

**UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002**

**PROFORMA FOR SUBMISSION OF THE FINAL REPORT OF THE WORK
DONE ON THE MAJOR RESEARCH PROJECT**

1. Title of the Project : Management of Micronutrients and Organic Manures for Sustainable Soil Fertility and Productivity of Sesame in Coastal Sandy Soil
2. Name and Address of the Principal Investigator : **D. ELAYARAJA**
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4. UGC Approval Letter No. and Date : F.42-727/2013 (SR) dated 25.03.2013
5. Date of Implementation : 01.04.2013
6. Tenure of the Project : From April 2013 - March 2017
7. Total Grant Allocated : Rs. 9,04,800
8. Total Grant Received : Rs. 8,22,000
9. Final Expenditure : Rs. 5,98,618
10. Title of the Project : Management of Micronutrients and Organic Manures for Sustainable Soil Fertility and Productivity of Sesame in Coastal Sandy Soil

11. Objectives of the Project:

- To study the effect of micronutrients and organics on the productivity of sesame in coastal sandy soil.
- To study the effect of micronutrients and organics on the nutrient uptake by sesame in coastal sandy soil.
- To study the effect of micronutrients and organics on the soil fertility in terms of physical, chemical and biological characteristics of coastal sandy soil.

12. Whether Objectives were achieved (Give details): YES

- i) Application of 125% NPK + ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ (SA) through soil as well as foliar spray @ 0.5% twice at pre flowering and flowering stage along with CCP @ 12.5 t ha⁻¹ which recorded the highest seed yield of 815 kg ha⁻¹ and stalk yield of 1805 kg ha⁻¹ which represented 48.34 and 47.70 per cent increase in seed and stalk yield, respectively over recommended dose of NPK alone.
- ii) Combined application of recommended dose of NPK + CCP @ 12.5 t ha⁻¹ along with ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil and foliar application registered the highest macro (N, P and K) and micronutrients (Zn and Mn) uptake by sesame at all the crop growth stages as compared to farmers practice.
- iii) Application of CCP @ 12.5 t ha⁻¹ + recommended dose of NPK along with ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil and foliar application favorably improved the bulk density, pore space and water holding capacity of soil. The pH, EC is also reduced due to composted coirpith applied treatments alone as compared to control. The combined application of 125% recommended dose of NPK + CCP along with ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil application and foliar application of ZnSO₄ + MnSO₄ @ 0.5 per cent recorded the highest available N, P, K, Zn and Mn content of the soil. The microbial population (bacteria, fungi and actinomycetes) as well as the activity of soil enzymes (urease, phosphatase and dehydrogenase) was also increased.

13. Achievements from the Project:

Application of ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil + foliar @ 0.5 per cent twice at critical stages *viz.*, pre flowering stage (PFS) and flowering stage (FS) along with 125% recommended dose of NPK and CCP @12.5 t ha⁻¹ improved the soil fertility and enhanced the nutrient uptake and yield of sesame in coastal sandy soils.

14. Summary of the Findings:

The poor retention and leaching of nutrients in coastal sandy soils necessitates for the increased rate of nutrient application in such soil along with organic matter incorporation. The deficiency of micronutrients especially Zn and Mn are very common in highly coarse textured sandy soils. The application of organic wastes in such soils by its significant effect in improving the physical, chemical and biological properties sustain soil health and crop productivity. Further, the coastal areas offer a greater scope for recycling of organic wastes as these areas in particular are endowed with a variety of natural resources and organic wastes. The organic wastes supplies plant nutrients, and also it is known to contain growth principles and enzymes, which can increase the efficiency of chemical fertilizers. In coastal area next to rice, sesame is the dominant crop being cultivated in such nutrient poverished coarse textured soil. Sesame being a heavy feeder of both macro and micronutrients, it is an imperative need to optimize the response level of sesame to NPK and micronutrients in poorly fertile coastal light textured soil. Hence in the present study, recycling of available organic wastes of the coastal areas are carried out along with NPK and micronutrients for sustainable sesame production.

