PLANTING AND HARVEST STUDIES WITH THE NORLAND POTATO IN NORTH DAKOTA

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In the latitude of North Dakota, Northern Michigan, Maine and northward, the late potato crop requires the entire season to mature (5). The normal growing season of the potato is limited by low temperatures and late frosts in the spring and by early frosts or disease in the late summer (1,2,6). The time of planting depends chiefly upon the prevailing climatic conditions (5). In these northern states, the season is relatively short, and, in general, potatoes should be planted as soon as the soil can be fitted (8).

The potatoes in these northern states are normally harvested in September or October and are marketed throughout the winter months (10). These states are classified in the fall production area for Irish potatoes (10).

The potato plant thrives best in a cool, humid climate (3). The optimum temperature for maximum yields is near 64 F. and for vine growth 70 (4,11,16). The potato plant forms tubers only if the night temperatures fall within a rather narrow range of 50 to 57 with 54 the optimal night temperature (14,15). Tuber formation is possible at high temperatures only to a limited extent in short days, whereas at lower temperatures, tubers can be formed both in long and short days (14). This explains why the most successful potato-growing areas are mainly in the north (15). Tubers set only when the carbohydrate content of the tops exceeds a certain level (9). An increase in temperature above the optimum causes an increase in the rate of respiration without a corresponding increase in photosynthesis which results in a decrease in carbohydrate content and a retardation of tuber growth (9,17). Tuber growth is affected more by unfavorable temperature than is growth of the above-ground parts (5).

The most critical period in the production of the potato crop occurs when the tubers are developing. A protracted spell of heat and drought can materially reduce the yield. This critical period varies from location to location and can also vary with the time of planting (7,8).

With the development of the early maturing Norland potato variety in North Dakota, the usual planting and harvest dates might be changed to take advantage of better growing and marketing conditions. This study was initiated to determine the best planting and harvesting dates for good market quality for the Norland potato in the Red River Valley of North Dakota.

METHODS AND MATERIALS

A three year randomized split-plot experiment with 4 replications was conducted in 1958, 1959 and 1960 at the Red River Valley Potato Research

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Farm at Grand Forks, North Dakota. Main plots were dates of planting on May 1 and 15, June 1 and 15, and July 1. Sub-plots were harvest dates on August 4 and 15, September 1 and 15, and October 1. Each main plot consisted of 12 rows 38 inches apart with 30 plants per row 12 inches apart. Every other row was a sample row.

The seed potatoes were stored in commercial storage and removed to room temperature storage two weeks before planting. The fresh cut seed pieces were slightly sprouted at the early plantings and considerably more sprouted at the later plantings. The Bearden clay loam soil was fertilized with 400 pounds of 16-16-8 fertilizer per acre in side bands at planting time. Commercial cultural practices common to the area were used. Vines were not artificially killed, since early harvested potatoes are usually immature and Norland vines often die before the late harvest.

The potatoes were hand picked behind a one-row digger, mechanically sized to marketable size and small size, counted and weighed. Each tuber was examined for skin color, type and severity of visible disease, and for maturity. Specific gravity was taken when enough potatoes were available to use the hydrometer.

**RESULTS AND DISCUSSION**

The average marketable yields for Norland potatoes with five planting dates and five harvest dates over a 3-year period are given in Fig. 1. Although the May 1 planting, harvested October 1, gave the highest yield of 175 hundredweight of marketable-size potatoes, there was no significant difference between the yields of the May plantings when harvested in September or October. June plantings similarly were not significantly different in yields of marketable-size tubers when harvested after mid-September. All these yields were 135 hundred-weight or more of marketable-size potatoes.

For early harvest, the May plantings gave quite satisfactory yields of marketable-size tubers; however, since early harvest yields were considerably lower than those of later harvest, some factor such as a more favorable price would have to justify the August harvest.

May 1 planting was prevented one year by cold wet soil. The late October 1 harvest was not necessary in two years as the vines were killed by early September frost.

Fig. 2 shows that 175 hundred-weight of marketable-size tubers might be obtained from the May 1 planting harvested on October 1. However, if harvested on August 15, and August 4, only ¾ and ½ of the total production of potatoes would be of adequate size to market. For a late planting date such as July 1, harvested on October 1, only ½ of the total possible marketable yield would reach marketable-size.

Fig. 2 shows how much of a sacrifice the grower at Grand Forks, North Dakota, is making by planting Norland potatoes late and harvesting

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3The term “marketable-size” means size A, which, for round or intermediate shaped varieties, the diameter of each potato shall be not less than 1½ inches, and not less than 60% of the potatoes in the lot shall be 2½ inches or larger (12, 13).

4The term “small size” means potatoes ¾ inch in diameter and larger up to size A. The ½ inch size was adopted as the time when the tubers are set. It was assumed that since cells in a tuber are formed before it is ½ inch in diameter (17) the tuber is not set until all the cells are formed.