www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(7): 518-521

www.thepharmajournal.com
Received: 14-05-2020
Accepted: 17-06-2020

**Lokesh**
University of Agricultural Sciences, Raichur, Karnataka, India

**K Basavegowda**
University of Agricultural Sciences, Raichur, Karnataka, India

**GC Shekar**
University of Agricultural Sciences, Raichur, Karnataka, India

**Muniswamy**
University of Agricultural Sciences, Raichur, Karnataka, India

**BS Ganiger**
University of Agricultural Sciences, Raichur, Karnataka, India

**Ningappa**
University of Agricultural Sciences, Raichur, Karnataka, India

**Corresponding Author:**
**Lokesh**
University of Agricultural Sciences, Raichur, Karnataka, India

# Integrated approach for maximization of seed yield and quality in soybean (*Glycine max.* L.)

**Lokesh, K Basavegowda, GC Shekar, Muniswamy, BS Ganiger and Ningappa**

**Abstract**
Soybean (*Glycine max.* L.) has become a miracle crop of the twentieth century. It is a triple beneficiary crop, a valuable feed and an industrial raw material. It is one of the important protein and oil seed crop and occupies third place both in seed and oil production throughout the world. It is also 'treated as manmade meat' because of its rich source of protein and fat. Soybean also has medicinal value and helps in prevention as well as treating chronic diseases like heart ailments, osteoporosis, cancer, kidney ailments and menopausal syndromes. The continuous use of NPK fertilizers under intensive cropping system has caused adverse effects on soil properties such as soil structure, density, pH, quantity and quality of organic matter, nutrient cycle within soil profile and biological properties thereby affecting the sustainability of crop production, besides causing environmental pollution (Virmani, 1994) [8]. Farmers are facing severe problem on availability of chemical fertilizers for soybean production (Suresh Meena and Ghasolia, 2013) [11]. The integrated nutrient management paves the way to overcome these problems, which involves the Methods of sowing and conjunctive use of chemical fertilizers, organic manures and bio-fertilizers to sustain crop production as well as maintenance of soil health. Systematic approach to nutrient management by tapping all possible sources of inorganic in a judicious manner to maintain soil fertility and crop productivity is the essence of integrated nutrient management (INM) (Sangeeta *et al.*, 2014) [3]. The present study was planned with hypothesis that among the factors responsible for low productivity in soybean, Sowing Methods and inadequate fertilizer use and emergence of multiple nutrient deficiencies due to poor recycling of organic resources and unbalanced use of fertilizers are important (Chaturvedi *et al*., 2010) [12]. Soybean is an energy rich crop and hence the requirement of major nutrients including secondary and micronutrients is high for soybean (Singh *et al*., 2006) [5]. Keeping above facts in mind the present study was undertaken to study the effect of Integrated approach for maximization of seed yield and Quality in soybean (*Glycine max.* L.)

**Keywords:** seed yield, quality in soybean (Glycine max. L.), crop, oil seed

## Introduction

## Materials and Methods

The experiment was conducted at Agricultural research station, Bidar during 2014-15. University of Agricultural Sciences, Raichur. There were eight treatments and laid out in randomized block design with three replications. The treatments combinations includes T0- NPK, TI- NPK+S, T2- NPK+Zn, T3- NPK+S + Zn, T4- NPK+B, T5- NPK+S+ Zn+B, T6- NPK+M0, T7- NPK+ S+ Zn+M0, T8- NPK+ S+ Zn+B+M0 *Corresponding author A Field experiment was conducted to study the effect of integrated nutrient management on crop growth, seed yield and yield attributing characters of soybean. Farm yard manure (FYM) were incorporated three weeks before sowing as per the treatments. The seed was treated with thiram+ carbendazim (2:1)@ 2gm/kg of seed of the ruling variety JS-335 was Sown on 17-7-2015 with 2 methods of sowing (normal and Ridge furrow) having 9 nutrient combination involving 3 doses of NPK with the combinations of micronutrients. As per the soil test report the soil was deficiency of Zinc was overcome by spraying Znso4 at green pod stage. Herbicide Pendimethalin was sprayed one day after sowing. Two sprays of Bavistin 2gm/lit of water at 35 and 50 days after sowing and Chlorpyrifos spray at the time of flower initiation.

The calculated quantity of N, P2O5 and K2O in the form of urea, single super phosphate and muriate of potash and micronutrients as per the treatments were supplied at the time of sowing and sown the seed at an inter and intra row spacing of 30 cm and 10 cm, Five plants per plot were selected randomly in the net plot area and tagged for recording observations on growth and yield parameters. The statistical analysis and the interpretation of the experimental data presented in the results and discussion chapter.

**Fig 1:** A Field experiment was conducted to study the effect of integrated nutrient management on crop growth, seed yield and yield attributing characters of soybean.

