



Bioactivation of unreactive phosphate in Udaipur Phosphate Rock with organic manures

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Abstract : An incubation study was conducted for sixty days to study the enrichment of fresh cow dung (FCD) and matured farm yard manure (FYM) with Udaipur phosphate rock applied at three rates (1, 5 and 10% weight basis). Udaipur PR contained 19.4 per cent P_2O_5 (8.35% P) and 1.62 per cent was citrate soluble phosphate. Water soluble P content of UPR was 0.01 per cent and pH was of 8.25 in 1:2.5 ratio. Fresh cow dung and FYM contained 0.37 per cent and 0.64 per cent total P and having pH of 7.91 and 8.24, respectively. Incubation of UPR with two organic amendments (FCD and FYM) brought about changes in different phosphorus fractions during initial 30 days of incubation. Variation of moisture from field capacity to saturation had no effect. Increase in time of incubation increased the total P and citrate soluble-P content of the two amendments significantly irrespective of the level of enrichment with UPR. The increase in total-P was more duration first 30 days as compared to subsequent days of incubation. The magnitude of increase was greater in FCD (205%) than that in FYM (112%). Water soluble P increased during initial 30 days of incubation in both the amendments and then it declined. Citrate soluble P decreased with rate of UPR application at 0 days in both FCD and FYM.

Key Words : Fresh cow dung (FCD), Farm Yard Manure (FYM), Udaipur Phosphate Rock (UPR), Total-P, Citrate soluble-P, water soluble-P

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INTRODUCTION

Soils have significant amount of phosphorus which is not immediately available to crops and only a small fraction becomes available during crop season. When rock phosphate is applied to soils a significant P accumulation occurs. Although direct use of phosphate rock (PR), which is the basic raw material used in the production of water soluble P fertilizers, is economical, lower reactivity of PR, hinders its direct application. Several scientists showed the possibility of increasing the reactivity of PR by composting (Bangar *et al.*, 1985; Singh *et al.*, 1992). Singh (2003) practiced incubation of PR with poultry manure for soybean. Organic materials produce organic acids such as formic acid, lactic acid, tartaric acid oxalic acid etc. during decomposition and organic acids act on PR releasing phosphorus (Kpombekou-a and Tabatabai,

1994). Therefore, it was hypothesized that incubation of PR with organic manures under moist conditions may increase the reactivity of PR. The main objective of this investigation was to evaluate the effect of the moist incubation of Udaipur phosphate rock (UPR) with matured farmyard manure (FYM) and fresh cow dung (FCD).

MATERIALS AND METHODS

Udaipur PR was incubated with the above two sources of organic manures for a period of two months and moisture was maintained at field capacity and saturation moisture which was maintained every alternate day. Three levels (1%, 5% and 10% by weight) of UPR were incubated with two types of organic manures. Experiment was arranged in a completely randomized design with three replicates and temperature

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