MJS, Vol. 2, No. 2, Nov. 2003 - Apr. 2004 pp. 8-13
ISSN 0975-3311
https://doi.org/10.12725/mjs.4.2

# INFLUENCE OF SOURCES OF ORGANIC MANURES ON AVAILABILITY OF MICRONUTRIENTS TO FINGER MILLET (ELEUSINE CORACANA, GAERTN) IN ALFISOL

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## ABSTRACT

*Field experiment was conducted on a sandy loam soil to know the periodic changes in DTPA extractable micronutrients Zn, Fe, Cu and Mn with different sources of organic manures in conjunction with fertilizer were studied at 0-15 cm soil depth during finger millet growth. Application of organics alone or incombination with fertilizers significantly increased DTPA extractable micronutrients when compared to NPK alone. Among the organic sources Farmyard Manure treated soil recorded maximum DTPA extractable micronutrients Zn, Fe, Cu and Mn when compared to Green leaf manure and Vermicompost.*

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*With intensive cropping of high yielding varieties, improved agricultural practices and high analysis fertilizers, soils are becoming deficient in micronutrients. Although some work has been reported in Punjab and other states on the effect of different sources of organic manures on the building up of nutrients and yield of crops, very little work has been done with respect to micronutrient elements. The present studies were conducted to know the effect of different sources of organic manures on Micronutrient availability in sandy loam soil in finger millet crop.*

# Material and Methods

A green house experiment was conducted during kharif 1993 using Indaf-8 variety of finger millet (Eleusine coracana G) as a test crop on sandy clay loam soil at Gandhi Krishi Vignana Kendra, Bangalore. The following treatments were selected for the study; T1 - 50 kg N / ha through Farmyard Manure (FYM); T2 - 50 kg N/ ha through Green Leaf manure (GLM); T3 - 50 kg N / ha through Vermicompost (VC); T4 - 50 kg N / ha through Farmyard Manure (FYM) + 50 kg P2O5 / ha as Single Superphosphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP); T5 - 50 kg N / ha through Green Leaf Manure (GLM) + 50 kg P2O5 /ha as Single Superposphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP) ; T6 - 50 kg N/ha through Vermicompost (VC) + 50 kg P2O5/ha as Single superphosphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP); T7 - 25 kg N/ha through Farmyard manure (FYM) + 25 kg N/ha as Urea + 50 kg P2O5 /ha as Single Superphosphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP); T8 - 25 kg N/ha through Green Leaf Manure (GLM) + 25 kg N/ha as Urea + 50 kg P2O5 / ha as Single Superphosphate (SSP) + 25 kg K2O /ha as Muriate of Potash (MOP); T9 - 25 kg N/ha through Vermicompost (VC) + 25 kg N/ha as Urea + 50 kg P2O5 /ha as Single Superphosphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP). T10 - 50kg N/ha as Urea + 50 kg P2O5 / ha as Single Superphosphate (SSP) + 25 kg K2O/ha as Muriate of Potash (MOP). Chemical properties of the soil were pH (1:2.5) - 5.4 and DTPA extractable micronutrient contents were Zn - 0.46 ppm, Iron - 9.80 ppm, Copper - 0.80 ppm and Manganese - 41.76 ppm. The soil samples replication wise from 0-15 cm soil depth from all the treatments at three stages of crop growth namely at tillering, flowering and harvest were collected. The soil samples were dried in shade, ground and sieved (<2 mm) for analysis. Available micronutrients were extracted by using DTPA (Lindsay and Norvell, 1978). The extract was analysed for Zn, Fe, Cu and Mn employing atomic absorption spectrophotometer. The micronutrient composition of organic manures is presented in Table 1.

Table-1: Micronutrient of composition of the organic manures (On oven dry weight basis)

| Organic manures | Micronutrient composition | | | |
|---|---|---|---|---|
| | Zn | Fe | Cu | Mn |
| | ppm | | | |
| Farmyard manure | 52.00 | 78.50 | 64.50 | 28.00 |
| Green leaf manure (*Gliricidia spp.*) | 20.50 | 16.71 | 26.00 | 10.20 |
| Vermicompost | 32.10 | 52.12 | 42.50 | 20.78 |

# Results and Discussion

The result of micronutrient states of the soil at different stages of crop growth as affected by different sources of organic manures in comparison to NPK is presented in Table 2. At all the stages of crop growth, organic sources alone were superior in influencing zinc, iron, copper and manganese content of soil compared to NPK. Among the organic sources FYM treated soil recorded maximum zinc content (1.88, 1.61 and 1.52 ppm at tillering, flowering and harvest, respectively), iron content (12.36, 14.30 and 11.46 ppm at tillering, flowering and harvest, respectively), copper content (0.87, 1.03 and 0.82 at tillering, flowering and harvest, respectively), manganese content (33.46, 37.46 and 21.87 at tillering, flowering and harvest, respectively), zinc, iron, copper and manganese were decreased due to combined application of organic manures and fertilizers when compared to manures alone.

