



Ailing Plants

WHEN a child looks "pale and peaked," his elders are apt to judge that he needs iron. When a plant's leaves look the same way, lacking their healthy deep green color, the trouble may be a lack of the same element.

Doctors of human ills have an advantage over doctors of plant ills. Their patients can talk and tell where it hurts. Plants can only mutely wave distress signals in leaves and stems and flowers and fruits, and leave it to their human attendants to diagnose the symptoms as best they can.

A new book, *Hunger Signs in Crops*, written by a committee of 14 specialists and edited by Gove Hambidge, has just been published (*Reviewed, SNL, this issue*). It describes and depicts in color some of the principal types of malnutrition in plants and tells what can be done about them.

Different plants naturally show different symptoms for the lack of any given mineral element, but there may be at least some general resemblances. Thus nitrogen starvation manifests itself as a yellowing of the leaves in several different species; most prominently along the midrib, in corn; entire lower leaves

on the stalk, in tobacco; a dirty yellowish-green tinge, in cotton leaves. Other deficiencies also manifest themselves in this similarity-with-differences pattern.

Of particular importance nowadays is research on effects of shortage in the so-called trace elements—mineral nutrients needed only in exceedingly minute amounts, but indispensable in those amounts. Until a few years ago, it was thought that plants needed only seven mineral elements: nitrogen, potassium, phosphorus, sulfur, magnesium, calcium and iron. Needs for the first six of these are measurable in scores of hundreds of pounds per acre of crop.

But to the seven elements of classic plant physiology there have now been added another six: manganese, boron, chlorine, iodine, zinc and copper. The need for these, per acre of crop, is measurable in ounces: the equivalent of a quarter of a pound of borax, enough iodine crystals to make up one ounce of tincture, and so on. Discovery of the necessity of these trace elements has been so recent, and research results are still coming in so fast, that all statements about them must still be regarded as provisional. This new book, however, does bring together all pertinent present information on the subject.

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PSYCHOLOGY

Experiments Throw Doubt On Function of Frontal Brain Area

Experiments Show That Monkeys Without Important Brain Area Able to Act in Ways Formerly Thought Impossible

THE EXACT function of the important frontal areas of the brain is thrown in doubt by the discovery by Dr. R. B. Malmo, of the Yale Laboratories of Primate Biology, that monkeys without this part of the brain can remember.

Dr. Malmo described his experiments to the Eastern Psychological Association meeting at Brooklyn College. Caged in a dark room, the monkeys could see an illuminated glass and learn to reach food by pushing the glass when the light came on. They learned to distinguish between an illuminated glass and one that was dark even when their relative positions were changed.

Then came the critical experiment. The glass behind which was the food was lighted as usual, but this time a wire screen kept the monkey from

reaching it immediately. He had to wait and remember where the light had been for an instant before the screen was raised and he could reach for his reward.

This is the sort of memory that has been thought impossible without the brain's frontal areas.

But these monkeys with no frontal association areas could do the trick. They could wait 2 seconds, 3 seconds and finally as long as 10 seconds, and still reach correctly and get the food. One animal's score was 81%, the other's 94%.

These scores were possible, however, only if the animal waited in the dark for the screen to rise. Turning on a ceiling light for five seconds in the middle of his wait brought the score down to 50% for one animal and 46% for the other. These are chance scores indicating no mastery of the trick.

Loss of the frontal association areas, Dr. Malmo suggests on the basis of his monkeys' achievements, makes an animal or a human patient more susceptible to that sort of forgetting which is due to a crowding out of mind by new happenings.

It does not seem to destroy his ability to hold things in mind if he is not distracted.

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