Original Research Article

Effect of spacing and foliar spray of liquid organic manures on Yield and Economics of zaid groundnut (*Arachis hypogea*)

ABSTRACT

The field experiment entitled "Effect of spacing and foliar spray of liquid organic manures on Yield and Economics of zaid groundnut (*Arachis hypogea*)" was conducted during *rabi* season, 2022 at Crop Research Farm in the Department of Agronomy, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj Uttar Pradesh. The treatment consisted of Row spacing 50x10 cm, 60x10cm, 70x10 cm and Liquid Organic formulation panchagavya 3%,vermiwash 10%, Cow urine10% and control. The experiment was laid out in Randomized Block Design (RBD) with 10 treatments and replicated thrice. Application of (Spacing 60x10 cm + Cow urine 3%) produces higher pod yield (3053 kg/ha.), Haulm yield (5142 kg/ha.), Gross Return (INR124106/ha.), Net Return (INR 77696/ha.) and B:C Ratio (2.67).

Keywords: Groundnut, Spacing, Liquid organic, Yield and Economics.

Introduction

Groundnut (Arachis hypogaea L.), a grain legume and significant oil seed crop, is cultivated primarily for its edible seeds. Other names for it include peanut, goober, and monkey nut. After China, India is the second-largest producer of groundnuts. The most widely produced oil seed and a significant cash crop in India is groundnut. Due to its high oil content, it is categorised as both a grain legume and an oil crop. The leguminaceae family member groundnut, often known as "The King of Oilseeds," is the third-most significant source of vegetable protein and the fourth-most significant source of edible oil. Being a legume, it contributed to sustainable agriculture and is grown by farmers in both Kharif and Zaid.

It has a greater amount of protein (22.0%), carbohydrate (10.0%), and minerals (3.0%), as wellas niacin (17mg/100g). India is major groundnut cultivated country, cultivated in an areaof 6.09 lakhs ha. with a production of 10.21 million tonnes and productivity of 1676

kg/ha. Total groundnut cultivated area in Uttar Pradesh was about 0.39 million hectares with the production of 0.74 million tonnes and productivity of 1879 kg/ha"(GOI)

Women's and children's dietary needs depend significantly on groundnuts. Haulm is utilised as animal feed. Mixed glycerides make up groundnut oil, which has a high concentration of the unsaturated fatty acids oleic (50–65%) and linoleic acid (18–30%). Cysteines, an amino acid that is necessary for animal growth, are found in groundnuts. Following oil extraction, groundnut cake is produced, which is high in protein, important organic manure, and animal feed. It also includes 7 to 8% N, 1.5% P, and 1% K. Due to its leguminous nature, groundnut contributes to the preservation of soil fertility. Additionally, because they are protein-rich, they meet a large portion of the nation's protein needs.

The need for more agricultural output and the desire for greater profits have made the application of nutrients in agriculture inefficient, with greater loss resulting in soil, water, and air pollution. The primary purposes of farmyard manure are to replace and maintain the humus quality of the soil and to maintain the ideal circumstances for the activities of soil microorganisms. Vermicompost's effects on soil conditions are likely to expedite seedling germination and vigour, facilitating early emergence.

Due to its high porosity, aeration, water-holding capacity, and availability of growth-promoting substances, the vermi-compost application had a good effect on seedling emergence and germination. Among the many elements that affect peanut yield, population density and appropriate row spacing are crucial. One of the key elements that affect the growth, yield, and quality of peanuts is planting density.

When the crop is grown with the right spacing, it was discovered that plant dry matter accumulation and branch formation were greater, and yield parameters like pod/plant,

yield/plant and 1000-grain weight were at their highest. Through optimum use of solar radiation, nutrients, water, land, and air gaps, optimal spacing ensures appropriate growth of the plant's aerial and subsurface parts. For a higher crop production per unit area, adequate row spacing must be used to obtain the proper plant stand. Research on low-cost production technologies is crucial if summer groundnut planting is to become more economical and widespread for such a big society. **Partha Sarathi (2012)** reported that the application of 2.5t/ha vermicompost resulted in the highest plant height (48.1 cm) and highest pods/plant (41.00), no. of branches/plant (6.3), compared with the application of fym 10t/ha plant height (42.00 cm) and highest pods/plant (33.3), no. of branches/plant(4.7), highest pod yield (1960 kg/ha) and haulm yield (2122 kg/ha).

2. MATERIALS AND METHODS

This experiment was laid out during the *Rabi* season of 2022 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.). The crop research farm is situated at 25^0 39" 42" N latitude, 81^0 67" 56" E longitude and at an altitude of 98 m above mean sea level. The experiment was laid out in Randomized Block Design Which consisting of ten treatments with T1 Spacing 50×10cm + Panchagavya3%, T2 Spacing 50×10cm + Vermiwash 10%, T3 Spacing 50×10cm + Cowurine 10%, T4 Spacing 60×10cm + Panchagavya3%, T5 Spacing 60×10cm + Vermiwash 10%, T6 Spacing 60×10cm + Cowurine 10%, T7 Spacing 70×10cm + Panchagavya3%, T8 Spacing 70×10cm + Vermiwash 10%, T9 Spacing 70×10cm + Cowurine 10%, T10 Control 30×10 cm+ RDF (20:40:40 NPK kg/ha)The soil in the experimental area was sandy loam with pH (8.0), organic carbon (0.42%), available N (180.58 kg/ha), available P (15.54 kg/ha), and available K (198.67 kg/ha). Seeds are sown at a spacing of 30×10cm to a seed rate of 80 kg/ha. The recommended dose of nitrogen (20 kg/ha), phosphorus (50 kg/ha) potassium (20 kg/ha) and Biofertilizer and phosphorus were applied as per the treatments. Data recorded on different aspects of the crop, *viz.*, growth, and yield attributes were subjected tostatistical analysis by analysis of variance method (**Gomez and Gomez, 1976)**. andeconomic data analysis mathematical method.

