IRON DEFICIENCY

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In connection with a 1974 survey of 22 western states, we agreed to gather information on the types of crops in California that are subject to iron deficiency and to estimate the acreage involved. Recognizing that the severity of the problem varies from year to year because of weather conditions, we concluded that the most useful information would be obtained from members of Cooperative Extension who have long familiarity with field conditions in the various agricultural sections of the state. Therefore, the information summarized below was obtained from County Farm Advisors throughout California.

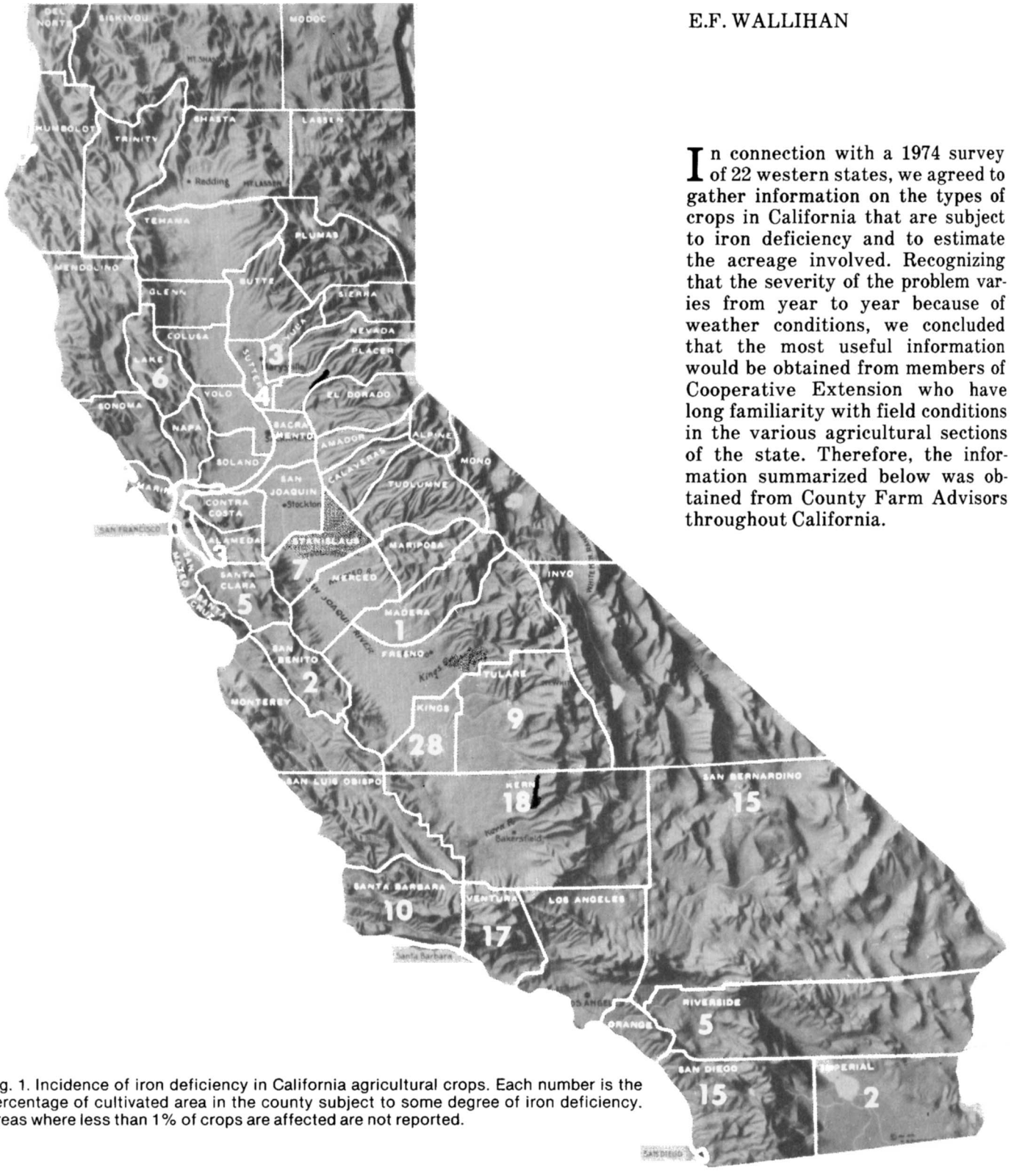

Fig. 1. Incidence of iron deficiency in California agricultural crops. Each number is the percentage of cultivated area in the county subject to some degree of iron deficiency. Areas where less than 1% of crops are affected are not reported.

