Original Research Article

"Effect of Irrigation Scheduling and Foliar Organic Nutrition on growth and yield of Summer Groundnut (*Arachis hypogaea L.*)"

ABSTRACT

A field experiment was conducted during *Zaid*season of 2022 at Crop Research Farm (CRF). Department of Agronomy, SHUATS, Prayagraj (UP) on soil with sandy loam in texturewith Organic carbon 0.48%, Available Nitrogen278.93 Kg/ha, Available Phosphorus19.03 Kg/ha, Available Potassium238.1 Kg/ha,Soil Ph7.4, EC0.47 ds/m to investigate the effect of Irrigation Scheduling and Foliar Organic Nutrition on growth and yield of Zaid Groundnut. The treatments consist of three Irrigation Schedulings viz., I_1: 3 Irrigations (25,45,70 DAS), I_2: 2 Irrigations (25,45 DAS), I_3: 2 Irrigations (25,70 DAS) and three Foliar Organic NutritionF_1 – Panchagavya at 3%,F_2 – Jeevamrutha at 3%,F_3 – Panchamrutha at 3% whose effect is observed on Groundnut (var. K-6). The experiment was laid out in Randomized Block Design with Ten treatments replicated thrice. The treatment with application of 3 Irrigations (25,45,70 DAS) + panchagavya-3%recorded significantly higher plant height (60.07cm) and plant dry weight (39.62 g), number of pods per plant (20.33), number of kernels per pod (2.47), seed index (40.08 g), pod yield (2.85 t/ha) and haulm yield (4.4 t/ha) compared to other treatment combinations.

Keywords:*Groundnut, Irrigation Scheduling, Panchagavya,Jeevamrutha, Panchamrutha Growth, Yield*.

Comment [A1]: At the beginning of the abstract, the reason for conducting the experiment should be stated in one line

Comment [A2]: It is not common to include this section in the abstract. It is better to be detailed in the materials and methods

Rewrite the sentence

Comment [A3]: Very little has been explained about the result of this experiment. be explained further. At the end of the abstract, a general conclusion and recommendation should be provided

Comment [A4]: Use words that are not in the title

INTRODUCTION

Among various oilseed crops grown in India, groundnut is the major oil seed crop in India and it plays a major role in bridging the vegetable oil deficit in the country. Groundnuts in India are available throughout the year due to a two-crop cycle harvested in March and October. Ground Nuts are important protein crops in India grown mostly under rain-fed conditions. Peanut or groundnut (*Arachis hypogaea L.*), is a species in the legume or "bean" family. The peanut was probably first domesticated and cultivated in the valleys of Paraguay. It is an annual herbaceous plant growing 30 to 50 cm (1.0 to 1.6 ft) tall. The leaves are opposite, pinnate with four leaflets (two opposite pairs; no terminal leaflet), each leaflet 1 to 7 cm long and 1 to 3 cm broad.

In 2020, world production of peanuts (reported as groundnuts in shells) was 54 million tons, an 8% increase over 2019 production. China had 34% of global production, followed by India (19%). Other significant producers were Nigeria, the United States, and Sudan. India is the second largest producer of groundnuts in the world. Indian groundnuts are available in different varieties: Bold or Runner, Java or Spanish and Red Natal.Major Growing States of ground nut are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Orissa, and Uttar Pradesh. India has exported 638,582.97 MT of groundnuts to the world for the worth of Rs. 5,381.61 Crores/ 727.40 USD Millions during the year 2020-21. (APEDA).

Water affects the performance of crops not only directly but also indirectly by influencing the availability of other nutrients, the timing of cultural operations, etc. Water and other production inputs interact with one another. In proper combinations, the crop yields can be boosted manifold to under irrigated agriculture. It profoundly influences photosynthesis, respiration, absorption, translocation and utilization of universal nutrients and cell division besides some other processes. Both its shortage and excess affect the growth and development of the plant, yield and quality of produce.

Organic manures have a variety of advantages, including a balanced supply of nutrients, higher soil nutrient availability due to increased soil microbial activity, the decomposition of hazardous components, improved soil structure and root development, and greater soil water availability. To reduce the impact of synthetic fertilizers on soil health, environment and to maintain ecological biodiversity, sustainable farming with organic inputs is must.Hence this

research is involved to find proper irrigation scheduling along with foliar application of liquid organic manures in summer groundnut.

