Eco. Env. & Cons. 28 (January Suppl. Issue) : 2022; pp. (S370-S373)
Copyright@ EM International
ISSN 0971–765X

http://doi.org/10.53550/EEC.2022.v28i01s.052

Influence of organic, Natural farming and recommended package of practices on yield and Economics of summer groundnut *(Arachis hypogea* L.)

Sunil Kumar, K*, Sudhir Kamath, K. V. Lakhsmana and Madhurima Vinod

Zonal Agricultural and Horticultural Research Station, Brahmavar, Udupi, University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka, India

(Received 22 August, 2021; Accepted 22 September, 2021)

ABSTRACT

A field experiment was carried out at Seed Farm, ZAHRS Brahmavar, Udupi, Karnataka during *summer* 2019 to study the influence of organic, natural farming, recommended package of practice and farmers practice on yield and economics of *summer* groundnut. The number of pods per plant (14.94) and pod yield (17.38 q ha^{-1}) were significantly higher in package of practice whereas, haulm yield (23.10 q ha^{-1}) was higher in natural farming which was on par with package of practice treatment. Maximum gross returns (Rs. 1,15,175 ha^{-1}), net returns (Rs. 52,582.5 ha^{-1}) and B:C ratio (1.84) were observed in package of practice treatment. However higher cost of cultivation (Rs. 65,435.0 ha^{-1}) was noticed in organic farming. Significantly lower pod yield (12.92 q ha^{-1}), haulm yield (17.10 q ha^{-1}), gross returns (Rs. 85,975.0 ha^{-1}) and net returns (Rs. 33,837.5 ha^{-1}) were recorded in farmers practice.

Key words: *Natural Farming, Organic farming, Package of practice, Farmers practice, Groundnut*

Introduction

Arachis hypogaea L., a member of the legume family Fabaceae is an annual crop which is also known as groundnut, peanut, jack nut *etc*. The most important groundnut producing countries in the world are India, China, USA, West Africa, Sudan, and Nigeria *etc*. India ranks first in the world in area (5.8 million hectares contributing about 40 % of the total world's area) and production of groundnut (6.7 million tonnes contributing about 33 % of the total world's production). The average productivity of India is only about 1214 kg ha^{-1} as against 2995 kg ha^{-1} in USA, 2688 kg ha^{-1} in China, 1379 kg ha^{-1} in Brazil and 1360 kg ha^{-1} in Indonesia. Among all oilseed crops, groundnut ranks first in the country which accounts for more than 40-50 % in area and 60 to 70 % in production (Anon., 2021).

Groundnut is an oil and protein rich energy giving crop, but usually grown under low soil fertility and in rainfed areas. The productivity of groundnut in India is still low mainly due to low consumption of fertilizers in spite of prominent nutrient deficiencies. Integrated nutrient management, involving the conjunctive use of chemical fertilizers and organic sources assumed great importance recently due to paucity of fertilizers and need to sustain productivity. Groundnut is an exhaustive crop and removes large amount of macro and micro-nutrients from soil which cannot be met by single nutrient source.

The supply of nutrients through biofertilizers, organic and inorganic sources has been found to be the best option for increasing productivity and maintaining sustainability, and hence there is ample scope of increasing productivity through combined use of various nutrient sources. Keeping all these facts in view, a field trail was conducted to study the effect of organic, natural farming and recommended package of practices on yield and economics of *summer* groundnut.

Materials and Methods

The field experiment was conducted at Seed farm, Zonal Agricultural and Horticultural Research Station, Brahmavar during *summer* 2019. The experimental site is located at an elevation of 10 meter above mean sea level. The soil of the experimental site is sandy loam in texture and acidic in reaction (pH 5.42), medium in organic carbon (0.72%), medium in available nitrogen (247.50 kg ha^{-1}), low in available phosphorus (45.43 kg ha^{-1}) and low in available potassium (64.68 kg ha^{-1}). The experiment was laid out in randomized block design comprising of four treatments; Natural farming (Zero Budget Natural Farming- ZBNF) (T1), Organic farming (OF) (T2), Package of practice (POP) (T3) and Farmers practice (FP) (T4). Each treatment was allocated randomly and replicated five times. TMV-2 variety of groundnut seeds were used for sowing. It was sown at a spacing of 30 cm *10 cm with seed rate of 100 kg ha^{-1}. In order to check the weeds, hand weeding was carried out twice. Irrigation was given based on soil moisture conditions. All the treatment details are presented in Table 1.