The lowest zinc content (0.73, 0.70 and 0.56 ppm at tillering, flowering and harvest, respectively), iron content (10.10, 11.46 and 9.13 ppm at tillering, flowering and harvest, respectively), copper content (0.67, 0.8 and 0.62 at tillering, flowering and harvest, respectively) and manganese content (27.53, 30.44 and 16.36 ppm at tillering, flowering and harvest, respectively).

The increase in the zinc, iron, copper and manganese content in organic manures treated soil compared to soil which received fertilizers could be due to chelating action of compounds released during decomposition and also because of release of zinc, iron, copper and manganese from the added organic matter during decomposition. Increase in the zinc, iron, copper and manganese content of the soil due to addition of FYM and other organic manures were observed by Katyal (1977), Sharma and Meelu (1975), Sankaran (1977) and Anand Swarup (1982). However, difference among the FYM, GLM and VC treatments could be attributed to their initial zinc, iron, copper and manganese content.

Table-2: Micronutrients status of the soil as influenced by different sources of organic manures with and without fertilizers at different stages of crop

| Treatments | Micronutrients (ppm) | | | | | |
|---|---|---|---|---|---|---|
| | Zinc | | | Iron | | |
| | Tillering stage | Flowering stage | At harvest | Tillering stage | Flowering stage | At harvest |
| $T_1$ : FYM | 1.88 | 1.61 | 1.52 | 12.36 | 14.30 | 11.46 |
| $T_2$ : GLM | 1.27 | 1.13 | 0.95 | 11.66 | 13.46 | 9.96 |
| $T_3$ : VC | 1.38 | 1.43 | 1.35 | 11.16 | 13.13 | 11.06 |
| $T_4$ : FYM+P+K | 1.50 | 1.46 | 1.36 | 13.90 | 18.43 | 13.89 |
| $T_5$ : GLM+P+K | 0.94 | 0.82 | 0.78 | 11.93 | 14.93 | 12.28 |
| $T_6$ : VC+P+K | 0.97 | 0.90 | 0.82 | 10.36 | 13.03 | 9.97 |
| $T_7$ : 50%N FYM+50%NF+P+K | 1.20 | 0.99 | 0.81 | 11.76 | 18.50 | 14.80 |
| $T_8$ : 50% N GLM+50%NF+P+K | 0.86 | 0.81 | 0.75 | 11.26 | 16.33 | 14.54 |
| $T_9$ : N VC+50%NF+P+K | 0.90 | 0.84 | 0.73 | 10.43 | 15.36 | 10.13 |
| $T_{10}$ : NPK | 0.73 | 0.70 | 0.56 | 10.10 | 11.46 | 9.13 |
| F – test | * | * | * | * | NS | * |
| S.Em± | 0.1085 | 0.0984 | 0.0783 | 0.6904 | -- | 0.9111 |
| C.D. at 5% | 0.3220 | 0.2920 | 0.2320 | 2.0510 | -- | 2.7070 |

*Significant at 5% level NS : Non significant

Contd...

| Treatments | Micronutrients (ppm) | | | | | |
|---|---|---|---|---|---|---|
| | Copper | | | Managanese | | |
| | Tillering stage | Flowering stage | At harvest | Tillering stage | Flowering stage | At harvest |
| $T_1$ : FYM | 0.87 | 1.03 | 0.82 | 33.46 | 37.46 | 21.87 |
| $T_2$ : GLM | 0.83 | 0.93 | 0.08 | 30.20 | 35.21 | 19.24 |
| $T_3$ : VC | 0.77 | 0.96 | 0.81 | 32.45 | 36.26 | 20.73 |
| $T_4$ : FYM+P+K | 0.86 | 0.96 | 0.75 | 31.07 | 35.38 | 20.53 |
| $T_5$ : GLM+P+K | 0.80 | 0.86 | 0.64 | 28.87 | 33.14 | 18.91 |
| $T_6$ : VC+P+K | 0.78 | 0.93 | 0.65 | 30.52 | 34.40 | 19.58 |
| $T_7$ : 50%N FYM+50%NF+P+K | 0.76 | 0.87 | 0.71 | 30.38 | 34.20 | 20.03 |
| $T_8$ : 50% N GLM+50%NF+P+K | 0.75 | 0.87 | 0.67 | 28.25 | 32.54 | 17.24 |
| $T_9$ : N VC+50%NF+P+K | 0.72 | 0.87 | 0.67 | 29.60 | 33.73 | 19.34 |
| $T_{10}$ : NPK | 0.67 | 0.80 | 0.62 | 27.53 | 30.44 | 16.36 |
| F – test | * | * | * | NS | NS | * |
| S.Em± | 0.0190 | 0.0417 | 0.0476 | -- | -- | 0.4237 |
| C.D. at 5% | 0.0560 | 0.1240 | 0.1410 | -- | -- | 1.2600 |

*Significant at 5% level NS : Non significant

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