Influence of Varieties and Plant Spacing on the Growth and Yield of Confectionery Groundnut (*Arachis hypogaea L.*)

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**Abstract:** Field experiments were conducted at Coconut Research Station, Aliyarnagar, Tamil Nadu Agricultural University, Tamil Nadu, India during *rabi* 2002-03, 2003-04 and 2004-05 to study the influence of varieties and different plant densities on the growth and yield of confectionary groundnut. The treatment consisted of four groundnut varieties viz, ASK 2002-11, ALR 2, ASK 2002-7 and ASK 2003-3 and three plant spacing viz., 30 x 10, 30 x 15 and 45 x 10 cm. The experiment was laid out in a factorial randomized block design replicated thrice. The results of the experiments revealed that the variety ASK 2002-7 recorded higher dry matter production and better yield attributes than the other varieties. The variety ASK 2002-7 also recorded significantly higher pod yield of 2724, 2633 and 2557 kg ha\(^{-1}\) with a BCR of 2.07, 2.87 and 1.89, respectively during the three years of study. Among the different plant spacing tried, even though wider spacing of 45 x 10 cm recorded better yield attributes, closer spacing of 30 x 10 cm recorded significantly higher pod yield of 2576, 2530 and 2192 kg ha\(^{-1}\) with a BCR of 1.80, 2.50, and 1.60, respectively during *rabi* seasons of all the three years.

**Keywords:** Groundnut, confectionary, variety, plant spacing, growth, yield

**INTRODUCTION**

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop in India. India is the second largest producer of groundnut accounting for 38% of the total area (7.7 million ha) and 31% production (6.7 million t) of the world\(^{[10]}\). The average productivity in India is 977 kg ha\(^{-1}\)\(^{[2]}\). Groundnut is known for its rich source of vegetable fats, protein and also for its use as cattle feed and concentrated organic manure. With regard to the consumption pattern, about 10 per cent is used for food purpose, 15 per cent for seed purpose and 75 per cent for oil purpose. Even though groundnut is primarily used for oil extraction; it is also consumed directly because of its high food value\(^{[5]}\).

Confectionery groundnut with premium edible grade has great demand. India has immense potential for exporting large seeded groundnut; however, lack of production technologies exclusive for confectionery groundnut has restricted the scope for exports\(^{[6]}\). Till today only limited genotypes have been bred with an aim to obtain hand picked selection (HPS) entries and such attempt was not made for the generation of production technologies for HPS groundnut. However, many new varieties with some export quality characters have been utilized for export by exporters with required processes. Choice of the variety plays a significant role in groundnut production. Some of the groundnut varieties have shown that low source and sink relationship resulted in the formation of more unfilled pods and lesser seed yield. Plant density is highly associated with yield potential and optimum plant density per unit area is an important non monetary input to decide the maximum groundnut productivity. Yield is a function of inter and intra plant competition and there is a considerable scope for increasing the in yield by adjusting plant population to an optimum level\(^{[3]}\). Considering all these facts, the present study was undertaken to find out the influence of plant spacing on the growth and yield of different groundnut varieties.

**MATERIAL AND METHODS**

Field experiments were carried out at Coconut Research Station, Aliyarnagar, Tamil Nadu Agricultural University, Tamil Nadu, India, during *rabi* 2002-03, 2003-04 and 2004-05 to find out the effect of plant spacing on the growth and yield of different groundnut varieties. The experiment was laid out in a factorial
randomized block design replicated thrice. The treatments consisted of four varieties viz., ASK 2002-11, ALR 2, ASK 2002-7 and ASK 2003-3 and three plant spacing viz., 30 x 10, 30 x 15 and 45 x 10 cm. The soil of the experimental field was sandy loam, low in available nitrogen (230 kg ha⁻¹), medium in available phosphorus (12.5 kg ha⁻¹) and potassium (252 kg ha⁻¹). The pH of the experimental field was 7.3 with a bulk density of 1.3 g cc⁻¹. Mechanical analysis showed that the experimental field had 14% clay, 7.85 % silt, 46.43 % fine sand and 30.66 % coarse sand. Field capacity and permanent wilting point were 20.4 per cent and 10.4 per cent respectively. The plant population was maintained according to the treatments. Farm yard manure @ 12.5 t ha⁻¹ was applied commonly to all the plots. A fertilizer schedule of 25: 50: 80 NPK kg ha⁻¹ and gypsum 400 kg ha⁻¹ were applied uniformly to all the plots irrespective of the treatments. Full dose of fertilizers were given as basal in the previously opened furrows. All the other cultural operations were carried out as per the recommendations. Observations on drymatter production, yield attributing characters, pod and haulm yield were recorded and presented.

