

that paper actually absorbs from the air harmful quantities of acidic sulphur compounds with which the air is generally polluted. The absorption is greater in the portions of the leaves more fully exposed to the atmosphere, and this is one reason why the leaves of old books become more brittle near the outside edges. Seven samples of commercial bond and ledger papers, made in 1914 and 1915, were tested after storing under normal conditions for eighteen years. They were examined after five years and again after eighteen years storage. After eighteen years, the folding endurance of these papers had decreased 23-93 per cent. and the bursting strength 0-18 per cent. In general, papers with the higher acidity, as indicated by the pH of their water extract, suffered the greatest deterioration. The results are indicative that a water extract with a pH of less than 5 is a major factor in the deterioration of even the best classes of paper. (*Nature*, May 22, 1937.)

ABSTRACTS

Zinc as a nutrient for Plants. Chandler, W. H. *Bot. Gazette*, 98 (1937), 625-646. There is strong evidence that zinc is an essential element for fungi and for higher plants; but, because of the very small amount of zinc required and its widespread presence as impurities, it has required exceptional methods to hold the zinc supply to plants in water cultures low enough to prevent moderate growth. Earlier workers were able to cause some improvement by supplying zinc, but some of them considered this response merely a stimulation, because the growth of check plants was approximately normal.

Widespread and serious injury to trees in orchards has been overcome by treating the trees with zinc, through the soil, by driving zinc or galvanized iron into the trunk or branches, and by spraying with zinc compounds on the foliage or on the dormant twigs.

The trees seem to take only about one ounce of zinc a year from an acre of soil, but under some conditions they are not able to obtain enough even for this small requirement. This is not always due to a small total zinc supply in the soil or to a reaction unfavourable to the solution of zinc. The soil flora seems to be involved: some soils in which plants show zinc deficiency will supply enough zinc after they have been sterilized. Theories are suggested to explain these phenomena.

The role of zinc in the plants is not known, but it is rather generally thought to act as a catalytic agent in some essential reaction. (Author's summary).

The age of a Cow and its Effect on Milk. *Queensland Agricultural Journal*—June 1937. How does the age of a cow influence the composition of its milk? This is a question often asked. From the dairyman's point of view the fat is the most important constituent; and much experimental work has been carried out to determine how the fat test varies with the age of the cow. It has been shown that, with advancing years, cows produce milk containing a diminishing percentage of fat. The variation observed is not of any serious consequence, but it is nevertheless noticeable when average figures are taken. A cow of a high testing breed, which shows an average test of 5 per cent. of fat as a young animal, will decline to about 4.5% if she continues to produce to fourteen years of age.

It is sometimes thought that a heifer showing a low test as a two-year-old may improve as she matures. There are no grounds for such a belief, and any farmer building up hopes of this nature is likely to be very disappointed. The richness of milk is a matter of inheritance, and so far as is known nothing can be done to change it in an individual animal.

An interesting feature with this work is that mathematicians have taken an interest in it, and one man has actually worked out a formula for calculating the fat test for any specified age, provided that the average test for the first milking period is known.

The effect of age on the other constituents of milk has also been studied and there is a decrease, with age, in all constituents except albumen, which increases slightly from year to year.

The effect of age on the fat test (richness) of milk should not be confused, with the effect of age on milk production. There is a gradual increase in the quantity of milk produced from year to year until a maximum period is reached after which the production figures show a slow decline. The age of maximum milk production for most breeds has been shown to be eight or nine years.

Chlorosis of Citrus in Puerto Rico. *Phytopathology*, Vol. 27, No. 6. Citrus leaf chloroses due to plant nutrient deficiencies have been reported in almost every region in which citrus plants are grown. Information regarding the causes and distribution of these diseases is in many cases incomplete. This note describes the symptoms and soil relations of a chlorosis causing losses to grapefruit growers in Puerto Rico, and reports the beneficial effects on diseased trees of zinc sulphate, already used elsewhere successfully in the treatment of "mottle-leaf" in citrus. It thus records the occurrence in an additional geographical area of what appears to be a similar deficiency disease.

The symptoms on diseased grapefruit trees in Puerto Rico resemble closely those described for the citrus disease known as "mottle-leaf" in California and "frenching" in Florida. Irregular chlorotic blotches first develop between the larger secondary veins on each side of the leaf midrib, becoming more pronouncedly yellow and increasing in area with increased severity of the disease. In severe cases tissues next to the larger veins and midrib remain green, while the rest of the leaf becomes completely yellow. Trees affected for several seasons frequently produce multiple buds resulting in a bushy growth at the ends of the part or most of the branches. Severely affected trees bear little or no fruit and finally become so weak that they are commercially valueless.

Diseased trees in Puerto Rico have been found on areas of alkaline soil of sedimentary origin, testing pH 8.0 to 8.5 near affected trees, none having yet been found on the acid soils of the island.

In preliminary tests, lots of 5-year old, severely diseased trees were sprayed with water solutions of copper sulphate, iron sulphate, zinc sulphate and manganese sulphate. Three weeks after the sprays were applied trees treated with zinc sulphate began to show signs of response. New healthy appearing leaves were formed, and some of the chlorotic leaves began to recover their green colour. Five weeks and 7 weeks after treatment diseased trees sprayed with zinc sulphate continued to show favourable recovery. Trees treated with copper sulphate shed their leaves. Iron sulphate and manganese sulphate gave no response.

Agricultural Fottings.

(THE DEPARTMENT OF AGRICULTURE, MADRAS)

The Mahali Disease of Arecanuts. *Success of Departmental Propaganda.* It will be recalled that about this time last year the arecanut gardens in several parts of South Kanara district were in the throes of a devastating disease known as *Mahali* or *Koleroga*. To many ryots in South Kanara and South Malabar, arecanut is a money-crop while to a large section of the poorer ryots, it happens to be their sole means of livelihood. The disease is by no means new to the