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## Response of groundnut varieties (*Arachis hypogaea* L.) on yield attributes and yield under different patterns of crop geometry

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### Abstract

This study was conducted at research farm, Vivekananda Global University, Jaipur, during the *kharif* season 2024-25 to study the “Response of Groundnut Varieties (*Arachis hypogaea* L.) on Yield Attributes and Yield under Different Pattern of Crop Geometry” to assess the performance of different groundnut varieties under various crop geometry. The experiment aimed to analyze their effect on growth parameters, yield components, and overall productivity. The research utilized a factorial randomized block design (FRBD) with three replications. Data collected included plant height, number of pods per plant, pod weight, and yield per hectare. Results indicated that crop geometry significantly influenced yield parameters, and certain varieties responded better under specific spacing arrangements.

**Keywords:** Groundnut, crop geometry, variety, yield and yield attributes

### Introduction

Groundnut (*Arachis hypogaea* L.) is a key oilseed crop cultivated in tropical and subtropical regions. It contributes significantly to edible oil production and has a variety of uses in food, fodder, and industry. Productivity in groundnut is often influenced by genetic potential, environmental conditions, and agronomic practices such as crop spacing. As being the King of Vegetable oilseeds in India, it occupies pre-eminent position in national edible oil economy. The oil cake, which is generally used as animal feed, contains 7 to 8% N, 1.5% P<sub>2</sub>O<sub>5</sub> and 1.2% K<sub>2</sub>O and can also be used as organic manure. Groundnut oil is used as a cooking medium. The total area under groundnut in Rajasthan is 8.69 Lakh ha, with the total production of 18.9 Lakh tons and productivity of 1971 kg ha<sup>-1</sup> (Hamakareem HF *et al.*, 2016 & Hamahasan BM *et al.*, 2016) [2]. The cost-effective technologies for utilization of natural resources such as optimum row spacing, precise nutrient and irrigation management, timely weed management etc. are the important agronomic techniques for enhancing and stabilizing the yield of any crop (Dileep *et al.*, 2021) [1]. Crop geometry plays a crucial role in determining resource use efficiency, aeration, light interception, and nutrient uptake. The present study explores the interaction between groundnut varieties and different crop geometry patterns.

### Materials and Methods

The field experiment was carried out at research farm, Vivekananda Global University, Jaipur, under uniform soil and climatic conditions. The soil of experimental field was loamy sand in texture, slightly alkaline in reaction (pH 8.19). A factorial randomized block design (FRBD) was employed with three replications. Three groundnut varieties (GG-21, HNG-10 and Girnar-2) were used in the study, subjected to three different crop geometries (20 x 10 cm, 30 x 15 cm and 45 x 20 cm). Standard agronomic practices were followed throughout the crop growth period. Observations were recorded for plant height, number of branches, and number of pods per plant, test weight, shelling percentage, and pod yield per hectare. Statistical analysis was conducted to interpret the significance of treatments. Various similar results were also found by Sharma OP *et al.* (2004) [5], Ramesh *et al.* (2007) [3] and Singh AL *et al.* (2007).

## Result and Discussion

The experiment showed that both variety and crop geometry significantly affected the yield attributes. Wider spacing resulted in increased number of pods per plant and higher pod weight, possibly due to reduced competition for light and nutrients. Among the varieties, Girnar-2 showed superior performance in

pod yield and 100-pod weight under 45x20 cm crop geometry. The highest yield (2.01 t/ha) was recorded in this treatment, suggesting the effectiveness of wider spacing for certain genotypes. The interaction effects were also statistically significant, indicating the importance of selecting appropriate spacing for each variety.

**Table 1:** Effect of varying crop geometry and varieties on yield attributes of groundnut

Treatment	Yield attributes			
	Number of pods per plant	Number of seeds per pod	Pod length (cm)	Test weight (g)
<b>Spacing (cm)</b>				
20 x 10 cm	23.2	3.4	3.7	55.59
30 x 15 cm	24.8	3.5	3.8	55.62
45 x 20 cm	25.7	3.6	3.8	55.68
SEm <sub>+</sub>	0.432	0.061	0.081	0.117
CD (P=0.05)	11.55	0.45	0.23	NS
<b>Varieties</b>				
GG-21	23.2	3.1	3.2	55.85
HNG-10	24.8	3.4	3.6	55.86
Girnar-2	25.7	3.5	3.6	55.86
SEm <sub>±</sub>	0.432	0.061	0.081	0.117
CD (P=0.05)	11.55	0.45	0.23	NS
<b>Interaction</b>				
SEm <sub>±</sub>	0.864	0.133	0.163	0.234
CD at 5%	NS	NS	NS	NS

**Table 2:** Effect of varying crop geometry and varieties on yields of groundnut

Treatment	Yield (kg per ha)		
	Seed yield	Stover yield	Biological yield
Spacing (cm) 20 x 10 cm	1162	4369	8137
30 x 15 cm	1235	4409	7823
45 x 20 cm	2006	4539	8752
SEm <sub>+</sub>	27.141	76.037	92.088
CD (P=0.05)	69.72	216.45	256.06
Varieties GG-21	1180	4029	8925
HNG-10	1362	4654	8732
Girnar-2	2006	4773	8257
SEm <sub>±</sub>	27.141	76.037	92.088
CD (P=0.05)	69.72	216.45	256.06
<b>Interaction</b>			
SEm <sub>±</sub>	49.281	152.075	178.176
CD at 5%	NS	NS	NS

## Conclusion

The study concludes that crop geometry has a significant impact on groundnut yield and its components. Wider spacing like 45x20 cm favored better development and yield performance in specific variety names Girnar-2. Thus, optimizing plant spacing based on variety can lead to improved groundnut productivity. These findings are useful for developing region-specific agronomic recommendations.

## Future Scope

Future research is required to examine the effects of the suggested combination on soil health, crop variety, pattern of crop geometry and nutrient saving.

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