Raise Efficiency of Utilization to Hold Down Costs of Irrigation, Fertilization

CHICAGO.—Rising raw materials prices and operational costs, and in many areas limitations in supply sources make it increasingly important from the economic point of view that maximum efficiency of utilization be attained in both irrigation and fertilization of agricultural crops. At the winter meeting of the American Society of Agricultural Engineers here Dec. 7 to 9, information secured in laboratory and field test studies was invoked to indicate possible methods of increasing utilization of both water and nutrients in plants.

In a round table discussion on the water requirements of crops, for example, D. R. Shockley, and L. L. Harrold of the Soil Conservation Service, USDA, discussed the availability of moisture in the "root zone" of soils and its effect upon the rate of plant growth. Forty per cent of the moisture taken up by plants from the soil comes from the upper quarter of the root zone, Shockley reported; another 30% comes from the second quarter, 20% from the third, and 10% from the bottom quarter of the zone. All soil moisture is not readily available for plant growth, he advised.

Evidence indicates that in many cases as much as 50% of the soil moisture is not readily available for rapid crop growth. Thus, knowledge of the capacity of various soil levels to hold moisture that is readily available for the maintenance of rapid crop growth is necessary for the design of irrigation systems, and for the formulation of recommendations for improved water application techniques, Shockley stated.

Further information is needed, he said, to indicate how much of the water in a given soil profile is actually very easily available for crop growth. Such information would aid in the classification of irrigated soils, permitting more accurate estimation of the optimum interval between irrigations, and of the maximum allowable moisture withdrawal before irrigation is initiated or repeated.

A study made at the Coshocton, Ohio, research station, according to Harrold, indicated that there is a direct relation between the amount and depth of irrigation and the yield of a given crop. Corn irrigated to a 12-inch depth with 4.30 inches of water yielded 160 bushels per acre, for example, and that irrigated to a 24-inch depth with 3.88 inches of water yielded 155 bushels per acre. Corn receiving no irrigation yielded only 116 bushels per acre, the study showed. It was found that moisture for the plants was withdrawn almost entirely from the top 14 inches of soil.

In view of water supply limitations and water delivery costs, Harrold said, it is essential that the design and operation of irrigation systems be based on the best available data concerning the interrelation of soils, crops, and water. A fundamental approach of this kind, he said, will permit economical operation, and the conservation of valuable water resources.

Plant food application, too, should be based on accurate determinations of the needs of both soil and crop. One method of increasing the efficiency of fertilizer use, according to A. C. Thompson of Thompson's Farms, is band fertilization. This method may in some cases cut fertilizer consumption in half for a given per-acre yield, Thompson said. However, fertilizer application requirements differ from crop to crop, and there is a need for more flexible application equipment which will permit varying the intensity of fertilizer application and its positioning in relation to the plant row. There is also a need for more accurately calibrated equipment for the broadcast application of fertilizers, Thompson declared. Such equipment should be sufficiently accurate that errors could be held to no more than 100 pounds per acre at most. Where subsurface application is employed, the equipment must enable the operator to place the plant nutrient accurately within reach of the roots, but not close enough to damage them by "burning."

A survey of sod crop fertilizer application practices in some 42 states, reported by H. A. Woodle of Clemson Agricultural College, revealed that—contrary to much popular belief—top dressing is probably the best method of maintaining an established sod, and results obtained with subsurface fertilizer application on established sods do not justify the added trouble and expense. There is, he said, general agreement concerning the time and method of applying lime and fertilizers for establishing sod; lime is worked into the top soil prior to seeding, and starting fertilizers are applied in bands just below the seed level, or are broadcast and worked into the upper portion of the seed bed, at the time of seeding.

DDT Residues Found to Be Cumulative in Soil

Quantities toxic to some plants reported at Rutgers conference

NEW BRUNSWICK.—Fields that have been treated with DDT for several seasons retain large quantities of the chemical in the cultivated top few inches of the soil, declared J. P. Reed of Rutgers University. As much as 19 pounds of DDT per acre have been found in corn fields, while over 100 pounds per acre have been found in orchards. Apparently, the compound does not leach but remains where it has been worked into the soil.

DDT may accumulate in potato fields to such an extent that more sensitive crops, such as tomatoes, may find the soil toxic, reported J. Campbell. As a general rule, fungicides, although certainly not without affect, affect potato flavor less than most insecticides. Before any insecticide or fungicide is recommended by Rutgers, the food technology department is consulted to determine the flavor effect on the foodstuff. Every lot of potatoes sprayed with a new insecticide or fungicide is checked by a taste panel.

These findings were reported at the tenth annual conference of New Jersey Insecticide, Fungicide, and Herbicide Retail Dealers, held at Rutgers on Nov. 19. County agents, agricultural chemicals retailers, representatives of the chemical industry, and members of the staff of the university discussed the pros and cons of many agricultural chemicals, and the tentative recommendations of the Rutgers' College of Argiculture for the 1954 season. Members of the staff presented their recommendations and explained them.

The value of methyl bromide for soil fungus control is being investigated with encouraging results, reported C. H. Haenseler. There is no good fumigant at present, chloropicrin being only fair, he said. Complete tomato nematode control was achieved at a level of two pounds of methyl bromide per 100 square