**RESULTS AND DISCUSSIONS**

**Drymatter Production:** Among the different varieties evaluated, the variety ASK 2002-7 recorded the highest DMP during all the years followed by the variety ASK 2003-3. The variety ASK 2002-11 recorded the least DMP in all the years of study. With regard to plant densities, closer spacing of 30 x 10 cm.
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Yield Attributes:

Pod Numbers Plant$^{-1}$: Among the varieties, ASK 2002-7 produced the highest number of pods plant$^{-1}$ viz., 20.9, 19.8 and 20.9 during 2002-03, 2003-04 and 2004-05, respectively. However it was comparable with the variety ASK 2003-3. The total number of pods plant$^{-1}$ varied significantly between plant densities. Wider spacing (45 x 10 cm) had the highest number of pods plant$^{-1}$ during all the years.

Pod Weight Plant$^{-1}$: Among the different varieties, the variety ASK 2002-7 registered significantly higher pod weight plant$^{-1}$ than the other varieties in all the three years of study. Among the spacing, wider spacing of 45 x 10 cm, recorded the highest pod weight plant$^{-1}$ in all the three years.

The higher pod number and pod weight plant$^{-1}$ in wider spacing treatment was mainly due to sufficient space between rows which encouraged producing more vigorous plants and also lesser interplant competition for space, light, nutrient and moisture.

Shelling Percentage: With regard to shelling percentage, there existed significant difference between the groundnut varieties. Higher shelling percentage of 72.7, 68.6 and 69.0 was noticed in the variety ASK 2002-7. However, this variety was comparable with ASK 2003-3. Plant geometry did not alter the shelling percentage during the three years of study.

The variety AGS 2002-7 had higher number of Sound Matured Kernel (SMK) percentage compared to the other varieties during the entire three years of study, though it was comparable with the variety AGS 2003-3. Similarly, the variety ASK 2002-7 had the highest 100 kernel weight than the other varieties but it was comparable with the variety ASK 2003-3. Influence of spacing on 100 kernel weight and SMK was not significant.

Pod Yield: Among the varieties, the variety ASK 2002-7 registered the highest pod yield of 2724, 2633 and 2557 kg ha$^{-1}$ in the first, second and third year respectively. The increased yield was due to higher no of pods per plant, higher pod weight and higher shelling percentage recorded by this variety. The least pod yield was recorded with the variety ASK 2002-11. Among the different plant spacing, closer spacing of 30 x 10 cm recorded higher pod yield as compared to wider spacing of 45 x 10 cm. This was due to the optimum population load per unit area$^{[1]}$. Maintenance of optimum population might have resulted in higher pod yield. Similar results of higher groundnut pod yield due to optimum plant population as reported by Agasimani$^{[1]}$ and Hameed Ansari et al.$^{[4]}$ is concomitant to the present result. These results confirmed that optimum population per unit area is required to harvest the maximum pod yield and the same result is obtained in the present investigation also. The reduction in pod yield in wide row spacing might be due to the lower plant population per unit area$^{[4]}$.

BCR: The variety, ASK 2002-7 recorded the highest BCR of 2.07, 2.87 and 1.89 in the first, second and third year, respectively. Among the various spacing, sowing at a spacing of 30 cm x 10 cm recorded the
highest BCR of 1.80, 2.50 and 1.50. The least BCR was with wider spacing. Closer spacing of 30 x 10 cm was found to be more economical in groundnut than wider spacing as reported by Ramesh and Sabale.

**Conclusion:** The results of the experiments revealed that the groundnut variety ASK 2002-7 recorded significantly higher pod yield followed by ASK 2003-3. Among the different plant spacing tried, closer spacing of 30 x 10 cm recorded significantly higher pod yield with a BCR of 1.80, 2.50, and 1.60 respectively during *rabi* seasons of all the three years. The variety ASK 2002-7 among the varieties and sowing at a spacing of 30 cm x 10 cm among the spacing was found to be the best in confectionery groundnut for getting higher yield and return.

**REFERENCES**