

Diseases Affecting the Market Quality of Irish Potatoes in  
Eastern North Carolina

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The Irish potato occurs naturally in the Andean countries of South America. The plant requires a cool growing season as found at the high elevations in these countries, the northern United States, southern Canada and other cool temperate regions around the world. In the potato's natural habitat the tubers enlarge during late summer when the day length is shortening and the temperature is declining. Under such conditions most of the carbohydrates are stored as starch in the potatoes giving high quality. The "skin" fully develops making the potato resistant to water loss, skinning, and many tuber rotting diseases.

The growing season in eastern North Carolina can be considered an "artificial" environment for growing the potato. Here the tubers approach maturity when the day length is greatest and the temperatures are approaching the maximum for the summer. Under warm growing conditions carbohydrates normally stored in the maturing tubers are used by the plant in respiration. This may partially account for the low starch content of potatoes from this section. In addition, most potatoes are harvested while immature and they are readily skinned and bruised by the harvesting process.

The weather shortly before and at harvest time largely determines the disease problems in transit. Cool, moist weather in May and June generally means good yields with late blight as a disease in the field and late blight tuber rot a problem in transit. Bacteria that cause soft rot frequently enter late blight wounds on the tubers and hasten the decay of blighted potatoes. If soil moisture is abundant the bacteria can initiate decay through lenticels

and bruises even though the temperatures are cool (in the 60's and 70's).

Cool, dry weather provides ideal harvesting conditions with a minimum of field and transit diseases. It is a rare year in eastern North Carolina that the harvest season remains cool. Generally, hot weather arrives about mid-June and the disease problems change. At temperatures greater than 70<sup>o</sup>F. the late blight spores rapidly perish. Dry, warm weather stops the development of the disease. Other diseases become important as the temperatures rise.

Southern bacterial wilt is a disease in regions having warm climates, and the bacteria persist in some soils of the southern states for many years. Southern bacterial wilt first develops about mid-May in eastern North Carolina, and in warm years will cause great damage by killing the plants and rotting the tubers. Bacterial soft rot frequently develops in potatoes partially rotted by the wilt bacteria.

Bacterial soft rot also becomes more serious during warm weather. This is primarily a disease of wounds but the bacteria may enter the lenticels in wet soils or during the washing process. The soft rot bacteria multiply very rapidly at temperatures between 80<sup>o</sup> to 100<sup>o</sup>F. and, at these temperatures, the starch in the tubers changes to sugar. Sugar also favors the development of the bacteria. As the temperature rises to about 109<sup>o</sup>F. a change occurs in the physiology of the cell membranes. The sugar diffuses from the cells and are more accessible to the bacteria introduced through wounds or lenticels. Potatoes heated to these high temperatures are very susceptible to soft rot for several hours after they cool to lower temperatures.

Freshly harvested potatoes will absorb much heat when exposed to solar radiation on a warm day in June. In one case the temperature just below the skin rose from 76<sup>o</sup> to 106.5<sup>o</sup>F. in 30 minutes, and to 115.0<sup>o</sup>F. in 65 minutes. Tissue at two-thirds of an inch below the surface rose to 87.5<sup>o</sup>F. in 30 minutes and 100.3<sup>o</sup>F. in 65 minutes. Experience and experimental evidence have shown

that potatoes exposed to direct sunlight for one hour become more susceptible to bacterial soft rot.

In recent years many of the potatoes grown in eastern North Carolina were transported to market by trucks. The delivery time to New York City via rail is 4 to 5 days and via truck 20 to 30 hours. The length of time potatoes are in transit will influence the amount of decay present on arrival. Test shipments of potatoes were made from North Carolina in 1949 and 1950. In both years the influence of washing, washing and drying and refrigeration were studied as factors related to transit rots. In 1949, the test shipments were made in 15 railroad cars; in 1950, 13 truck loads were shipped.

Bacterial soft rot was more prevalent in those potatoes shipped in railroad cars. There were 3 cars (900 sacks) in which the potatoes were washed and dried and shipped standard ventilation. Seven and one-half percent of the potatoes from the experimental bags had soft rot. Seven truck loads (1800 sacks) were washed and shipped standard ventilation and averaged 0.6 percent soft rot. When all shipments by either mode of transportation are compared, it was found that the 15 railroad cars of potatoes shipped during the month of June, 1949 averaged 2.7 percent soft rot; and the 13 truckloads shipped the last of June and early July 1950 averaged 0.5 percent soft rot. It must be emphasized that the weather conditions for the two harvest seasons was not the same, however, the smaller percentage of bacterial soft rot in the potatoes transported by truck is correlated with the shorter transit time.