**Results and discussion**

The results on plant height as influenced by method of Sowing, micronutrient application and interactions were presented in the Table1. The plant height and days to 50% flowering did not differed significantly among the methods of sowing. The maximum plant height (35.57cm) in ridge furrow method of sowing and the lowest (35.12cm) was recorded in the flat method of sowing. The yield attributing characters viz., number of pods/plant, number of seeds per pod, Seed yield per plot and seed yield per hectare differed significantly, however it was highest in Ridge method of sowing as compared to flat method. Since different planting patterns significantly influence the light environment considerably affects the productivity because sun-light plays a vital role in increasing the photosynthetic rate and biomass yield (Singh, R. and Rai, R. K. 2004) [2, 4].

Among the micronutrient application yield and yield attributing characters differed significantly however, days to 50 per cent flowering did not differ significantly. The plant height was highest in (T7- NPK+ S+ Zn+M0) and it was lowest in (T2- NPK+Zn). The number of pods, number of seeds per pod, seed yield per plot and hectare were recorded more in treatment of T7 (- NPK+ S+ Zn+M0) as compared to other treatment combinations. Similar results were observed by Venktesh *et al*., (2018) in soybean.

Seed quality parameters viz., seed recovery and per cent seed germination did not differed significantly among the methods of sowing however, seedling length, Dry weight and vigour index differed significantly by ridge furrow method of sowing.

However, the micronutrient application did not differed significantly for days to 50 per cent flowering.

**Table 1: Effect of sowing Methods & Micronutrient application on seed yield & quality in soybean.**

| Sl. No. | treatments | Plant height (cm) | Days to 50% flowering | No. pods Per plant | No. seeds Per pod | Seed yield/plot (kg) | Seed yield (qtl/ ha) | 1000 Seed wt.(gm) | Seed recovery(%) | Germination(%) | Seedling length(cm) | Seedling Dry wt.(gm) | Vigour index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Sowing methods | | | | | | | | | | | | |
| | S1: Ridge | 35.57 | 40 | 57.52 | 2.82 | 3.00 | 25.03 | 111.20 | 92.8O | 88.92 | 25.64 | 0.87 | 7736 |
| | S2:flat(normal) | 35.12 | 38 | 51.00 | 2.74 | 2.72 | 22.90 | 109.88 | 92.20 | 87.68 | 24.62 | 0.84 | 7365 |
| | SE(m) +_ | 0.36 | 0.39 | 0.12 | 0.002 | 0.003 | 0.007 | 0.14 | 0.42 | 0.26 | 0.06 | 0.008 | 0.20 |
| | CD at 5% | NS | NS | 0.74 | 0.012 | 0.017 | 0.042 | 0.86 | NS | NS | 0.037 | 0.004 | 1.19 |
| 2 | Micronutrient application | | | | | | | | | | | | |
| | To | 33.90 | 39.03 | 53.01 | 2.58 | 2.47 | 20.42 | 109.73 | 91.11 | 86.60 | 24.20 | 0.89 | 7743 |
| | T1 | 35.20 | 38.97 | 56.93 | 2.60 | 2.92 | 23.68 | 110.32 | 92.10 | 87.12 | 23.85 | 0.81 | 7047 |
| | T2 | 36.18 | 38.10 | 60.57 | 2.73 | 3.00 | 25.40 | 110.77 | 92.20 | 88.18 | 25.65 | 0.84 | 7392 |
| | T3 | 35.47 | 38.66 | 58.70 | 2.78 | 2.68 | 22.06 | 110..36 | 91.89 | 87.80 | 23.98 | 0.86 | 7568 |
| | T4 | 35.00 | 39.87 | 56.60 | 2.69 | 2.50 | 21.11 | 110.20 | 91.90 | 87.00 | 23.90 | 0.83 | 7221 |
| | T5 | 35.98 | 39.97 | 73.95 | 2.54 | 3.02 | 25.12 | 111.04 | 93.00 | 89.20 | 25.62 | 0.88 | 7832 |
| | T6 | 35.58 | 40.03 | 70.20 | 2.85 | 2.80 | 23.88 | 111.58 | 92.76 | 88.50 | 25.25 | 0.86 | 7568 |
| | T7 | 36.63 | 40.10 | 75.88 | 2.10 | 3.10 | 27.94 | 110.88 | 93.67 | 90.00 | 26.38 | 0.89 | 8010 |
| | T8 | 36.06 | 39.98 | 68.00 | 2.80 | 3.12 | 26.20 | 110.89 | 93.14 | 88.95 | 25.97 | 0.88 | 7832 |
| | SE(m) +_ | 0.53 | 0.39 | 0.23 | 0.002 | 0.004 | 0.004 | 0.28 | 0.51 | 0.41 | 0.06 | 0.003 | 0.53 |
| | CD at 5% | 1.46 | NS | 0.63 | 0.005 | 0.012 | 0.013 | 0.81 | 1.45 | 1.21 | 0.17 | 0.010 | 1.45 |

To-NPK, T1-NPK+S, T2-NPK+Zn, T3-NPK+S + Zn, T4-NPK+B, T5-NPK+S+Zn+B, T6-NPK+MO, T7-NPK+S+ Zn+MO, T8- NPK+ S+ Zn+B+MO

**Table 2:** Interaction Effect of sowing Methods & Micronutrient application on seed yield & quality in soybean.

| Sl.No. | treatments | Plant height (cm) | Days to 50% flowering | No. pods Per plant | No. seeds Per pod | Seed yield/plot (kg) | Seed yield (qtl/ha) | 1000 Seed wt.(gm) | Seed recovery(%) | Germination(%) | Seedling length(cm) | Seedling Dry wt.(gm) | Vigour index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | S1T0 | 34.73 | 39.51 | 55.26 | 2.70 | 2.73 | 22.72 | 110.46 | 91.95 | 87.76 | 24.92 | 0.88 | 7722 |
| 2 | S1T1 | 35.16 | 39.48 | 57.22 | 2.71 | 2.96 | 24.35 | 110.76 | 92.45 | 88.02 | 24.23 | 0.84 | 7393 |
| 3 | S1T2 | 35.87 | 39.05 | 59.04 | 2.71 | 3.00 | 25.21 | 110.98 | 92.50 | 88.55 | 25.64 | 0.85 | 7526 |
| 4 | S1T3 | 35.52 | 39.33 | 58.11 | 2.80 | 2.84 | 23.54 | 110.78 | 92.34 | 88.36 | 24.81 | 0.86 | 7598 |
| 5 | S1T4 | 35.28 | 39.93 | 57.06 | 2.74 | 2.75 | 23.07 | 110.70 | 92.35 | 87.96 | 24.77 | 0.85 | 7476 |
| 6 | S1T5 | 35.77 | 39.98 | 65.73 | 2.68 | 3.01 | 25.07 | 111.12 | 92.90 | 89.06 | 25.63 | 0.87 | 7448 |
| 7 | S1T6 | 35.57 | 40.01 | 63.86 | 2.80 | 2.90 | 24.45 | 111.39 | 92.78 | 88.71 | 25.44 | 0.86 | 7629 |
| 8 | S1T7 | 36.10 | 40.05 | 66.70 | 2.46 | 3.05 | 26.48 | 111.04 | 93.23 | 89.46 | 26.01 | 0.88 | 7872 |
| 9 | S1T8 | 35.81 | 39.99 | 62.76 | 2.81 | 3.06 | 25.56 | 111.04 | 92.97 | 88.93 | 25.80 | 0.87 | 7825 |
| 10 | S2T0 | 34.51 | 38.51 | 52.00 | 2.66 | 2.59 | 21.66 | 109.80 | 91.65 | 87.14 | 24.41 | 0.86 | 7494 |
| 11 | S2T1 | 35.16 | 38.48 | 53.96 | 2.67 | 2.82 | 23.29 | 110.10 | 92.15 | 87.40 | 24.23 | 0.82 | 7176 |
| 12 | S2T2 | 35.65 | 38.05 | 55.78 | 2.73 | 2.86 | 24.15 | 110.32 | 92.20 | 87.93 | 25.13 | 0.84 | 7386 |
| 13 | S2T3 | 35.06 | 38.33 | 54.85 | 2.76 | 2.70 | 22.48 | 110.12 | 92.04 | 87.74 | 24.30 | 0.85 | 7457 |
| 14 | S2T4 | 35.55 | 38.93 | 53.80 | 2.71 | 2.61 | 22.00 | 110.04 | 92.05 | 87.34 | 24.26 | 0.83 | 7249 |
| 15 | S2T5 | 35.35 | 38.98 | 62.47 | 2.64 | 2.87 | 24.01 | 110.46 | 92.60 | 88.44 | 25.12 | 0.86 | 7605 |
| 16 | S2T6 | 35.74 | 39.01 | 60.60 | 2.79 | 2.76 | 23.39 | 111.73 | 92.48 | 88.09 | 24.93 | 0.85 | 7556 |
| 17 | S2T7 | 35.87 | 39.05 | 63.44 | 2.42 | 2.91 | 25.42 | 110.38 | 92.93 | 88.84 | 25.50 | 0.86 | 7640 |
| 18 | S2T8 | 35.59 | 38.99 | 59.50 | 2.77 | 2.92 | 24.55 | 110.38 | 92.67 | 88.31 | 25.29 | 0.88 | 7771 |
| | SE(m) +_ | 1.28 | 1.45 | 0.54 | 0.005 | 0.01 | 0.01 | 0.71 | 1.28 | 1.06 | 0.14 | 0.01 | 1.85 |
| | CD at 5% | NS | NS | 1.52 | 0.014 | 0.03 | 0.03 | NS | 3.59 | NS | 0.39 | 0.03 | 4.86 |

