 0.943               |                     |                     |                    | 0.654               |                     |                     |                    |

**Table 6:** Harvest index of summer groundnut as influenced by plant spacing and fertilizer levels

| F<br>S         |  | Harvest index       |                     |                    |                   |                    |                    |                    |                    |                    |                    |                    |                   |
|----------------|--|---------------------|---------------------|--------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
|                |  | 2017                |                     |                    |                   | 2018               |                    |                    |                    | Pooled             |                    |                    |                   |
|                |  | F <sub>1</sub>      | F <sub>2</sub>      | F <sub>3</sub>     | Mean              | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean               | F <sub>1</sub>     | F <sub>2</sub>     | F <sub>3</sub>     | Mean              |
| S <sub>1</sub> |  | 0.32 <sup>a-c</sup> | 0.34 <sup>a</sup>   | 0.33 <sup>ab</sup> | 0.33 <sup>a</sup> | 0.30 <sup>ab</sup> | 0.31 <sup>a</sup>  | 0.30 <sup>ab</sup> | 0.30 <sup>a</sup>  | 0.31 <sup>ab</sup> | 0.32 <sup>a</sup>  | 0.32 <sup>a</sup>  | 0.32 <sup>a</sup> |
| S <sub>2</sub> |  | 0.31 <sup>bc</sup>  | 0.32 <sup>a-c</sup> | 0.31 <sup>bc</sup> | 0.31 <sup>b</sup> | 0.28 <sup>b</sup>  | 0.29 <sup>ab</sup> | 0.29 <sup>ab</sup> | 0.29 <sup>ab</sup> | 0.30 <sup>bc</sup> | 0.31 <sup>ab</sup> | 0.30 <sup>bc</sup> | 0.30 <sup>b</sup> |
| S <sub>3</sub> |  | 0.30 <sup>c</sup>   | 0.31 <sup>bc</sup>  | 0.30 <sup>c</sup>  | 0.30 <sup>b</sup> | 0.28 <sup>b</sup>  | 0.28 <sup>b</sup>  | 0.28 <sup>b</sup>  | 0.28 <sup>b</sup>  | 0.29 <sup>c</sup>  | 0.30 <sup>bc</sup> | 0.29 <sup>c</sup>  | 0.29 <sup>b</sup> |
| Mean           |  | 0.31 <sup>a</sup>   | 0.32 <sup>a</sup>   | 0.31 <sup>a</sup>  |                   | 0.29 <sup>a</sup>  | 0.30 <sup>a</sup>  | 0.29 <sup>a</sup>  |                    | 0.30 <sup>a</sup>  | 0.31 <sup>a</sup>  | 0.30 <sup>a</sup>  |                   |
| S.V.           |  | S.Em. ±             |                     |                    |                   | S.Em. ±            |                    |                    |                    | S.Em. ±            |                    |                    |                   |
| S              |  | 0.0042              |                     |                    |                   | 0.0029             |                    |                    |                    | 0.0028             |                    |                    |                   |
| F              |  | 0.0039              |                     |                    |                   | 0.0036             |                    |                    |                    | 0.0033             |                    |                    |                   |
| S×F            |  | 0.0076              |                     |                    |                   | 0.0063             |                    |                    |                    | 0.0056             |                    |                    |                   |

Means followed by the same letter (s) within a column are not significantly differed by DMRT (P = 0.05)

Main plot: Spacing (S): S<sub>1</sub>: 30cm × 10cm S<sub>2</sub>: 30cm × 7.5cm S<sub>3</sub>: 30cm × 5.0cm

Sub plot: Fertilizer levels (F): F<sub>1</sub>: 100 per cent RDF F<sub>2</sub>: 125 per cent RDF F<sub>3</sub>: 150 per cent RDF

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