

Breeding May Improve Processing Quality of Sugar Beets

Beet sugar industry improving plant equipment to boost efficiency

DENVER.—Improvement in the quality of raw materials delivered to sugar beet processing plants is now a possibility through breeding methods, R. R. Wood, Great Western Sugar Co., said at the American Society of Sugar Beet Technologists general meeting here. Breeding for processing characteristics could become as common as for disease resistance, he said. Credit for this development was given to recent accomplishments in analytical techniques.

The rapid determination of sodium, potassium, and other metals in beet roots is now possible with the flame photometer, Wood said. Paper chromatography has made possible the determination of raffinose with greater speed and accuracy than in the past. Rapid determination of thin juice purity, which is of importance in plant operation and control, can be made through oxalation techniques.

It was indicated that the sodium content of beet roots was heritable and, thus, subject to selection pressure. Its association with sugar content has been demonstrated in the past. Raffinose content, a processing nuisance, can also be reduced by selection.

Chromatographic Disease Detector. Determination of healthy and curly top diseased beet plants is now possible through recently developed paper chromatography techniques, according to J. M. Fife of USDA in a paper presented in his absence by Myron Stout, also of USDA. Initially, it is indicated that tests might also be developed which would determine resistant and non-resistant varieties. Six microliters of juice expressed from leaves of plant are used in the test and with this amount, the presence or absence of at least 10 amino acids, in addition to glutamine and asparagine, can be determined and diseased plants quickly identified. The principal organic acids present in healthy and diseased leaf juice and in the phloem



Henry B. Haas, president, Sugar Research Foundation, said that part of an annual loss of \$36 million to corn products in bakery applications was being recovered for the sugar industry as a result of research

exudate from similar plants have been identified.

Petiole Analysis. Recent experiments by D. Ririe, A. Ulrich, and F. J. Hills, University of California, have demonstrated that petiole analysis can be a valuable aid in sugar beet fertilization on fields of high, medium, or low fertility. Purpose of these experiments was to determine if curves based on analytical data could be used practically as indicators of impending nutrient needs and to affirm critical levels for the major fertilizer elements. Petiole samples were taken periodically from check plots and plots treated with a predetermined basic fertilizer rate. Analysis was made for $\text{NO}_3\text{-N}$, $\text{PO}_4\text{-P}$, and K, and curves of plant content of nutrient vs. time plotted.

It is possible to predict from the curves when supplemental applications of nitrogen should be made. In one case, a

relationship between the $\text{PO}_4\text{-P}$ concentration of the petioles and sugar beet growth was established, and, in this instance, leaf analysis indicated the possibility of improving subsequent crops by phosphate fertilization.

Power Wastes. A survey of 53 sugar factories showed that at least half used from 50 to 100% more fuel per bag of refined sugar produced as did the four most efficient of the group, E. B. Cole, Amalgamated Sugar Co., reported. Cost of fuel consumed is second only to cost of labor in more efficient plants; in less efficient plants, cost of fuel may be 50% more than labor. Of prime importance is effect that coordinated design of power plant and evaporator station has an over-all heat balance of the sugar factory, Cole said. He believes that it is possible to design and operate successfully a sugar factory at a fuel consumption figure of less than 60% on sugar produced, a unit of fuel being arbitrarily taken at 10,000 B.t.u. per pound of fuel.

Automation Trends. Another step toward more efficient plant operation was presented by A. H. Stuhlreyer, Western States Machine Co. Stuhlreyer described a 48" \times 30" continuous batch centrifuger which is equipped with automatic loading, automatic plowing, and automatic restarting of the next cycles. While no beet sugar plants use the equipment with all of the automatic features, there are installations in cane sugar and other plants. Hall-way conversation suggests that some of the larger beet sugar companies are considering installation of automatic centrifugals.

Beet Top Feed. In many areas, the only value received from beet tops has been that derived from dicing them under or from pasturing. In California, returns from pasturing on the average has been only 12 cents per head per day or \$10 to \$16 per acre. This can be markedly increased from use of tops for feed, according to R. N. Winters, Union Sugar Co. Last year, for the first time in this area, growers sold tops to feed operators. Price was \$22.50 per ton of dry matter. Tops from approximately 650 acres were fed and it is expected that this will be doubled this year. Average net return to grower was \$40.16 per acre or 2.46 per ton of sugar beets—over 4 times that which would have been received from pasturing.