SUCROSE LOSS AND CHANGES OF NITROGEN CONSTITUENTS IN SUGAR BEETS UNDER CONDITIONS OF DELAYED TOPPING

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SOME sugar beet growers in certain parts of California have followed the practice of severing the beet roots from the soil several days in advance of topping and hauling them to the factory for processing. It has been assumed that if the leaves are left attached the sucrose in them will move down into the roots and increase the amount of available sugar for extraction. The practice has been further defended on the assumption that loss in weight by drying is compensated by an increase in sucrose percentage and that savings may be effected by the reduction in costs of hauling.

Larmer (3) conducted field tests with delayed topping at Davis, California, in 1933 and 1934 in which he compared the results obtained from sugar beets grown in replicated plots which were harvested immediately after lifting with those obtained from plots in which the roots were harvested later; topping being delayed 1, 2, and 3 days in the 1933 experiment and approximately 1, 2, 3, and 4 days in the 1934 trials. He concluded that the increase in sucrose percentage shown when harvest was delayed was assignable to desiccation of the root tissues. He found rather consistently lower total sugar yields associated with delayed harvesting, and concluded that the postulated translocation of sugars from foliage to the root had been over emphasized. Under the conditions of his experiments, however, the sugar losses found did not reach significance. In the absence of evidence of gain in sugar yields, he pointed out that advantages from delayed harvesting would need to be based on economies in handling the crop for delivery, at the same time calling attention to the undesirability of flaccid beets for processing.

Considerable European literature having more or less bearing on the general subject of changes taking place in sugar beet roots under drying conditions has accumulated. All reports agree that respiration and metabolic processes continue after the root connections with the soil are broken. Massa (4) has shown that freshly dried and topped beets lose sugar by respiration rapidly for 6 or 8 days after which the rate of loss slackens. Oparin, et al. (6) reported that the gradual wilting of the beet root had no marked influence on respiration. As to translocation, various claims of gains in sucrose with delayed topping have been made in certain popular articles. Novak (5), on the other hand, in a thorough study of movement of sugar from sugar beet leaves to roots under conditions of drying, found that in none of his experiments could such movement be shown. In his review of the work of other investigations, he stated that error was made by not taking

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3 Figures in parenthesis refer to "Literature Cited", p. 907.