RESULT AND DISCUSSION:

Pod Yield (kg/ha):

The data revealed that Treatment 4 [spacing 60x10cm + panchgavya 3%] recorded a significant maximum pod yield (3053 kg/ha) which was superior over all other treatments. However, treatment 6 [spacing 60x10cm + Cow urine 10%] was found to be statistically at par with treatment 9 [*Rhizobium* + PSB + Phosphorus 60kg/ha] in (Table 2).

Vasumathi (2001) and Sanjutha et al., (2008) concluded that the growth enzymes present in panchagavya might have favoured rapid cell division and multiplication for higher growth characters.

Haulm yield (kg/ha):

The data revealed that Treatment 4 [spacing 60x10cm + panchgavya 3%] was recorded a significantly maximum Haulm yield (5142 kg/ha) which was superior over all other treatments. However, the treatment 6 [spacing 60x10cm + Cowurine 10%], 2 [spacing 50x10cm + Vermiwash 10%], treatment 3 [spacing 50x10cm + Cowurine 10%], treatment 7 [spacing 70x10cm + Panchgavya 3%] and treatment 9 [spacing 70x10cm + Cowurine 10%] was found to be statically at par with treatment-4 [spacing 60x10cm + Panchgavya 3%] in (Table 2).

Beaulah et al., (2002) concluded that the beneficial microorganisms from panchagavya and their presence in the rhizosphere environment of the root zone influence the plant growth and crop yield.

Harvest Index:

At harvest, the maximum harvest index (37.3%) was recorded in Treatment 4 [spacing 60x10cm + Panchgavya 3%], there was no significant difference among the treatments.

Cost of Cultivation (INR/ha)

Cost of production (INR 46410/ha) was found to be highest in treatment 4 [spacing 60x10cm + Panchgavya 3%], as compared to other treatments.

Gross return (INR/ha)

Gross return (INR 124106/ha) was found to be highest in treatment 4 [Spacing 60x10cm + Panchgavya 3%], as compared to other treatments.

Net return (INR/ha)

Net return (INR 77696/ha) was found to be highest in treatment 4 [Spacing 60x10cm + Panchgavya 3%], as compared to other treatments.

B: C Ratio

Benefit Cost Ratio (2.67) was found to be highest in treatment 4 [spacing 60x10cm + Panchgavya 3%], as compared to other treatments.

Preparation of panchagavya is easy and decreases the investment cost and on the other hand, it gives high net- returns which helps to attain a high B:C ratio to the farmer. Panchagavya is safe and eco-friendly and contributes to sustainability. Chunchu Suchith Kumar and Gurpreet Singh (2020)

CONCLUSION:

Based on the above findings it can be concluded that Groundnut with the application of [spacing 60x10cm + Panchgavya 3%], (Treatment 4) was observed highest pod yield, Haulm yield, gross return, net return and benefit-cost ratio.

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Table: 1 Effect of spacing and foliar spray of liquid organic formulation on yield of summer groundnut

S.No.	Treatment combinations	At Harvest		
		Pod Yield (kg/ha)	Haulm Yield (kg/ha)	Harvest Index
1.	Spacing 50x10cm + Panchgavya 3%	2774	5013	35.6
2.	Spacing 50x10cm + Vermiwash 10%	2503	4914	33.7
3.	Spacing 50x10cm + Cowurine 10%	2611	4982	34.4
4.	Spacing 60x10cm + panchgavya 3%	3053	5142	37.3
5.	Spacing 60x10cm + Vermiwash 10%	2567	4921	34.3
6.	Spacing 60x10cm + Cowurine 10%	2940	5050	36.8
7.	Spacing 70x10cm + panchgavya 3%	2742	4993	35.4
8.	Spacing 70x10cm + Vermiwash 10%	2410	4886	33.0
9.	Spacing 70x10cm + Cowurine 10%	2584	4955	34.3
10.	Control (NPK 20:40:40 kg/ha)	2123	4566	31.7
	F-test	S	S	NS
	Sem (±)	48.43	82.0	-
	CD (p=0.05)	143.91	243.32	-

Table: 2 Effect of spacing and foliar spray of liquid organic formulation on economics of summer groundnut

S.No.	Treatment combination	Cost of cultivation (INR/ha)	Gross return (INR/ha)	Net return (INR/ha)	B:C ratio
1.	Spacing 50x10cm + Panchgavya 3%	45798	112856	67058	2.46
2.	Spacing 50x10cm + Vermiwash 10%	44286	101928	57642	2.30
3.	Spacing 50x10cm + Cowurine 10%	45084	106283	61199	2.36
4.	Spacing 60x10cm + panchgavya 3%	46410	124106	77696	2.67
5.	Spacing 60x10cm + Vermiwash 10%	44479	104509	60030	2.35
6.	Spacing 60x10cm + Cowurine 10%	46290	119550	73260	2.58
7.	Spacing 70x10cm + panchgavya 3%	45108	111566	66458	2.47
8.	Spacing 70x10cm + Vermiwash 10%	44097	98178	54081	2.23
9.	Spacing 70x10cm + Cowurine 10%	44962	105195	60233	2.34
10.	Control (NPK 20:40:40 kg/ha)	43810	86606	42796	1.98