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# Physical Properties Of Soil And Yield Of Maize As Influenced By Various Solubilizers Of Rock Phosphate

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## ABSTRACT

Rock phosphate (RP) admixed with organic and inorganic acidulents in a field experiment showed significant effect on water stable aggregates (> 0.25 mm) and moisture retention capacity of the soil (Haplustalfs). Maximum water-soluble aggregates (WSA) -37.20% and available water -0.33 bar were observed with RP + biogas slurry (BGS) (1:3). Highest grain (48.08 q $ha^{-1}$) and stover (96.93 q $ha^{-1}$) yields of maize, uptake of P by the plant parts and P availability were recorded under RP + single super phosphate (SSP) treatment.

**Key words:** Rock phosphate; water-soluble aggregates; available water; inorganic and organic acidulents.

## INTRODUCTION

Direct application of rock phosphate as fertilizer has long been advocated but on calcareous soils its use is still being contested. Incorporating certain acidulents with rock phosphate has shown encouraging results on alkaline calcareous soils. Acidulents like FYM, biogas slurry, spent wash etc. not only convert the insoluble forms of phosphorus to soluble forms but also simultaneously improve physical condition of the soil Singh *et al.,* (1988); Das *et al.,* (1995). A very scanty work on these lines has been reported for Udaipur valley soils (Haplustalfs). The present study envistages the effects of application of organic and inorganic acid aciduleute with rock phosphate on water stable aggregates (> 0.25 mm), moisture retention capacity, available P status of the Haplustalfs and corresponding changes in the yield and P uptake by maize crop.

## MATERIALS AND METHODS

A field experiment was conducted on Haplustalfs of Udaipur valley during *kharif* 1996. The treatments comprised of Udaipur rock phosphate (URP)=$T_1$, Single super phosphate (SSP)=$T_2$, URP + SSP (1:1)=$T_3$, URP + FYM (1:2)=$T_4$, URP + FYM (1:3)=$T_5$, URP + biogas slurry (BGS) (1:2)=$T_6$, URP + BGS (1:3)=$T_7$, URP + Spent wash (1:2)=$T_8$ and URP + elemental sulphur (ES) (2:1)=$T_9$. The rate of phosphorus application was maintained @ 40 kg $P_2O_5$ $ha^{-1}$ uniformly for every treatment. Udaipur rock phosphate used in the present study was incubated for 45 days with different organic and inorganic acidulents. At the end of the incubation period, the different mixtures were applied in the field as per treatments. Maize var. Gang-5 was tested in randomized block design with three replications. Some of the physico-chemical characteristics of soils are: Sand – 38.06 per cent, Silt 30.22 per cent, Clay 31.54 per cent, WSA (> 0.25 mm) 30.18 – 30.23 per cent, soil moisture retention (0.33 bar) 30.20 – 30.22 per cent, pH (1:2) 8.30, EC 1.2 $dSm^{-1}$, Available N, P and K 245.0, 18.0 and 228.0 kg $h^{-1}$, respectively.

The crop was grown to maturity and at harvest grain and stover yields were recorded. The physical properties viz. water stable aggregates percentage and water retention characteristics were determined by Yodder's sieve method and pressure plate membrane apparatus. Phosphorus content in both grain and stover was determined as per procedure outlined by Jackson (1958) and the P uptake was calculated. Soil samples from each plot were also collected after the harvest of crop and analyzed for available P using standard procedure.

## RESULTS AND DISCUSSION

The data presented in Table 1 reveal significant difference in percent water stable aggregates (> 0.25 mm) under different treatments as compared to the application of URP alone ($T_1$). Results further indicate that application of SSP alone did not affect percentage of water stable aggregates, as compared to URP application. However, percent WSA increased significantly when it was applied with URP in 1:1 proportion. Maximum (37.20%) water stable aggregates were recorded in $T_7$ i.e. URP + BGS (1:3) and minimum (30.20%) in $T_1$. The findings of Dara *et*

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