Comment [A5]: There is no reference in the introduction. All references should be stated. At least 12 references Use the new reference (2015-2023)

MATERIALS AND METHODS

A field experiment was conducted during *Zaid* season of *2022* at Crop Research Farm (CRF), Department of Agronomy, SHUATS, Prayagraj (UP). The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.4), medium in organic carbon (0.48%), medium in available Nitrogen (278.93 kg/ha), low in available Phosphorous (19.03 kg/ha) and medium in available Potash (238.1 kg/ha). The treatments consist of three Irrigation Schedulings viz., I_1: 3 Irrigations (25,45,70 DAS), I_2: 2 Irrigations (25,45 DAS), I_3: 2 Irrigations (25,70 DAS) and three Foliar Organic NutritionF1 – Panchagavya at 3%,F2 – Jeevamrutha at 3%,F3 – Panchamrutha at 3% whose effect is observed on Groundnut (var. K-6). The experiment was laid out in Randomized Block Design with ten treatments replicated thrice. The experiment comprising ten treatment possible combination of above factor, *viz.*, T_1: 3 Irrigations (25,45,70 DAS) + panchagavya-3% T_2: 3 Irrigations (25,45,70 DAS) + Jeevamrutha-3%, T_3: 3 Irrigations (25,45,70 DAS) + Panchamrutha-3%, T_4: 2 Irrigations (25,45 DAS) + panchagavya-3%, T_5: 2 Irrigations (25,45 DAS) + Jeevamrutha-3%, T_6: 2 Irrigations (25,45 DAS) + Panchamrutha-3%, T_7: 2 Irrigations (25,70 DAS) + panchagavya-3%, T_8: 2 Irrigations (25,70 DAS) + Jeevamrutha-3%, T_9: 2 Irrigations (25,70 DAS) + Panchamrutha-3%, T_{10}: Control. Observations regarding growth and yield attributes was recorded during the field experiment and analysed statistically.

RESULT AND DISCUSSION

Growth

According to the recorded and tabulated data pertaining to growth parameters,the significantly higher plant height(60.07 cm)andhigher plant dry weight (39.62 g)at harvest was recorded in treatment with application of3 Irrigations (25,45,70 DAS) + panchagavya-3%.

Significant increase in plant height with might be due to well availability of soil moisture under irrigation scheduling during the critical stages of crop growth at the root zone of the crop and higher nutrient availability, rapid conversion of carbohydrates into protein which in turn elaborated in to protoplasm. These results are in conformity with observations of **Naresha*et al.*, (2018)** and **Madhuri Devi *et al.*, (2019).**

The increased plant height and plant dry weight may be due to continuous supply of nutrients due to the release of nutrients from organics resulted in better translocation of

photosynthates and panchagavya includes coconut water (contains kinetin) increased cytokinin content in leaf, which in turn increased chlorophyll content and photosynthetic activity for longer period. These results were in close conformity with findings of **Ravi kumar*et al.*, (2012).**

Yield attributes

According to the yield characteristics data that was collected and analysed at harvest, maximum number ofpods/ plant (20.33), maximum number of kernels/ pod (2.47) and higher seed index (40.08g) was recorded in treatment with the application of3 Irrigations (25,45,70 DAS) + panchagavya-3%.

The higher performance of yield attributes might be due to the fact that, availability of sufficient soil moisture at the root zone which in turn supplies all the nutrients to the crop during all the growth stages as a result raised the values of yield attributes. These results are in close conformity with the findings of **BN Solanke *et al.*, (2021), Bibhu Santosh Behera *et al.*, (2015).**

Yield

After evaluated the data recorded post harvesting of crop show that significantly higher podyield (2.47 t/ha), higher haulm yield (4.4 t/ha) and harvest index (39.31%) was recorded in treatment with the application of3 Irrigations (25,45,70 DAS) + panchagavya-3%.

In panchagavya spray, the easy transfer of nutrients to plant through foliar spray and the quantities of IAA and GA present in panchagavya, could have created the stimuli in the plant system and which in turn increased the production of growth regulators in cell system. Hence, stimulated the necessary growth and development in plants, leading to better yield. These results are in close conformity with the findings of **Ravi Kumar *et al.*, (2012),Vikash *et al.*, (2022).**

CONCLUSION

Based on the above experimental findings,it is concluded thatapplication of 3 Irrigations (25,45,70 DAS) + panchagavya-3%accomplished better growth parameters, yield attributes andhigher pod yieldingroundnut crop under eastern Uttar Pradesh conditions.

Comment [A6]: Writing a scientific article in this way is not acceptable. It is better to refer to the scientific articles of other researchers

Future Scope

The conclusion drawn are based on one season experimentation only which requires further confirmation for recommendation.

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Table 1. Growth attributes of Groundnut at harvest as influenced by Irrigation Scheduling and Foliar Organic Nutrition.

Treatments	Plant Height (cm)	Plant Dry Weight (g)	CGR ($g/m^2/day$)	RGR (g/g/day)
3 Irrigations (25,45,70 DAS) + panchagavya-3%	60.07	39.62	14.40	0.0133
3 Irrigations (25,45,70 DAS) + Jeevamrutha-3%	59.37	38.47	14.21	0.0136
3 Irrigations (25,45,70 DAS) + Panchamrutha-3%	58.43	37.79	14.34	0.0140
2 Irrigations (25,45 DAS) + panchagavya-3%	57.53	36.84	13.48	0.0134
2 Irrigations (25,45 DAS) + Jeevamrutha-3%	57.19	36.67	13.53	0.0136
2 Irrigations (25,45 DAS) + Panchamrutha-3%	56.39	36.26	13.30	0.0135
2 Irrigations (25,70 DAS) + panchagavya-3%	55.64	35.82	13.29	0.0137
2 Irrigations (25,70 DAS) + Jeevamrutha-3%	55.17	35.53	13.29	0.0138
2 Irrigations (25,70 DAS) + Panchamrutha-3%	54.49	35.20	13.47	0.0142
Control	53.1	33.21	12.27	0.0136
F test	S	S	S	S
SEm(±)	0.06	0.04	0.06	0.00
CD(p=0.05)	0.17	0.12	0.18	0.00

Table 2. Yield attributes of Groundnut at harvest as influenced by Irrigation Scheduling and Foliar Organic Nutrition.

Treatment	Yield attributes		
	No. of pods/plant	**No. of kernels/ pod**	**Seed Index (g)**
3 Irrigations (25,45,70 DAS) + panchagavya-3%	20.33	2.47	40.08
3 Irrigations (25,45,70 DAS) + Jeevamrutha-3%	19.67	2.27	38.96
3 Irrigations (25,45,70 DAS) + Panchamrutha-3%	19.53	2.07	38.61
2 Irrigations (25,45 DAS) + panchagavya-3%	18.87	2.00	37.47
2 Irrigations (25,45 DAS) + Jeevamrutha-3%	18.40	1.87	36.77
2 Irrigations (25,45 DAS) + Panchamrutha-3%	18.27	1.73	36.39
2 Irrigations (25,70 DAS) + panchagavya-3%	18.13	1.60	35.73
2 Irrigations (25,70 DAS) + Jeevamrutha-3%	17.53	1.60	35.64
2 Irrigations (25,70 DAS) + Panchamrutha-3%	17.47	1.60	35.17
Control	15.47	1.40	32.43
F test	S	S	S
SEm(±)	0.06	0.05	0.16
CD(p=0.05)	0.19	0.14	0.49

Treatment	Pod Yield (t/ha)	Haulm Yield (t/ha)	Harvest Index (%)
3 Irrigations (25,45,70 DAS) + panchagavya-3%	2.85	4.40	39.31
3 Irrigations (25,45,70 DAS) + Jeevamrutha-3%	2.76	4.28	39.24
3 Irrigations (25,45,70 DAS) + Panchamrutha-3%	2.55	4.26	37.42
2 Irrigations (25,45 DAS) + panchagavya-3%	2.36	4.22	35.84
2 Irrigations (25,45 DAS) + Jeevamrutha-3%	2.27	4.17	35.21
2 Irrigations (25,45 DAS) + Panchamrutha-3%	2.20	4.13	34.74
2 Irrigations (25,70 DAS) + panchagavya-3%	2.19	3.88	36.02
2 Irrigations (25,70 DAS) + Jeevamrutha-3%	2.12	3.76	36.08
2 Irrigations (25,70 DAS) + Panchamrutha-3%	2.09	3.58	36.84
Control	1.99	3.37	37.11
F test	S	S	S
SEm(±)	0.01	0.01	0.13
CD(p=0.05)	0.04	0.02	0.38

Table 3. Yieldof Groundnut at harvest as influenced by Irrigation Scheduling and Foliar Organic Nutrition.