T0– NPK, T1-NPK+S, T2-NPK+Zn, T3- NPK+S+Zn, T4-NPK+B, T5-NPK+S+Zn+B, T6-NPK+MD, T7-NPK+S+Zn+M0, T8-NPK+S+Zn+B+M0

The Ridge and Furrow method of sowing was to be significantly superior over normal sowing for seed yield (25.03q/ha) 100 seed wt. (111.20g) Seed recovery (92.80%) germination (88.92%) and vigour index (7736). Among combination application of micronutrients the treatment for processed seed yield was (27.94qtl/ha). Similar results also reported by Suresh Motwani and Ashish (2018) [10] that higher production and profitability of soybean cultivation planting on broad bed and furrow system in imperative and farmers are required to be motivated to adopt it to mitigate the losses due to climate change**.** Soybean is an energy rich crop and hence the requirement of major nutrients including secondary and micronutrients is high for soybean (Singh *et al*., 2006) [5].

Considering the interaction effects for both ridge (25.03qt/ha) and Normal (22.90qt/ha) sowing conditions. The treatment (NPK+S+Zn+B+Mo) was found to be significantly superior over other treatments for higher seed yield.

The interaction effects due to methods of seed sowing and micronutrient application differed significantly for number of pods per plant (66.70 to 52.00), number of seeds per pod (2.81 to 2.41), seed yield per ha (21.66 to 26.48) differed significantly. However, days to 50 per cent flowering did not differed significantly.

The interaction effects due to methods of seed sowing and micronutrient application differed significantly for per cent seed recovery, seedling length, seedling dry weight and vigour index. However, higher seed recovery (92.97%) was in (SI T8) and the lowest seed recovery was in (S1T0) that is (91.95%).

The interaction effects due to methods of seed sowing and micronutrient application did not differed significantly for 1000 seed weight and per cent seed germination.

## Conclusion

The results in the present study clearly brought out that the treatment combination (S1 T7) T7- NPK+ S+ Zn+M0 was found superior and recorded higher growth, seed yield and yield attributes of soybean. Therefore, this treatment combination can be used to maximize seed yield of soybean.

## References


1. Maheshbabu HM, Ravi Hunje, Biradar Patil NK, Babalad HB. Effect of organic manures on plant growth, seed yield and quality of soybean. Karnataka J Agric. Sci. 2008; 21(2):219-221.
2. Ranjit Singh, Rai RK. Yield attributes, yield and quality of soybean as influenced by integrated nutrient management. Indian J Agron. 2004; 49:271-274.
3. Sangeeta S, Singh VK, Kumar R. Effect of integrated nutrient management on yield and quality of cauliflower (*Brassica Oleracea var. Botrytis* L.). The Bioscan. 2014; 9(3):1053-1058.
4. Singh R, Rai RK. Yield attributes, yield and quality of soybean (*Glycine max*) as influenced by integrated nutrient management. Indian J Agron. 2004; 49(4):271-274.
5. Singh RK, Ghosh PK, Bandyopadhyay KK, Misra AK,

Mandal KG, Hati KM. Integrated plant nutrient supply for sustainable production in soybean - based cropping system Indian J Fertil. 2006; 1(11):25-32.
6. Singh SR, Umed Singh K, Singh JK. Effect of bioinoculants and FYM on growth, yield and quality of soybean (*Glycine max* L. Merrill) under rainfed conditions of Kashmir valley. Ann. Agric. Res. New Series, 2009.
7. Vadgave S. Studies on integrated nutrient management on seed yield, quality and storability of greengram. M. Sc. Thesis, Univ. of Agric. Sci., Dharwad, 2010.
8. Virmani SM. The twenty first-Dr. R.V. Tamhane memorial lecture: Unceed Agenda 21: the new challenge for soil research. J Indian Soc. Soil Sci. 1994; 49:521-523.
9. Virkar AT, Tumbare AD. Effect of integrated nutrient management on growth and yield of soybean-wheat cropping sequence. J Agric. Res. Technol. 2008; 36(3):358-363.
10. Suresh Motwani, Ashish. Performance of soybean planted on broad bed furrow system under real farm conditions. Soybean research. 2018; 16(1&2):113-117.
11. Meena S, Ghasolia RP. Effect of phosphate solubilizers and FYM on microbial population of soybean field [*Glycine Max* (L.) Merrill]. The Bioscan. 2013; 8(3):965-968.
12. Chaturvedi S, Chandel AS, Dhyani AS, Singh AP. Productivity, Profitability and quality of soybean (residual soil fertility as influenced by integrated nutrient management. Indian J Agron. 2010; 55(2):133-137.