



Accumulation of Cadmium in Arid Soils as Affected by Intensive Phosphorus Fertilization

A. S. MODAIHSH
A. E. ABDALLAH
M. O. MAHJOUR

Soil Science Department
College of Agriculture
King Saud University
Riyadh, Saudi Arabia

Amounts of P-fertilizers annually added to crops grown on soils of Saudi Arabia are enormously increased. The environmental hazards of these fertilizers worldwide, however, have become of great concern. As these fertilizers might bear rich content of detrimental elements typically like cadmium, that elements levels in the used P-fertilizers and soil were pursued. Eleven wheat farms situated in Al-Kharj district were chosen to carry out this study. These farms represented a comparatively short period of cultivation (less than ten years) and a long one (more than ten years). Soil samples representing three depths, 0-15, 15-30, and 30-40 cm, were taken from inside the central pivots and from its outer uncultivated sphere. The changes of soil total and extractable P and total Cd were measured and the effect of P fertilization on the build up of soil P and Cd was estimated. The results obtained revealed that build up in P status of soil has occurred. P was accumulated in the surface soil layer due to higher P applications. Its total content in the surface soil layer (0-15 cm) was raised from 254 to 482 mg kg⁻¹ due to long term cultivation. Testing Cd content in the utilized P fertilizers indicated that it averaged 32.2 mg kg⁻¹. A positive significant relationship between total P and total Cd in soil was obtained. Nonetheless, the results indicated that, a comparatively long-term application of P fertilizers only slightly elevated Cd content of the soil surface layer. The data made clear that Cd accumulation is associated with P accumulation. However, no harmful effect would be expected as Cd was accumulated in minute amounts.

Keywords cadmium in P fertilizers, calcareous soils, Saudi Arabia

Accumulation of heavy metals in soil has been given high concern by many investigators inasmuch as they are environmental hazards (Singh 1991; Singh and Steinnes 1994). Cadmium among those metals has been receiving much more attention due to its transfer to the food chain. This metal occurs naturally as a minor constituent of phosphatic rock ore and is transferred in variable amounts to phosphorus fertilizers during manufacturing process (Alloway and Steinnes 1999).

Over the past two decades P inputs to agricultural land in the Kingdom of Saudi Arabia have increased substantially with the use of P-fertilizers. Such use, in most

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Address correspondence to Dr. A. S. Modaihsh, Department of Soil Science, College of Agriculture, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia