

SOME EFFECTS OF FREEZING AND SUBSEQUENT STORAGE ON BEET QUALITY AND SUGAR YIELD

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Does freezing affect beet storage losses? Experiments were done in three seasons using beet grown in boxes containing 33ft³ of soil. Each box grew 16 plants that were exposed to freezing treatments while still growing in the box. Freezing was done in a cabinet for 12 hour nights followed by 12 hour days at 41°F. Treatments differed from season to season but always included 21 and 14°F: exposure was for 1, 3 or 6 nights. Treatments also included a frost-free 'recovery period' (1, 3 or 6 days) prior to harvest, and storage for about 40 days at a range of temperatures (between 50 and 75°F). At harvest, beet were assessed for damage and put into nets for storage in the dark in still air prior to being washed, weighed and assessed for sugar and impurity concentrations. Exposure at 27°F, even for 6 nights, never damaged roots, but damaged the foliage. Exposure at 21°F damaged 10% (1 or 3 night's exposure) to 65% (6 nights) of the roots. At 14°F, one day's exposure damaged 50% of the beets. Incidence of damage did not decrease during the 'recovery period', even after 8 days. Freezing had little effect on beet weight after storage, but did decrease sugar %. Three or six nights freezing reduced sugar percentage and sugar yield. This effect was mild if the storage was cool (about 56°F) but became very serious if the storage temperature rose into the mid 60's. Between 25 and 35% of the sugar in the stored beet was lost after about 40 days if the beet were allowed to become hot (about 70°F) in the store. The damage was more serious if the freezing occurred in September or October than in November or December. Freeze-damaged beet can be stored without serious loss of yield or quality if they can be kept cool (< 56°F). However, deterioration of all beets is rapid if the storage temperature is allowed to rise to about 70°F. This work was funded by the National Crop Insurance Service.