BALANCED SOIL FERTILITY MEANS

LESS PLANT DISEASE, FEWER CROP, PESTS, MORE VEGETATIVE COVER

As Suggested by Dr. W. A. ALBRECHT

Modern soil research suggests that responsibility for disease and pest control in many instances should be placed with the persons managing the crops and their nutrition. Nature grew most of our crops in a healthy condition before man took them over.

In nature, wild plants growing in excellent condition were found in what the ecologist calls "an ecological climax," (a) they were in a pure stand with no contaminating weeds, (b) they had been growing as the same crop in succession in the same location for many years and had accumulated much of their own residue as organic matter, on or within the soil, and they were free from diseases and pests. When plants in nature reach their climax where no soil fertility (neither inorganic or organic) is removed and when our agricultural management removes these far in excess of their return, might we not theorize that depleted soils and accompanying poor plant nutrition results in plant diseases and insect attacks. On the converse, then we might theorize that properly balanced fertility levels would prevent these troubles and yield healthier plants.

In tests with fungus diseases of soybeans, research clearly demonstrates that attacks were highest on soils with low calcium levels. These attacks were prevented by higher levels of exchange calcium in the soil.

Recent research methods indicate the presence or absence of the leaf-eating insects (Heliothrips haemorrhoidalis) varied with the levels of nitrogen and exchangeable calcium. When the soil supplied ten milligrams equivalent, or less of nitrogen per plant, the thrips made their attack. When the soil offered twenty there were no thrips. When the nitrogen supplies were low but calcium was plentiful there were less thrips injury as more calcium was available in the soil for plant nutrition. There is a forceful suggestion that not one element of fertility, but all of them in balance and integration of their separate functions are required to grow plants healthy enough to ward off these diseases and pests. Less plant diseases and pests resulted from balanced fertility in these observations.

Expensive animal injury from deficient soil.

A plant growing its own protection, according to observations, cited first the calcium then nitrogen, then phosphorus in a readily anticipated order when we grant that calcium is the major nutrient in the soil. Potassium is next in order of use. The others fall in line, based on the way they become limiting elements in the plant's processes of growing whatever organic compounds through which it protects itself.

We have much to learn about soil management to nourish plants well enough for them to protect themselves from diseases and pests without our poisons and medications. It also raises the question of whether crops too deficient in their nutrition to grow their own antibiotics for self-defense would contain enough nutrients to produce healthy livestock. Also what about the use of these deficient plants in human nutrition?

Soil research faces a challenge to formulate a balanced fertility as a guarantee of less plant disease and fewer crop pests, as well as a means of producing more vegetative bulk per acre.

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In the case of garden vegetables, which includes many different families of plants, the degree of the acidity of the soil has an important effect on the yield of each variety, the health of each crop, and the uniformity of maturity at harvesting time.

NUTRIENT VALUE OF CROPS

About 100 pure bred samples of nine varieties of pulses raised in different state agricultural farms in India in 1957 when analyzed indicated a variation of the protein content of 60% in a single variety in some cases depending upon the strain and the locality where grown. The data is too limited to conclude whether any relationship exists between the yield and the protein content.

There is experimental evidence in the literature that the strain and the nature and the degree of fertilization greatly influences the yield of a particular crop, but also the nutrient content of a specific harvest crop. That wheat can vary in its protein content up to 20% according to the locality in which it is grown. This has been shown by L. J. Maynard, et al.

These workers have also shown that the plant variety and the amount of fertilization influences the amount of protein and the ammo-acid distribution in corn.

Reference: E.S.H., G.C., D.E., T.S., Basu., V.P.: Influence of the Genetic Strain and Environment on Protein Content of Pulses: SCIENCE 1959: p. 148.

HEAVY APPLICATION OF ONE ELEMENT MAY CAUSE A DEFICIENCY IN ANOTHER

That the micro-nutrient nutrition of citrus trees may be changed by continual heavy applications of commercial fertilizers, has been indicated by reports. Recent work in California suggests that trees in heavily fertilized Valencia orange orchards—particularly when chemical phosphorus or organic fertilizers containing a large amount of phosphorus are used over a period of years—should be carefully examined for copper deficiency. Many workers in the field have found that heavy applications of phosphate fertilizers to citrus trees, over a period of years, induce zinc deficiency pattern in citrus leaves. This can be prevented by zinc sprays.