In the present investigation, a series of one pot experiments and two field experiments with sesame was carried out. The first pot experiment was carried out to optimize the NPK level and micronutrients for increasing the yield of sesame and soil nutrient status. The treatments included were five levels of NPK *viz.*, 0, 75, 100, 125 and 150 per cent and micronutrients *viz.*, Control, ZnSO₄, MnSO₄ and ZnSO₄ + MnSO₄ for sesame were studied. The pot experiment was conducted in the pot culture yard of the Department of Soil Science and Agricultural Chemistry, Annamalai University during June - September, 2013, in Factorial Completely Randomized Design (FCRD) with three replications. Sesame var. TMV 7 was grown as test crop in coastal sandy soil. To validate the results obtained from the pot experiment, the selected best two levels of NPK and micronutrients along with organics (Composted coirpith and FYM) were studied in a first field trial at coastal farmer's field at Ponnanthittu village, near Chidambaram using sesame variety TMV 7 during January - April, 2014. The second field experiment was carried out

in the farmer's field during December-March, 2017, using sesame variety TMV 7, to establish efficient method of micronutrients fertilization practice viz., soil or foliar application, a field experiment was carried out with inclusion of selected NPK level (125% NPK) and micronutrients (Zn and Mn) along with the best organic source (Composted coirpith) which can increase the soil fertility status and productivity of sesame in coastal sandy soil. The present investigation clearly concluded the beneficial effect of organics and micronutrients fertilization for increasing sesame production in coastal sandy soil. Application of 125 per cent recommended dose of NPK + composted coirpith @12.5 t ha⁻¹ along with ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil and foliar spray of both the micronutrients (ZnSO₄+MnSO₄) @ 0.5 per cent twice at critical stages viz., pre flowering and flowering stage was identified as best treatment combination can be recommend to the farmer's of coastal areas to realize the maximum profit in sesame yield and to sustain soil health in coastal sandy soil.

15. Contribution to the Society:

The beneficial effect of organics and micronutrients fertilization for increasing sesame production in coastal sandy soil. Application of 125 per cent recommended dose of NPK + composted coirpith @ 12.5 t ha⁻¹ along with ZnSO₄ @ 25 kg ha⁻¹ + MnSO₄ @ 5 kg ha⁻¹ through soil and foliar spray of both the micronutrients (ZnSO₄+MnSO₄) @ 0.5 per cent twice at critical stages viz., pre flowering and flowering stage was identified as best treatment combination can be recommend to the farmer's of coastal areas to realize the maximum profit in sesame yield and to sustain soil health in coastal sandy soil.

16. Whether any Ph.D. Enrolled / Produced out of the Project : NO

17. No. of Publications out of the Project: (Please Attach)

Details of the Publications resulting from the project work

S. No.	Publications details
1.	Elayaraja, D. , 2013. Influence of micronutrients and NPK levels on the yield and nutrient uptake of sesame in coastal sandy soil. Abstr. 3 rd International Science Congress (ISC-2013). Organized by “International Science Congress Association”. Karunya University, Karunya Nagar, Coimbatore, December 8 - 9, pp-30-31.
2.	Elayaraja, D. and R. Vetriselvan, 2014. Response of sesame to micronutrients and NPK levels on the yield and nutrient availability in coastal soil. Abstr. UGC Sponsored National Seminar on “Integrated Approaches for Sustainable Agriculture” (IASA). Dept. of Agronomy, Faculty of Agriculture, Annamalai University, 27 th March, p. 5.
3.	Elayaraja, D. , 2015. Response of sesame (<i>Sesamum indicum</i> L.) to micronutrients and NPK levels on the growth, yield and nutrients uptake in coastal sandy soil. <i>J. Oilseeds Res.</i> , 32(2): 179-182.
4.	Elayaraja, D. and R. Singaravel, 2017. Influence of micronutrients and NPK levels on the yield and nutrient availability of sesame in coastal sandy soil. Abstr. UGC-SAP Sponsored National Seminar on “Conventional and Molecular Strategies for Sustainable Crop Improvement” (CMSSCI). Dept. of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, March 16- 17, p. 134.

PRINCIPAL INVESTIGATOR

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