FERTILIZER VALUE OF HYDRAZINE PHOSPHATE

The stability, high nutrient content and water solubility of hydrazine phosphate indicate that it may be suitable for use as a fertilizer, provided that it could be marketed at a competitive price. Since the agronomic quality of this compound has apparently not been investigated, advantage was taken of a recent opportunity to test a characterized preparation in greenhouse culture.

Preparation and characterization of test material—Equimolar quantities of hydrazine hydrate, \(\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}\), and 85% orthophosphoric acid were slowly added to water at 10-20°C and the resulting solution was evaporated on a steam bath to the point of incipient crystallization. The crystals which formed on cooling were separated and air-dried. The product, a white, damp solid, was heated to 150°C and quenched, producing a white, glassy compound which was sufficiently dry and stable to be ground and used in the agronomic tests.

This material contained 54.8% \(\text{P}_2\text{O}_5\), 15.0% \(\text{N}\), and 0.2% moisture, compared with a theoretical content of 54.6% \(\text{P}_2\text{O}_5\) and 21.5% \(\text{N}\) for \(\text{N}_2\text{H}_4\cdot\text{H}_2\text{PO}_4\). Since reduction of a hydrazine compound is not readily effected by means normally employed in fertilizer analysis, some difficulty was encountered in the nitrogen determination. The stated figure, which is the mean of two closely-agreeing replications, was obtained by reduction with powdered zinc in the presence of sulfuric and salicylic acids, a procedure of unknown reliability. It is quite likely, however, that the low nitrogen content is an indication of nitrogen loss occurring in the heating of the original material. The solid finally obtained was probably composed of hydrazine phosphate and a small proportion of hydrazine bisdihydro phosphate (\(\text{N}_2\text{H}_4\cdot\text{H}_2\text{PO}_4\)\(_2\)). It was water-soluble and melted indistinctly at 72-77°C. Microscopic examination showed it to be a homogeneous, well-crystallized material with high birefringence but poor cleavage.

Experimental details of greenhouse test—A direct comparison was made of the nutritive value of the hydrazine phosphate with that of triple superphosphate. The two test materials were applied in triplicate to Evesboro loamy sand (pH 6.5) at rates of 100 and 200 pounds of \(\text{P}_2\text{O}_5\) per acre. Potassium chloride and ammonium nitrate were added to the soil to bring the level of potassium and nitrogen to that indicated in table 1. Starr millet was employed as the test crop.

Observations on experimental results—In the first crop of millet (table 1), hydrazine phosphate produced responses similar to those of triple superphosphate, as reflected by both crop yield and uptake of phosphorus. No significant differences in yield were obtained from increased applications of phosphorus within the same nitrogen level. On the other hand, increase in the rate of application of both test materials resulted in a marked elevation of phosphorus uptake.

In the second and third crops, yield results indicate that hydrazine phosphate again compared favorably with triple superphosphate, except in those treatments in which application rates of both nitrogen and phosphorus were high. With regard to phosphorus uptake, hydrazine phosphate produced an inferior response only in the third crop at the highest rate of nutrient application.

Conclusions—Under the experimental conditions, the test preparation of hydrazine phosphate is seen to be a non-toxic, quick-response fertilizer equally as efficient as triple superphosphate. Its longer-term influence was, however, somewhat inferior to the latter, and its nitrogen content did not contribute materially to plant response. It should be noted that the material used in the experiment was a heated preparation containing less than the theoretical quantity of nitrogen in hydrazine phosphate. J. H. CARO and C. J. ERICKSON, Fertilizer Investigations Research Branch, SWCRD, ARS, USDA, Beltsville, MD.

A CHLOROPHYLL MUTATION IN INDIGOBERA ENDECAPHYLLA

The tropical legume Indigofera endecaphylla Jacq., or creeping indigo, has been the subject of investigation at the University of Hawaii and elsewhere as a potentially valuable tropical forage legume.

During the course of investigations three flowering plants of creeping indigo were irradiated using gamma radiation from a Co\(^{60}\) source. One plant (137) was a seedling from another of the treated plants (4350), while the third was unrelated (4479).

The plants were grown in 5- or 10-gallon cans at the University Farm of the Hawaiian Agricultural Experiment Station except for the period of treatment when they were moved to the Hawaiian Sugar Planters’ Experiment Station. Treatments were made on different plants at intervals from April to July, 1955.

Treatment consisted of suspending the cobalt source near the plants which were rotated from time to time.


\(^2\) Analysis by F. O. Lundstrom.