ANALYSES

Continued from preceding page

sired end. Findings of the check-ups should be correlated with tree condition, yield, and quality.

For example, if potassium and magnesium are low in the leaf, subsequent analyses at yearly intervals will be needed to determine whether the fertilizer additions made are bringing about the desired change and how rapidly. Suppose the lower root zone shows excessive salt. Subsequent soil analyses will be needed to check on the effectiveness of the changed irrigation practices recommended.

Because of these several requirements, the costs involved are rather high. However, they can be reduced substantially by the grower who has the time or interest. Much of the initial appraisal information on orchard and soil can be supplied by him, and with a little help from his farm advisor he can learn how to take proper leaf and soil samples.

After the analyses have been made by an appropriate commercial laboratory, the farm advisor can help interpret them, and recommend changed practices where necessary.

Steady progress is being made in developing more rapid analytical procedures which are still sufficiently accurate, thereby cutting both time and cost of analyses.

The use of the flame photometer has greatly decreased costs of sodium, potassium, magnesium, and calcium analyses and a comparatively new instrument, the X-ray spectrophotometer, will enable costs to be reduced on a great many other elements. The spectrograph is also useful for many trace elements.

Work is continuing on determining current costs of initiating and carrying forward a program of leaf and soil analysis by present methods and techniques. This information will enable us to determine costs on a per acre basis so that growers can judge whether they can afford this type of service. It is certain that with improved analytical methods, proper organization, and sufficient volume, future costs can be greatly reduced.

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The foregoing article is based, in part, on Leaf and Soil Analysis in Citrus Orchards *by H. D. Chapman, Manual 25 (75¢).*

Example of Leaf and Soil Analysis Values in a Mature High Producing Navel Orange Orchard

Nature of Orchard: Mature navel orchard in Arlington Heights area.
Age: About 64 years.
Average production for 3 years (1945–48): 7.2 field boxes/tree.
Size and quality: Excellent.
Soil: Greenfield sandy loam.
Culture: Cultivated: Volunteer weeds in winter.
Irrigation: Every 30 days with good quality water.
Fertilizer practices: Manure, ammonium sulfate, anhydrous ammonia.
Estimated nitrogen rate 500 lbs./acre/year.
Zinc sprays used regularly.

Leaf Analysis Data
(5-month old spring cycle leaves from fruit bearing terminals)

Percent in dry matter								Ppm in dry matter			
Ca	Mg	K	Na	N	P	S	Cl	B	Cu	Fe	Mn
5.04	0.24	1.07	0.07	2.76	0.12	0.39	0.10	55	4.2	49	11

Soil Analysis Data

Soil depth	pH on paste	Elec. Cond. of Sat. Extr. ECx10⁶	Exch. Cap. me/ 100 g.	Exchangeable bases in % Exch. Cap.				Ratio K/Mg	Phosphate (PO_4) (Ppm dry soil)	
				Ca	Mg	K	Na		water sol.	acid sol.
0 –6″	6.9	3.57	9.74	76.8	13.1	8.6	1.5	0.65	1.1	1763
6″–18″	6.9	1.54	6.86	66.1	20.8	10.7	2.3	0.51	0.9	810
18″–36″	7.2	1.13	6.86	63.8	25.4	8.6	2.2	0.34	0.4	336
36″–48″	7.2	0.94	9.44	62.8	30.5	3.6	3.1	0.12	0.2	396

Evaluation

1. Nitrogen: Decrease rate to 200–300 pounds per acre.
2. Potassium: Level in leaf and soil satisfactory; discontinue manure for a few years.
3. Phosphorus: High in soil; discontinue manure for a few years.
4. Magnesium: Leaf and soil values indicate desirability of raising levels somewhat, suggest adding magnesium sulfate (epsom salts) at 5 lbs./tree for several years until leaf levels are brought up to 0.30–0.40%.
5. Sulfur: A little high, use NH_4NO_3 or urea in place of $(NH_4)_2SO_4$.
6. Micronutrients: Manganese low; include manganese with future zinc sprays.
7. Soluble salts: A little high in surface, but winter rains will probably flush this down into lower horizons; conditions there are satisfactory. These data indicate that irrigation practice from the standpoint of salt accumulation is satisfactory.
8. pH: Is in satisfactory range.

Role of pantothenic acid in

EMBRYONIC DEVELOPMENT

Congenital abnormalities of children and of livestock may result from a deficiency of certain essential nutrients in the diet of the mother.

Research in progress at Davis is studying the role of pantothenic acid—one of the B-complex vitamins—in embryonic development. Pantothenic acid functions in the body as a part of a specific coenzyme—Coenzyme A—a molecule necessary for many important chemical reactions in the body. Analyses of Coenzyme A activity, and of pantothenic acid content, in the tissues of embryos are being made periodically during gestation to learn when the embryo is able to convert the vitamin to the active coenzyme form.

Current experiments are designed to determine whether certain periods of pantothenic acid deficiency in the mother's diet during gestation will produce congenital abnormalities in the offspring, and to correlate such changes with levels of the vitamin and the coenzyme in the embryonic tissues.

Such experiments may lead to a better understanding of the mechanisms responsible for the occurrence of congenital abnormalities, and may also help to clarify the functions of nutritional factors in metabolism.—*Lucille S. Hurley, Dept. of Home Economics, Davis.*

Inventory of uplands by

SOIL-VEGETATION SURVEY

A study of soils and associated vegetative cover of foothill and mountainous lands is being conducted by the State Cooperative Soil-Vegetation Survey to gain basic information for the best use of the acreage for timber, forage, water, and recreation.

One part of the work—specifically for range management purposes—is a study of the nutrient relationships of herbaceous vegetation associated with various soil series. The nutrient relationships are determined by greenhouse pot tests and field fertilizer trials.—*W. Robert Powell, Dept. of Agronomy, Davis.*