

# Plant, Animal and Human Health Vary with Soil Fertility

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There is an age-old saying which tells us that "To be well-fed is to be healthy." All of us appreciate human health, but, unfortunately, more when we do not have it, than when we do. Plants and animals should be healthy also when well fed. Wild animals "know their medicine," as it were, not by knowing how to cure sickness, but what to choose to eat so as to be healthy. Grazing wild animals do not discriminate much between different plant species on a fertile soil, but they will discriminate between the same plant grown on different fertility of soils, or on the same soils treated differently. The animals are "seeing" their good nutrition, then, according to **what the soil offers via any plant species**. It is the **soil fertility** and **not the plant's pedigree** that is the distinguishing feature of the forage, and the criterion of the choice by the animal. **Nutritional value according as the soil makes it**, is the animal's means of being well-fed and therefore being healthy.

## **Immunity of Healthy Plants**

The plant's health fits into the same category, namely, if the plant is "well-fed"—not necessarily in terms of yielding big bulk of vegetative mass—it can protect itself against fungus attack and also against insect attack. Healthy plants, then, in what you might want to call healthy in their "resistance to attack by fungi, or insects" result from soil fertile enough to make those plants carrying higher concentrations of proteins within themselves. The physiology of the plant, determined by its nutrition, is the dis-

tinguishing feature. If the plants are well-fed, then, they are healthy—that is, fungi or other microbes (lower life forms) do not attack them.

## **Protein Builds Resistance**

It is significant that we point to the higher content of these plants, when they are "healthy." It is protein by which our bodies get protection. Our bloodstreams must have the protecting proteins, either already on hand or soon made, if some foreign proteins like a bacteria, fungi, or parasite entering our body is to be destroyed by our body (or we be destroyed by it). Animals protect themselves by proteins, but animals must get their proteins by eating the plants. Plants (and microbes) are equipped to make proteins from the elements, animals are not. Thus, animals get their proteins and protection from the plants. Plants get their proteins to the degree that the soil fertility helps them create these compounds. Healthy animals and healthy plants, then, are so because they have proteins, or are well-fed in what comes about because of the soil. It is the soil, then, which is the foundation of good nutrition, especially complete proteins, thereby building good health.

## **Protein Basic to Life**

Good health of animals and plants calls for (1) cell multiplications, cell repair or replacement, or just simply body growth—fat is not growth in that sense, even if it increases weight of body; (2) protection against invasion by other life forms like bacteria, fungi, virus, etc.,

and consumption of our cells by those other cells against which we must generate our antibiotics, antibodies, antigens, or protective compounds; (3) reproduction of the species. In all of these there are the proteins, and all that is associated with them, viz., the enzymes, vitamins, hormones, etc., which render the services. Being well nourished is then mainly a problem of proteins, and their creation by plants and microbes, according as the soils permit.

### Protein and Reproduction

In this geographical area, i.e. Missouri, we know that the soils do not grow the protein-producing crops unless some soil treatments are used. We should, therefore, expect protein problems in nutrition in this area. We should, also, expect health accordingly. We can grow the carbohydrate crops for fattening. We **fatten** hogs and cattle here, but have troubles with their **reproduction**.

### Crops Reflect Protein

Since soils fit a climatic pattern of differences in the degree to which the rocks have been developed into a fertile soil, or excessively developed into one washed out, as it were, we have crops making proteins and carbohydrates to be "grow" food, or we have crops making mainly carbohydrates to be not "grow" foods, but only energy or "go" foods. These latter soils then do not feed us well and may, therefore, give us poor health. Some correlation of the condition of teeth, of rejectees from the armed services, of fungus attack like histoplasmosis, etc., suggest that health patterns of the country go back to the soil patterns via the proteins and all that is required to grow them.

### Vital Soil Elements

Since the air and rainfall serve to supply the carbon, hydrogen, and oxygen,

namely, the components of the carbohydrates or energy foods, we do not worry about those three essential elements our bodies need. They, coupled with nitrogen, also coming originally from the air but taken by most crops from the soil, constitute about 95 per cent of the crops, of our food and animal feed, but the 5 per cent coming from the soil includes a much larger list of elements, namely, calcium, phosphorus, potassium, sodium, chlorine, sulfur, magnesium, iron, iodine, fluorine, manganese, copper, boron, zinc, cobalt, molybdenum, and possibly others.

Of these, the "trace" elements, namely, manganese, copper, boron, zinc, iodine, chlorine, and molybdenum have just recently gotten attention.

### Evidence of Soil Deficiencies

Our limited knowledge has been extending itself. By means of bioassays, that is, the use of experimental animals, the science of biochemistry and its refined methods have helped us learn of the importance not only of the possible deficiencies in our soils of the major elements as they bring about deficiencies in health, but also the deficiencies in our soils of the trace elements as potential deficiencies in health via plants and animals as our foods.

The major elements as materials of construction permit us to locate them in their functional places. But the **trace** elements, serving much as tools, cannot always be found in the finished product or in established functional positions in the body.

We are slowly coming around to see the soil fertility pattern as the determiner of our health pattern as our life lines of nutrition are shortened or cut off by (a) increasing population, (b) dwindling acres per person, and (c) declining depth of surface soil as declining fertility supplies.