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Effect of Foliar Application of Organic Nutrition on the Growth and Yield of Groundnut (*Arachis hypogaea* L.)

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A B S T R A C T

The field experiment was carried out during *Rabi* season in 2020, in a farmer's field in Periya Muliyanur village, Anthiyur taluk, Erode district, Tamil Nadu to enhance the productivity of groundnut through foliar application with organic nutrition. The field experiment was laid out in a randomized block design (RBD) with tree replication with nine treatments *viz.*,T_1 – RDF + Panchagavya - 2 %, T_2 – 75 % RDF + Panchagavya - 4 %, T_3 – RDF + Vermiwash - 2 %, T_4– 75 % RDF + Vermiwash - 4 %, T_5 – RDF + Cow dung spray - 10 %, T_6 – RDF + Humic acid – 4 %, T_7 – RDF + Pulse Wonder – 2 %, T_8 – RDF+ Homobrassinolide – 0.12 g a.i. h^{-1}, T_9 – RDF alone. Among the different foliar nutrition tried out, the number of component leaves (42.87), dry matter production (5964 kg/ha), Leaf area index (4.32), Peg to pod percentage (66.34 %), Shelling percentage (71.63 %), pod yield (2396 kg/ha), haulm yield (3620 kg/ha),oil yield (837.75 kg) and oil content (48.82 %) were recorded at application of recommended dose of fertilizers (RDF) combined with foliar application of humic acid (0.4 percent).

Introduction

The "King" of oilseeds is groundnut. It is a major food and revenue crop in our nation. Groundnuts are sometimes known as "wonder nuts" and "poor man's cashew nuts." It's a low-cost nutrient-dense food. Oil (35-56%), protein (25-30%), carbohydrates (9.5-19.0%), minerals (P, Ca, Mg, and K), and vitamins (A, B, C, D, E, F, and G) are all abundant in seeds (E, K and B) (Gulluoglu *et al.*, 2016). It thrives in tropical, subtropical, and warm temperate areas all throughout the world. The world's major groundnut-producing countries include India, China, Nigeria, Senegal, Sudan, Burma, and the United States of America (Madhusudhana, 2013). In terms of land area and production, India is the world's most populated nation. Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, and Maharashtra account for 80% of total groundnut acreage and production. Drought stress, the use of low levels of inputs by small land

holders and marginal farmers in dryland areas, cultivation on problem soils with low soil fertility, a lack of high yielding, disease tolerant varieties, and a high incidence of foliar fungal diseases and insect pests are all factors contributing to India's low groundnut productivity compared to other countries. Due to the limited scope for conventional and organic farming in Asia, future output advances will have to be based on greater productivity. Foliar formulations are becoming more popular in crop production due to their speedy reaction in plant development (Linda, 2007). Foliar feeding is one of the most successful and efficient fertilizers delivery methods because it allows for quick nutrient absorption by piercing the leaf cuticle. It has an effectiveness of 8-10 times that of a soil application. Chlorophyll synthesis, cellular activity, and respiration have all been shown to be stimulated by it. Increased water and nutrient intake from the soil also prompts a plant response (Veeramani *et al.*, 2012).

Materials and Methods

The field was conducted on a farmer's field during *rabi* season in 2020 at Periya Muliyanur village, Anthiyur taluk, Erode district, Tamil Nadu. The experimental field is located at 11.36°N latitude and 77.41°E longitude, with a height of + 243 metres above sea level (MSL). The experimental field's soil is a sandy clay loam with 0.52 percent organic matter and a pH of 7.8. 165.49, 16.76, and 284.12 kg ha^{-1} of accessible N, P, and K were found. The experiment was set up a Randomized Block Design with nine distinct treatments, and it was replicated three times.

The treatment includes, T1 – RDF + Panchagavya - 2 %, T2 – 75 % RDF + Panchagavya - 4 %, T3 – RDF + Vermiwash - 2 %, T4 – 75 % RDF + Vermiwash - 4 %, T5 – RDF + Cow dung spray - 10 %, T6 – RDF + Humic acid – 4 %, T7 – RDF + Pulse Wonder – 2 %, T8 – RDF+ Homobrassinolide – 0.12 g a.i. ha^{-1}, T9 – RDF alone. The groundnut variety CO 3 was chosen in this experiment. Rhizobium (600 g ha-1 seeds) treated seeds were dibbled 30 10 cm apart. The required quantity of NPK was applied in the form of urea, SSP and MOP respectively. 50 % N, 100 % P_2O_5 and 50 % K_2O were applied as basal. At 25 and 40 DAS, the remaining 50 percent N and 50 percent K were applied as top dressing in two equal halves. All agronomic practices were carried out according to the regulations. Foliar fertilizer was applied twice, first at flower initiation and again 15 days after the crop had completed blossoming. The foliar application of panchagavya (2 per cent, 4 per cent), vermiwash (2 per cent, 4 per cent), cow dung spray (10 per cent), humic acid spray (0.4 per cent), pulse wonder 2 per cent, homobrassinolide – 0.12 g a.i. h^{-1} were done as per the treatment schedule on 30 and 45 DAS with the spray volume of 500 litre ha^{-1} using hand operated knapsack sprayer during morning hours. Peg to pod percentage was calculated using number of pegs which are converted into productive pods are calculated from the tagged plants and expressed in percentage. Shelling percentage was calculated with one kg of composite samples from each plot was shelled and the kernels were separated and weighed.

