Use of ELISA for DDT Analysis in Mineral Soils

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The use of Enzyme-linked immunoassay (ELISA) technique in estimating pesticide residue in soils in a faster, less expensive and easier method to use than the gas chromatography (GC) analysis technique. The Envirowoglix plate kit was tested for the measurement of total DDT in virgin and fortified (0-1000 ng g⁻¹) soil samples of different properties from Lebanon. Extraction of DDT from soil was done by shaking with 90% methanol without any clean-up steps. Then, the samples were allowed to stand for 30 min. and an aliquot was taken from the clear supernatant. The DDT in the extract was measured in triplicate by GC and ELISA. The results indicated that the two techniques were highly correlated (r² = 0.9671-0.9973). Differences in soil properties did not affect the accuracy of the detection limits of ELISA when compared to GC-ECO results.

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Methods of Measuring the Effects of Nutrient and Pest Management on Fertilizer and Pesticide Use


Based on the initial success with a collaborative approach toward promoting Integrated Crop Management in Northern New Jersey, agricultural agencies undertook a second USEPA Pollution Prevention Grant. The grant funded two outreach specialists to assist agencies in reaching 35 new farmers with soil and manure testing, pest scouting, recordkeeping, and erosion control on 3,654 ha of cropland. The specialists documented changes in input use with a combination of written records, farmer interviews, and spreadsheets. Working closely with the farmers allowed the specialists to pinpoint where changes were made, eliminating the collection of unnecessary data. This targeted approach allowed the specialists to spend more time educating and providing service. The extra follow-up greatly enhanced sustained adoption of ICM.

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Correlating Routine Soil Test Lead Levels to EPA 3050 Lead Levels

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Soil testing laboratories are frequently asked to ascertain the concentration of environmental contaminants in soils. To determine if agricultural soil tests are able to predict USEPA SW846-3050 levels of lead (EPA3050 Pb), the EPA3050 test and agricultural soil tests commonly used in the Northeast were performed on 70 soil samples. The range of EPA3050 Pb in the samples was 2.5 - 909.3 mg/kg Pb, with a geometric mean of 112.8 mg/kg Pb. Significant positive correlations for Pb existed between tests. The percent of EPA3050 Pb extracted by the agricultural soil tests differed amongst soil tests and varied inversely with pH and percent soil organic matter in the soil. Fitting of lines for samples yielded equations for Mellich-3: EPA3050 Pb = 1.5 x (M3 Pb) + 11 (r² = 0.76), Modified Morgan: EPA3050 Pb = 3.0 x (MM Pb) + 91 (r² = 0.72), and Mellich-1: EPA3050 Pb = 6.1 x (M1 Pb) + 84 (r² = 0.63). These equations can be used to convert soil test Pb levels to EPA3050 Pb levels, as an initial screening tool to predict Pb contamination.

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Graduate Student Paper Competition

Investigation of the Residence Time Effect on Phosphate (P) Adsorption/Desorption

Mechanisms at the Ferrilithic/Water Interface using PXANES and ATR-FTIR

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The fate and transport of P in acid soils is highly dependent on adsorption/desorption reactions at the amorphous mineral/water interface. In this study, we investigated residence time (~24h and ~24h) effects on P adsorption/desorption at the ferrilithic/water interface at pH=4, 0.1M NaCl, and [P]=1mM. Adsorption kinetics were initially fast, resulting in 98% of the total adsorption within 6h, followed by a slow P uptake. Desorption were carried for 24h under same reaction conditions using a stirred-flow apparatus. Only 15% of total adsorbed P is recovered after being incubated for 24d and the total P recovery decreases to ~1% with increasing aging time from 2d to 10months. Temperature studies show that the overall adsorption is an endothermic reaction, suggesting a predominantly chemically-controlled reaction. In-situ FTIR studies suggested the formation of inner-sphere (monodentate mononuclear or bidentate binuclear) complexes and whereas P-XANES indicated the formation of an amorphous iron phosphate-like surface precipitates.

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