Results

Growth: The experimental results on influence of different farming practices on growth parameters of groundnut revealed that at harvest, natural farming treatment recorded significantly taller plants (38.48 cm), more number of functional leaves (41.92 plant^{-1}) and maximum number of branches (12.22 plant^{-1}) which was on par with package of practice treatment (34.20, 37.36 and 11.63 plant^{-1}, respectively) (Table 2). However, the total dry matter accumulation was significantly higher in package of practice treatment (45.60 g plant^{-1}). The lowest total dry matter production was recorded in farmer's practice treatment (38.68 g plant^{-1}) (Table 2).

Yield: The package of practice treatment (T_3) recorded significantly higher number of pods per plant (14.94) and pod yield (17.38 q ha^{-1}) whereas, the highest haulm yield was recorded in Natural Farming treatment (23.10 q ha^{-1}) (Table 3). The higher pod yield could be attributed to integrated use of inorganic, organic source of nutrients and biofertilizers as this could ascertain continuous supply of nutrients throughout the growth of crop from

Table 1. Treatment details of the experiment

Treatments	Particulars
T1: Natural Farming (ZBNF)	Application of Ghanajeevamruta @ 1000 kg ha^{-1} before sowing Seed treatment with Beejamruta @ 50 litres per ha Application of Jeevamruta @ 500 litres per ha at an interval of 15 days (6 times) Mulching at 25 days after sowing of crop Application of Neemastra @ 500 litres per ha against sucking pests (2 times)
T2: Organic farming (OF)	Application of FYM @ 10 t per ha before sowing Application of 1 ton per ha vermicompost before sowing Application of cow urine 10 % @ 1500 l per ha at 30, 45 and 60 days after sowing Seed treatment with Rhizobium and PSB @ 200 g each per kg seeds Application of Azadirachtin 0.03% @ 3 ml per litre against sucking pests and fungal diseases (2 times)
T3: Package of practice (POP)	Application of FYM @ 10 tonnes per ha before sowingApplication of 25:75:37 kg NPK per ha at the time of sowing Seed treatment with Rhizobium and PSB @ 200g each per kg seeds Application of Dimethoate 30 EC @ 1.7 ml per litre against sucking pests (2 times) Application of Mancozeb 75 WP @ 2.5 g per litre against rust (1 spray)
T4: Farmers practice(FP)	Application of Gypsum @ 150 kg ha^{-1} before sowing Application of 21.25: 21.25: 21.25 kg NPK ha^{-1} at the time of sowing

early stage to maturity. However, farmer's practice treatment recorded lowest yield parameters *viz*., number of pods per plant (9.94), pod yield (12.92 q ha^{-1}) and haulm yield (17.10 q ha^{-1}).

Economics: The higher gross, net returns and B:C ratio (Rs. 115175.0, 52582.0 ha^{-1} and 1.84, respectively) were obtained with treatment of recommended package of practice due to increase in the groundnut pod yield (Table 4). However, the farmers practice treatment recorded the lowest gross returns and net returns of Rs.85,975.0 and 33,837.0, respectively.

Discussion

Better growth parameters recorded in Natural farming treatment might be due to continuous application of Jeevamruta which resulted in better vegetative growth. Similar results were reported by Sutar *et al.* (2018) in cowpea, where the application of jeevamrit @ 1000 l ha^{-1} resulted in significantly taller plants with higher number of branches per plant. Increase in growth attributes due to jeevamruta application might be attributed to solublisation of nutrients in soil and absorption of nutrients and moisture as reported by Yogananda *et al.* (2015), Vaishnavi and Jeyakumar (2016) and Siddappa *et al.* (2016). However, total dry matter production was higher in package of practice treatment. This might be ascribed to the greater availability of essential nutrients with the application of inorganic fertilizers, FYM and microbial inoculants that promoted various physiological activities in plants which are considered to be indispensable for their proper growth and development. The present findings are in line with the reports of Bajrang *et al*., (2013) and Patil *et al*. (2017).

With respect to yield parameters in groundnut, the highest yield was recorded in package of practice treatment. The results obtained are in confor-

Table 2. Growth parameters of groundnut at harvest as influenced by different agronomic practices

Treatments	Plant height (cm)	No. of leaves $plant^{-1}$	No. of branches $plant^{-1}$	Dry weight (g $plant^{-1}$)
T1- Natural Farming (ZBNF)	38.48	41.92	12.22	43.30
T2- Organic Farming (OF)	34.44	39.30	10.20	43.26
T3-Package of Practice (POP)	34.20	37.36	11.62	45.60
T4- Farmer's practice (FP)	30.34	32.30	9.32	38.68
S. Em±	1.43	1.50	0.71	1.28
C.D. @ 5 %	4.39	4.63	2.18	3.93

Table 3. Yield and yield parameters of groundnut as influenced by different agronomic practices

Treatments	No. of pods $plant^{-1}$	Pod yield (q ha^{-1})	Haulm yield (q ha^{-1})	Test weight (g)
T1- Natural Farming (ZBNF)	13.78	15.34	23.10	30.86
T2- Organic Farming (OF)	14.12	15.98	21.36	30.64
T3-Package of Practice (POP)	14.94	17.38	21.86	30.94
T4- Farmer's practice (FP)	9.94	12.92	17.10	29.60
S. Em±	0.57	0.84	0.78	0.46
C.D. @ 5 %	1.75	2.60	2.41	1.40

Table 4. Cost of cultivation, gross returns, net returns and B:C ratio of groundnut as influenced by different cultural practices

Treatments	Cost of cultivation (Rs. ha^{-1})	Gross returns (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B : C Ratio
T1- Natural Farming (ZBNF)	58,942.0	1,03,650.0	44,707.0	1.76
T2- Organic Farming (OF)	65,435.0	1,06,525.0	41,090.0	1.63
T3-Package of Practice (POP)	62,592.0	1,15,175.0	52,582.0	1.84
T4- Farmer's practice (FP)	52,137.0	85,975.0	33,837.0	1.65

mity with the earlier findings of Bajrang *et al*. (2013), Madhubala and Kedarnath (2015) and Patil *et al*. (2017). In addition to this, inoculation of *Rhizobium* and PSB results in cumulative effects such as supply of N and P to the crop along with production of growth promoting substances like auxin, gibberlins and cytokinins. A similar finding in soybean crop was reported by Nagaraju and Mohankumar (2010) and Sunil *et al*. (2018). The findings with respect to economics of groundnut crop are in line with the reports of Madhubala and Kedarnath (2015) and Patil *et al*. (2017).

Conclusion

Finally, it can be concluded that, among different cultivation practices in groundnut, recommended package of practice which comprised of organics, inorganics and bio-fertilizers recorded higher yield and economics as compared to organic and natural farming methods.

Acknowledgement

Special thanks to Natural Farming project (ZBNF) funded by GOK grants, Karnataka State Department of Agriculture and University of Agricultural and Horticultural Sciences, Shivamogga for providing the necessary facilities to carry out this study.

References

Anonymous. 2021. International Production Assessment Division, USDA

Bajrang, L., Pareek, B.L., Rathore, P.S. and Amit, K. 2013. Effect of integrated nutrient management on productivity of groundnut (*Arachis hypogaea*) in arid western Rajasthan. *Agriculture for Sustainable Development.* 1 : 124-142.

Madhubala and Kedarnath, 2015. Maximization of groundnut (*Arachis hypogaea*) yield by nutrient management practices. *Journal of Experimental Biology and Agricultural Sciences*. 3(3) : 241-245.

Nagaraju, A.P. and Mohan Kumar, 2010. H. K. Effect of micronutrients and bioinoculants on growth and yield of soybean (*Gycine max* (L.)). *Mysore Journal of Agricultural Sciences*. 44(2) : 260-265.

Patil, D.B., Pawar, P.P., Wadile, S.C. and Patil, H.M. 2017. Effect of integrated nutrient management on growth and yield of *kharif* groundnut (*Arachis hypogaea* L.). *International Journal of Horticulture, Agriculture and Food Science.* 1(1): 21-23.

Siddappa, Murali, K. and Devakumar. N. 2016. Organically grown field bean (*Lablab purpureus* var. *lignosus*) using jeevamrutha and farm yard manure. **In:** *National Conference on Sustainable and Self Sufficient Productiob of Pulses through an Integrated Approach,* Bengaluru, p. 105.

Sunil Kumar, K., Andani Gowda and Shankar Gowda Patil, 2018. Integrated effect of organic and inorganic sources of nutrients on vegetable soybean production (*Glycine max*). *International Journal of Chemical Studies*. 6(2) : 962-965.

Sutar, R., Sujith, G.M. and Devakumar, N. 2018. Growth and yield of cowpea [*Vigna unguiculata* (L.) Walp] as influenced by jeevamrutha and panchagavya application. *Legume Research.* 3932 : 1-5.

Vaishnavi, J.S. and Jeyakumar, P. 2016. Growth and yield response of cowpea to multi location bio – inoculants. *Legume Research*. 39(6) : 962-969.

Yogananda, S.B., Devakumar, N., Shruti, M.K. and Ningaraju. 2015. Growth and yield of cowpea as influenced by different sources of organic manures. **In:** *National Symposium on Organic Agriculture for Sustainable Food Security - Challenges and Opportunities Tamilnadu,* India, p. 113.