Standard approach was used to record the observations on growth, yield characteristics, and yield. The data was analysed statistically as outlined by Gomez and Gomez (1994) and crucial differences were calculated at a 5% probability level if treatment differences were determined to be significant (F test).

Results and Discussion

Among the different treatments tried out, application of recommended dose of fertilizers along with foliar application of humic acid (0.4 %) significantly component leaves (42.87), leaf area index (4.32), dry matter production (5964 kg/ha).This was followed by the application of recommended dose of fertilizers with Homobrassinolide 0.04 % EC @ 0.12 g a.i. h^{-1} with maximum number of component leaves $planrt^{-1}$ (41.50), Leaf area index (4.18), Dry Matter Production (5783 kg ha^{-1}) at harvest stage of groundnut. It was explained in Table 1.

Table.1 Effect of organic foliar nutrition on growth and yield of groundnut

Treatment	Number of component leaves	Leaf Area Index	Dry Matter Production (kg/ha)	Peg to Pod Percentage	Shelling Percentage	Pod Yield (kg/ha)	Halum Yield (kg/ha)	Oil content (%)	Oil Yield (kg/ha)
T1	39.50	3.99	5501	64.17	70.67	2323	3523	48.53	796.86
T2	35.33	3.56	4954	61.00	69.41	2213	3369	48.26	741.27
T3	40.11	4.03	5603	64.57	70.84	2335	3540	48.59	803.67
T4	33.96	3.43	4773	59.90	68.96	2170	3312	48.15	720.32
T5	36.72	3.70	5137	62.14	69.84	2250	3423	48.38	760.04
T6	42.87	4.32	5964	66.34	71.63	2396	3620	48.82	837.75
T7	38.12	3.86	5322	63.17	70.25	2289	3474	48.49	779.71
T8	41.50	4.18	5783	65.47	71.24	2367	3585	48.69	820.91
T9	32.55	3.28	4594	58.69	68.37	2090	3253	48.03	686.34
SEm±	0.44	0.04	58.94	0.26	0.12	9.27	11.26	0.91	5.3
CD (P=0.05)	1.34	0.11	178	0.80	0.36	28	34	NS	16

T1 – RDF + Panchagavya - 2 % , T2 – 75 % RDF + Panchagavya - 4 %, T3 – RDF + Vermiwash - 2 %, T4 – 75 % RDF + Vermiwash - 4 %, T5 – RDF + Cow dung spray - 10 %, T6 – RDF + Humic acid – 4 %, T7 – RDF + Pulse Wonder – 2 %, T8 – RDF+ Homobrassinolide – 0.12 g a.i. h^{-1}, T9 – RDF alone.

The foliar application of humic sources enhances the absorption of nutrients by the leaf at site of application. The above findings are in consonance with the findings of Chen and Solovitch (2003). They found that foliar application of humic sources enhanced the shoot growth in different crops viz., wheat, maize, barely, bean etc. Humic acid is the source of major nutrients viz., N, P, K when these nutrients are applied through foliage, they are quickly absorbed by the vegetative parts and remobilized to other parts. Nitrogen, phosphorus and potassium are concerned with different plant growth functions viz., cell enlargement, greater photosynthetic activity, formation of carbohydrates, translocation of solutes. These might be the reasons for increased component leaves and leaf area index in the present investigation. These results were in line with Mangesh *et al.,* (2013).

The foliar treatment had a substantial impact on yield components, with the application of RDF + humic acid 0.4 percent resulting in greater yield components and groundnut yield. The foliar application had a significant effect on yield components and the results revealed that the application of RDF + humic acid 0.4 per cent recorded higher values in peg to pod (66.34 %), shelling percentage (71.63 %), pod yield (2396 kg ha^{-1}), haulm yield (3620 kg ha^{-1}), oil content (48.82 %) and oil yield (837.75 kg/ha) in groundnut. It was explained in Table 1. The proportion of shelled eggs rose considerably when humic acid was applied foliarly. It's been hypothesised that a rise in groundnut shelling % is related to humic chemicals having diverse biochemical effects on cell walls, membranes, and in the cytoplasm, resulting in increased photosynthesis. These results corroborate with the finding Bakry *et al.,* (2014).

The use of humic acid as a foliar spray greatly increased groundnut output. The increase in pod, haulm, and kernel production was attributable to the fact that humic acid increased the permeability of the cell membrane, allowing more potassium to enter the cell and, as a result, increasing the pressure within the cell and cell division. Oil accumulation in groundnut is reliant on the genetic makeup of the cultivars, and there was no significant variation in oil content of seeds among the different treatments used, but a boost in oil production is mostly connected to an increase in groundnut pod yield. Similar findings were also reported by Zalate and Padmani (2010).

According to the results of this experiment, application of RDF + Humic acid (0.4 %) on 30 and 45 DAS resulted the highest growth and yield parameters and enhanced the productivity of groundnut.

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