Orange and Lemon Oil By-Products Bring Prosperity to Citrus Fruit Growers

One Plant Alone Nets $100,000 from Cull Oranges Formerly of Little Value

CITRUS growers in California continue to develop facilities for utilizing cull oranges and lemons. A few weeks ago a new plant for recovering usable substances from oranges was formally opened at Ontario, Calif., according to reports received by the United States Department of Agriculture.

A dozen years ago great quantities of oranges and lemons not only were discarded as cull fruit, but had to be hauled away at a cost of at least $1 a ton. To-day practically all of this sub-standard fruit is being utilized in numerous ways, returning to the growers an average of $12 or more a ton.

The remarkable growth of the citrus by-products industry which has been developed within the last decade is founded on results of scientific research. Investigations begun about 12 years ago by the Bureau of Chemistry, United States Department of Agriculture, in its branch laboratory at Los Angeles, have resulted in the development of processes for recovering citric acid, as well as other valuable substances such as oil, pectin, juice and pulp, from oranges and lemons. The commercial application of these processes not only enables the industry to save the fruit that is for one reason or another undesirable for market, but to use marketable fruit at a profit when there is a surplus. It is estimated that 30 per cent of the annual production is classed as culls, and the prosperity of the citrus growers depends upon a profitable utilization of this unmarketable fruit.

By means of an improved machine to press the oil from orange and lemon peel developed during the past year, at least 5 pounds of oil can be pressed from the peels of a ton of lemons. One concern in Los Angeles uses 60 tons of citrus fruit a day in making juice by means of a revolving burr-type machine. As citrus oils are worth approximately $2.50 a pound the extraction and utilization of the oil would mean an additional return of $12.50 for each ton of cull fruit, or on the output of this one plant, a gross additional income of $750 a day. More work must be done to perfect the machine, however, before it can be commercially applied.

It is believed that the research work now underway will enable California manufacturing concerns to utilize these oils from orange and lemon peel for all purposes for which European oils now are used.

It has been found in this and other countries that the basic research necessary for many lines of endeavor is generally a problem for the Government to work out. Returns from such fundamental study are often so long delayed that it can not well be done by individuals or concerns who ordinarily expect a profitable income from their investment within a short time. Investigations and experimental study to aid in perfecting methods of utilizing waste products of agri-

culture is one of the most effective ways in which the Bureau of Chemistry can serve the agriculture and manufacturing industries of the country. The citrus by-products industry is a conspicuous example of the commercial application of fundamental research.

Citrus growers themselves are now operating two by-products plants, one for lemons at Corona, Calif., and the one for oranges at Ontario, Calif. Commercial concerns are now manufacturing on a profitable scale numerous marketable products from large quantities of cull fruit that would otherwise be a loss to the industry.

One plant operating on cull lemons last year produced about 65,000 pounds of lemon oil with a value of approximately $70,000, as well as 30,000 pounds of pectin.

From waste oranges are manufactured juice, marmalade, pectin, orange oil, and other products. One plant, which used last year 10,000 tons of oranges, put out, among other products, about 50,000 pounds of orange oil having a wholesale value of approximately $100,000.

The research laboratory at Los Angeles made considerable progress last year in studies to determine the exact chemical differences between the oils made from California fruit and those made from European oranges and lemons. The results of this investigation should show the relative values of the oils for certain uses, such as the manufacture of ice creams, hard candies, cake icings, perfumery and beverages.

CELLULOSE SAUSAGE CASINGS

To join the ranks of chemical wonders there now comes the artificial sausage casing, made from material that is first cousin to rayon. Cellulose sausage casings are the outcome of several years of research on the part of William F. Henderson and Harold E. Dietrich at the Mellon Institute for Industrial Research. Animals furnish the coverings for sausages as we have always known them. The source of supply has been more or less irregular, while the expense of hand labor and difficulties of handling and cleaning, particularly the latter, have made a satisfactory artificial casing extremely desirable. The fibres of cotton seeds, treated with chemicals as in the viscose process, are the source material of the new product. Machinery has been developed at the Mellon Institute which has demonstrated that thin, semi-transparent tubes can be turned out in lengths and sizes to fit any sausage or wiener at a moderate price. They are used dry and will keep any length of time—an advantage not possessed by the animal variety—and can be stuffed with sausage "makings" much more rapidly than the old ones. The inventors declare that "the sausages packed in cellulose containers are perfectly comestible and may be cooked in any manner and eaten with no difficulty."—*Current History.*

VEGETABLE OILS PLANT FOR CALEXICO

W. J. Hartman, cotton grower of Calexico, Calif., has purchased the old Southwest plant in that city and is installing machinery for the manufacture of oil from flax seed, soya beans, sesame, cotton seed and copra.