in California Crops

Of the 58 counties in the state, 36 reported that iron deficiency is not a problem in agricultural crops. In the remaining 22 counties, comprising about 6 million acres of cultivated or irrigated land, about 700,000 acres (11 percent) are subject to some degree of iron deficiency. Six percent of that area was classified as having "severe" iron deficiency.

Iron conditions vary widely in other states but the overall average indicates that about 5 percent of the agricultural acreage is affected to some degree. This figure applies also to California.

The overall western area, including California, cites grain sorghum as the primary problem crop. Other affected crops in California are, in descending order of severity of deficiency, citrus, pear, walnut, corn, plum, peach, strawberry, avocado, and bean.

The survey was aimed particularly at agricultural crops but the reports make it clear that iron deficiency in ornamentals is a widespread concern, particularly gardenia, bottlebrush, liquidambar, magnolia, azalea, and roses.

Distribution of the problem in California is indicated in the map by showing the percent of agricultural land that is affected in counties reporting 1 percent or more. Interpretation requires some knowledge of conditions under which the problem occurs.

In the case of iron, unlike most plant nutrients, deficiency is not usually caused by low concentrations in the soil but, rather, by conditions that limit the ability of plants to absorb it. The most common of these is high pH, usually caused by lime (calcareous soils). The presence of lime alone does not usually induce iron deficiency, but when excessive amounts of water are present, or soil temperatures are low, the problem exists in some plant types. Reasons for this combination effect are not clear but there is evidence that limited root development is involved and that poor soil aeration is often the cause. Any compact heavy-textured soil that is alkaline is a potential source of iron problems, subject to modification by management practices of tillage and irrigation as well as crop selection.

Such compact, alkaline soils are common in several counties having high incidence of iron deficiency, particularly Kings, Tulare, Kern, Santa Barbara, Ventura, San Bernardino, and San Diego. Their soil is generally alluvial material from mountain streams deposited in valleys as broad fans or flood plains. The ultimate reach of the rivers is usually the area in which the finest soil particles, lime, and dissolved salts are deposited, such as the Tulare Lake and China Basin areas.

In addition to these recent alluvial deposits, soils with similar characteristics were formed from sedimentary rocks in the Coast Ranges after the ocean receded.

The areas of soils discussed above tend to be spotty because of the various sources of materials and the effects of topography on deposition. Their boundaries often grade into areas of better drained and aereated soils.

Generally speaking, the iron problem tends to be more common in regions of low rainfall, partly because of the minimal leaching of lime and other salts. It is also more prevalent in the Coast Ranges or in alluvium from them because of the extensive deposits of lime and the preponderance of fine-textures soils derived from sedimentary rocks.

In spite of the rather well defined nature of soils in which iron deficiency most commonly occurs, it is seldom possible to predict the problem from physical or chemical tests. Some of the reasons for low incidence of iron deficiency in certain fine-textured calcareous soils are:

1. Most of the non-cultivated nonirrigated land in the state supports native vegetation which is seldom subject to iron deficiency. This includes the Sierra Nevada range, the region of high rainfall in the northern end of the state, grazing lands, and the deserts.
2. Judicious selection of crop plants that have low susceptibility to the iron problem has been helpful *e.g.*, in Imperial County where cotton, alfalfa, and sugar beets are the main crops.
3. Skilled management of tillage and irrigation practices often minimizes the problem.
4. Some soils, particularly those of high salt content, are unsuitable for any cultivated crop and are not used.
5. Popularity of seacoast areas for residential and industrial development has eliminated agriculture from some problem areas, notably in Los Angeles and Orange counties.

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