

# Effect of Prior Reaction of Soil with Phosphate on Plant Response and Phosphate Sorption in a Soil of West Bengal

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**Abstract**—Phosphate (P) sorption-desorption experiments were conducted in some Alfisols of Purulia, West Bengal, having low soil P content (both in Bray and Colwell extractant). Sorption-desorption studies were conducted in soils initially and after incubation with P at 60°C. In one of these soils response of fertilizer P was compared by growing mustard plants (*Brassica juncea* Var. Yellow sarson) under freshly applied P with that after incubation at 60°C for 35 days in order to measure the effectiveness of early applied P.

Sorption of P in soil increased with increasing levels of phosphorus added to soil for incubation. The amount of phosphate sorbed at a given phosphate concentration was always higher than that during desorption run, showing low desorptivity of sorbed phosphate being indicative of high hysteresis ratio and P buffering capacity. Incubation with gradual higher levels of added phosphorus reduced the hysteresis ratio. This occurred because the pathways by which adsorbed phosphate diffuse were saturated and the slow reaction that follows adsorption was stopped. The effectiveness of applied P in soil was measured from the yields of mustard grown immediately after application of P and after incubation of soil with P for 35 days at 60°C and then by comparing the parameters of the Mitscherlich equation applied in this regard. There was a general decrease in the effectiveness of the applied P noted to the tune of 0.58

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*times due to incubation. This was due to continuing reaction of phosphate that takes part in soil following sorption. It was concluded that for a soil to be less responsive to applied P, it is necessary to supply more phosphate than is removed in produce. However after long-term phosphate fertilization, it is sufficient to only replace phosphate lost in produce.*

**Keyword:** *Desorption, hysteresis ratio, phosphate, sorption, yield of mustard, Mitscherlich equation.*