California Avocado Society 1952 Yearbook 37: 73-75

JUDGEMENT AND AVOCADO TREE NUTRITION

Joe Coony
Farm Advisor, University of California Agricultural Extension Service,
San Diego County.

(An address green at the Annual Meeting of the California Avocado Society, June 7, 1952.)

It is easy to say that a grower's general cultural program should be a result of judgment. And this judgment should be based on knowledge of the conditions and results of the grower's own experience, of other successful growers, of research, and of tests in the field. In other words, there is pertinent evidence available. It should be considered and evaluated before deciding any phase of the cultural program.

Concerning the nutritional needs of avocado trees, it is not easy to briefly describe a simple, reasonable program that can be uniformly adopted by growers in all areas. After examining the evidence here today, we'll realize that an exact or final situation does not exist. Perhaps we can build towards a more sound basis for judgment.

By definition, nutrition means more than feeding the trees with certain fertilizers. It means the ability of the tree to obtain and utilize what it needs to grow and produce well. Toxic elements, unfavorable soil moisture conditions, disease and other factors can interfere. Many trees that fail to grow and produce properly, or display certain leaf symptoms of malnutrition, cannot respond to any fertilizer material because of irrigation or disease limitations.

For our purposes now, let's consider the soil, as a supplier of elements needed or toxic. In brief, the following statements are found to be generally acceptable. Nitrogen must be supplied. Mineral elements—phosphorus, potash, and others—appear well supplied in a number of soils. The need for applications of organic materials to mature non-tilled orchards is open to question. Certain minor element deficiencies, such as zinc, are common and can be corrected. Toxic salts like sodium and chloride are problems in some areas. Let's see how we may have arrived at some of the above statements.

We've learned a lot about California soils and various crop nutritional problems. Some avocados are grown on deep, fertile soils that are considered loaded. In fact, sometimes the problem is one of too rapid growth into big, beautiful trees, but with a minimum of fruit. Crops on such soils seldom need or respond to anything other than nitrogen.

Many avocados are grown on upland soils that are not deep or inherently fertile. We know that any soil that has enough depth, is well drained, and is satisfactory from alkaline and saline aspects, can be managed to grow good avocado trees. It's the management of these hillside soils which gives us most concern.

Chemical soil analysis has added to our fund of information. Actually it is the interpretation of the results that is difficult and a little misleading under our tree crop

conditions. To us, they give support to the general need for nitrogen, and occasionally phosphorus. We really appreciate the soil test in the appraisal of adverse chemical situations, such as salinity or soil reaction.

Since soil reaction was mentioned, we'd like to add that growers who become aware of pH or soil reaction tend to become unduly concerned. Even if some so-called optimum value was designated, there would be no need, no certain way to approach or maintain it. We do recommend lime where pH is really low—close to the 5.0 mark—and we discourage use of acid reacting fertilizers where the tendency is towards too low a value.

We have been particularly alert for evidence with regard to organic materials. One of the finest treatments of this subject was the paper presented at the Avocado Growers Institute in Escondido in March, 1952, by Dr. James P. Martin, Division of Soils and Plant Nutrition, University of California Citrus Experiment Station. Among the pertinent data for our soils and conditions, is found support and explanation for our many field observations that mature orchards do not require applications of manure or other organics for the maintenance of healthy, productive trees and excellent soil conditions.

One of the best guides that any of us have is the tree itself. Leaf and growth symptoms can tell us much. The objective of a good crop is also visually apparent. Laboratory and field experiments have shown a number of deficiency and excess conditions to be recognizable by visual symptoms.

Leaf analysis as a diagnostic tool is developing in a number of crops. Correlated with soil information and visual or measurable criteria, the technique offers promise for a better picture of avocado nutrition. A leaf analysis survey of San Diego County avocado orchards was begun in the Fall of 1951 in cooperation with Dr. D. G. Aldrich of the Citrus Experiment Station. Results are not complete, but sufficient samples have been analyzed to indicate that some areas of San Diego County will need field test plots, particularly as regards phosphatic fertilizer. That's not surprising in view of the number of soil types in the county that are relatively low in phosphorus, and upon which lemons and oranges have responded to applications of phosphate materials.

Salt injury in recent years, has affected many orchards for the first time. It's a logical development after several years of deficient winter rainfall, conservative use of water, and often lowered water quality. Most common injury was the tip or marginal leaf burn, due to an accumulation of chloride in the leaf. It is most evident in the fall and winter months on old leaves. Winter rains removed the accumulation of chlorides in the soil, and reduced injury next winter is expected. Where chlorides in the water are high, slightly more liberal use of water will help reduce injury. Where sub-drainage is impaired, this practice is not suggested.

A relatively new salt problem, that of sodium excess, is evident in intraveinal dead spots or areas in the leaf. Contributing factors are low rainfall and fairly high sodium in the irrigation water. Apparently the sodium that becomes absorbed on the soil particles is enough to be toxic, but not enough to cause poor soil structure or impair water penetration. Trees injured by sodium may not recover readily. Past winter rains will help if gypsum or lime had been applied. A heavy irrigation is needed following an application of calcium to counteract sodium.

Zinc deficiency continues to be most common. Trees so affected show narrow, small, mottled leaves, stunted growth and a tendency for round fruit in varieties like the Fuerte. A foliage spray is suggested.

Iron deficiency, called lime induced chlorosis, is found in many orchards, but severe cases are generally on calcareous soils. The leaf becomes uniformly pale to yellow, with the veins and veinlets remaining a good green. No real corrective measure has been developed.

So, after examining the evidence, we see there is very little that is new that we can definitely advocate. The sodium aspect is relatively recent in the field, but is not general. Zinc, chloride, and iron are old customers.

The basic need for nitrogen has always been stressed. Our Management Studies show that 150- 200 pounds per acre give excellent production. Organics are considered helpful in young groves on our hillside soils, but appear to decrease in need in mature, non-tilled orchards.

In addition to judgment, there's the important ingredient of common sense that enters in. What value is there to really studying and working on the fertilizer aspects, while not giving full attention to the far more important practice of irrigation. And there's the matter of cost. Again records show-expenditures of $75.00 to $100.00 per acre, when possibly the essentials of the program could be obtained for $25.00 to $45.00. Then the matter of consistency appears profitable. A program should be given a minimum of three years to evaluate results. As we see them, the groves with the simpler, consistent fertilizer program—avoiding excess, do better and are more free of nutritional disturbances.

That's the picture as of now. Perhaps you've gathered that we intend to develop additional evidence, and continually appraise the situation.