

Progressive Farming Notes

RECENT ADVANCES IN SOIL SCIENCE AND PLANT NUTRITION IN THE UNITED STATES *

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1. Discovery of certain isotopes and their application in biochemistry or soil fertility studies: For example, the use of heavy nitrogen (At. wt. 15), heavy carbon (At. wt. 13), etc. in plant nutrition. These have been made possible because of the development and use of the mass spectrograph in the routine analysis of these isotopes.

2. Production of radioactive elements and their application in biochemistry: For example, the use of radioactive phosphorus and radioactive potassium in the tracer technique in plant nutrition. The activation of elements has become a routine work by means of the cyclotron or the betatron. The tracer technique or that of following the course of radioactive element, say phosphorus, absorbed by a living plant has been possible because of such devices as the Geiger counter, for instance.

3. Mineralogical methods for the study of silts and clays: The most modern methods are those with the use of the X-ray diffraction apparatus, the electron microscope, and the apparatus for thermal analysis of clay minerals.

Soil fertility studies demand a knowledge of the exact nature—molecular structure as well as chemical composition—of silt and clay minerals—kaolinite, montmorillonite, beidellite, etc. Base exchange studies have confirmed the results of such mineralogical studies of silts and clays.

4. Studies on the nutritional requirements of plants as well as of animals are now possible by the refinements in chemical analytical methods, such as by chemical spectroscopy—both by emission and absorption spectroscopy, polarographic methods and colorimetric methods of micro-analysis.

5. Soil micro-nutrient deficiency studies have been much advanced by spectrochemical methods and colorimetric methods. The zinc deficiency of pineapple; the boron deficiency of alfalfa, apple, citrus and other plants; the cobalt deficiency of pasture soils, which results in the malnutrition of livestock; and the copper deficiency of soils which affects both plant and animal nutrition had been discovered and remedied by means of refinements in chemical analytical methods.

6. The influence of manganese deficiency in soils on the synthesis of ascorbic acid (Vitamin C) in the foliage of plants is now

definitely establish in the United States.

7. The biological assays of some soil types gave comparative balanced fertility of the soil. These had been well tried in the University of Missouri, using domestic rabbits in the bioassays. The rabbits in lots of 8 to 10 were fed for six weeks, after weaning, with hays (Korean lespedeza) grown on different soil types. Animals fed with hay grown on fertile soils showed greater gains in weights, brighter eyes, more smooth or sleek coats or fur, heavier and bigger bones with greater breaking strength than animals fed with hay grown on the poorer soil types.

With cattle, preference had been shown for the hay grown on fertile soil to those grown on poorer soils, when the animals had free access to the stacks of the various hays.

Fertilizer treatments gave similar results. Cattle preferred the hays from the fertilized plots to those from the control or unfertilized plots.

8. In fertilizer practice, great progress has been made in devising accurate and reliable soil and plant tests to minimize if not to do away with guess work. In this way, extensive long-range fertilizer experiments in the field or in green houses can also be minimized.

In fertilizer placement, there has been much improvement in the method of application—that is, by fertilizer attachment to cultivators as well as to planters or drills. In general, there has been much progress in fertilizer placement in the soil.

9. In soil classification, the use of aerial photographs has greatly facilitated detailed, more accurately delineated survey work. The network of good country roads as well

as the findings of previous geological surveys are essential to soil classification work.

In tensile studies on the genesis and morphology of the more important soils of the various regions of the United States have been made. Notable are the studies on the loessial soils, the chernozem and prairie soils, the podsol or the forest soils, the desert soils of the arid south-western regions, and the sandy coastal soils of the humid southeastern regions.

10. In soil technology, there has been much development in the application of soil stabilizers, which "affords the means of improving and simplifying the whole technique of road making, and soils properly and effectively stabilized are able to support a relatively heavy load even though the water content is high." (MCLoad, 1943)

The most promising chemicals are combination of sodium silicate and sodium aluminate, raw tung oil, linseed oil, and a synthetic resin formed by a mixture of furfuryl alcohol and acid.

11. In soil conservation or more precisely, soil erosion control, intensive studies have been made on the effect of various types of vegetation or their combinations, or of various soil amendments on soil erosion losses on different important soil types with various slopes or grades. Soil erosion control such as terracing, contour plowing, strip-cropping, permanent soil cover-cropping, have actually saved millions of acres of agricultural lands from complete destruction and ruin. These had been observed especially in the extensive fertile loessial soils in central United States (principally Iowa) and in the vast rolling lands of Texas.

OUR COVER

President Roxas inspecting the Agricultural Machinery and Equipment Corporation (AMEC), factory for farm implements after which he said "Go Ahead". At President Roxas' left, smiling with pride and satisfaction is energetic Engineer Hilarion Henares, Manager of the AMEC and moving spirit of this government owned enterprise.

This tools that will be made will complement tractors for farm. Let them roll and keep them rolling for fruduction and not only for demonstration.

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On President Roxas' birthday, expressing satisfaction over the progress of AMEC he said: "The AMEC plow factory is going to be the arsenal of Agricultural Machinery in the Philippines." And turning to Mr. Henares, he said, "Henares, you are going to be the custodian of that arsenal, the AMEC factory."