EFFECT OF FARM YARD MANURE AND IRON ON DRY MATTER YIELD AND NUTRIENTS UPTAKE BY OATS (*Avena sativa*)

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KEY WORDS

Farm yard manure  Iron  Nutrient uptake by oats  Oats  Yield of oats

ABSTRACT

A pot culture experiment was conducted on a loamy sand soil to study the effect of FYM and Fe on dry matter yield and uptake of nutrients by oats (*Avena sativa*) crop in greenhouse. Application of Fe at 5 and 20 ppm increased dry matter yield by 5.11 and 11.55 per cent, respectively. The per cent increase in dry matter yield over control with the application of 0.5 and 1.0 percent FYM was 19.06 and 30.07, respectively. Application of FYM increased concentration and uptake of P significantly. Phosphorus uptake increased by 23.60, 54.38, 91.01 and 134.61 per cent over control with 0.5, 1.0, 2.0 and 4.0 per cent FYM, respectively. Phosphorus concentration decreased at 20 ppm Fe but uptake increased significantly at 5 ppm Fe. Concentration and uptake of Ca increased with increasing amounts of Fe and application of FYM decreased concentration of Ca but uptake increased upto 1.0 per cent FYM over control. The Mg concentration and uptake decreased significantly with increased amount of Fe. Application of FYM also decreased Mg concentration but its uptake increased upto 1.0 per cent FYM and then decreased.

Iron concentration and uptake increased upto 2 per cent FYM and then decreased. Whereas concentration of Fe decreased with increased amount of applied Fe but its uptake increased non-significantly with increased amount of added Fe.

Manganese concentration and uptake decreased significantly with increased amount of applied Fe. Manganese concentration increased upto 0.5 per cent FYM but its uptake continued increasing with increasing amounts of applied FYM.

INTRODUCTION

Nutrients availability is governed by large number of soil and crop factors. Among the most limiting factors are soil pH, CaCO₃, organic matter, inherent soil fertility, physical conditions and biological activities of soils. Most of the light-textured soils are deficient in macro and micronutrients. This is especially true in case of N, P, Zn and Fe under conditions of intensive cultivation. The availability of Fe in soils which have high pH, ECe and low organic matter, is very
much reduced and limits crop production to a considerable extent. The addition of organic matter through farm yard manure and inorganic Fe salts under such conditions may help in increasing nutrients availability both from applied and native sources. The information on the behaviour of FYM and Fe in light-textured soils was limiting, thus, the present project was undertaken to study effect of variable amounts of FYM and Fe on dry matter yield and nutrients uptake by oats (*Avena sativa*).

**EXPERIMENTAL**

A pot culture experiment was conducted on a loamy sand soil having a pH (1:2) 7.1, ECe 1.44 mmhos/cm, O.C. 0.25 per cent CEC 3.75 me/100 g soil, exchangeable Fe 1.25 ppm and exchangeable Mn in traces and CaCO₃ absent. Air-dried well-mixed four kg soil was filled in polythene lined earthen pots. Farm yard manure containing N, P, K, Ca, Mg, Fe, and Mn 0.55, 0.38, 0.60, 1.53, 1.20, 0.20 and 0.024 per cent, respectively, was applied @ 0, 0.5, 1.0, 2.0 and 4 per cent and Fe was super-imposed @ 0, 5 and 20 ppm through FeSO₄ (A.R. grade). Completely randomized design with three replications was adopted. A basal dose of N, P, K and Mn was applied @ 120, 60, 60 and 10 ppm in solution form and N was applied in two splits. Six seeds of oats HFO-114 were sown at proper depth and irrigated with deionized water as and when required. After emergence and setting four plants were kept for observation and crop was harvested after six weeks of sowing. Plant samples were washed and dried as per standard methods and then oven dried at 55°C till the constant weight was obtained. After recording dry weight plant samples were ground in a Wiley Mill with stainless steel blades and digested in diacid mixture of HNO₃:HC1₀₄ (5:1 ratio) and analysed for Fe and Mn on atomic absorption spectrophotometer. Phosphorus was determined as per method of Koenig and Johnson. Calcium and Mg were determined by the versenate method of Cheng and Bray.

**RESULTS AND DISCUSSION**

*Dry matter yield*

Dry matter yield increased significantly with increased amount of Fe in absence as well as in presence of FYM (Table 1). The increase in DMY at 5 and 20 ppm Fe in absence of FYM was 14.15 and 24.40 percent, respectively, over control. The mean dry matter yield was increased from 8.41 to 8.84 and 9.83 g/pot as the levels of Fe increased from 0 to 5 and 20 ppm Fe, respectively. Iron and FYM interacted synergistically in increasing the yield upto 2 per cent farm yard manure and a significant decrease in yield was observed at 4 per cent farm yard manure in comparison to 2 per cent FYM. However, the dry matter yield was significantly higher at 4 per cent FYM over control. The increase in dry matter yield with increased levels of Fe is due to increased availability of Fe from applied Fe and moreover addition of FYM also resulted in lowering of soil pH and thus increasing the solubility of native and applied Fe.