



### INTRODUCTION

Potato growers from the southern U.S.A. and some parts of Europe consider seed potatoes grown in northern latitudes to produce more vigorous and higher yielding crops than seed from southern latitudes.

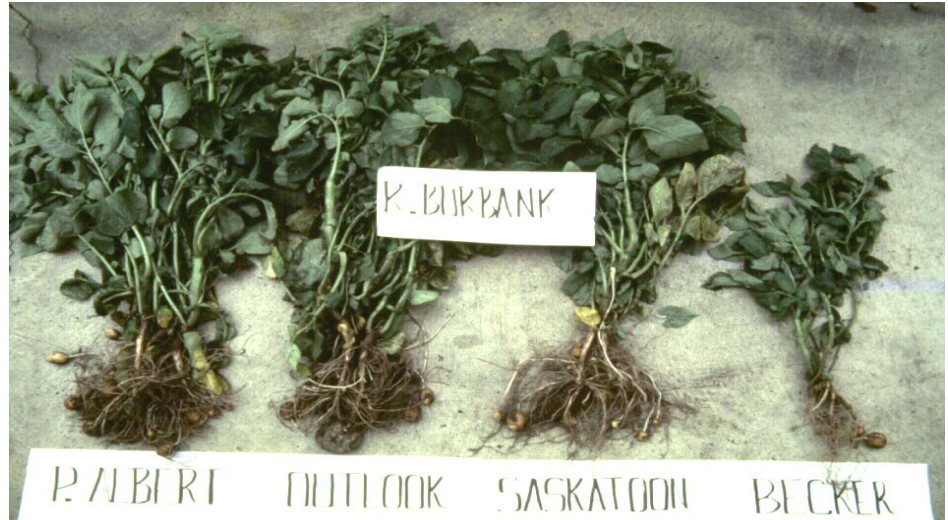
This superiority was presumed to be due to reduced levels of seed borne disease and /or some inherent physiological characteristics of the seed tuber itself. However, the exact reason(s) for this Northern Vigor™ is not known.

In 1986, a research project was started at the Department of Horticulture Science, University of Saskatchewan to determine the basis for the Northern Vigor™ phenomenon.

### YIELD EVALUATION

A preliminary study using certified seed of Norland and of Russet Burbank potatoes from Minnesota, Nebraska and Saskatchewan (Outlook and Prince Albert) were evaluated in field plots at Saskatoon.

Results indicated that the Norland seed from Saskatchewan out yielded the southern sources by an average of 19%. For Russet Burbank the increase was 55%. The certified seed used was considered to be free of major seed-borne diseases, therefore the superior performance of the northern seed tubers could have been caused by physiological differences in the seed.



Northern Vigor™ in potato. Plants grown from Saskatchewan-produced seed are more vigorous and are higher yielding than those grown using a southern seed source.

More detailed studies were conducted from 1987 to 1992. Genetically uniform seed-tubers, obtained by increasing a single original seed stock at various locations, were used. All seed was stored under the same conditions until planting.

Replicated field trials were carried out at several locations to compare crop growth and tuber yield of seed from the various Saskatchewan (LaRonge, Prince Albert, Saskatoon, and Outlook), and southern

(Colorado, Minnesota, and Wisconsin) sites. Yield tests were conducted in Saskatchewan, Minnesota, and Colorado.

The yield advantage obtained by using Northern seed was consistent for all sites in all seven years. The Saskatchewan grown Norland out yielded the southern seed sources by 5 - 27%. For Russet Burbank the yield advantages were as great as 133%.



Northern Seed



Southern Seed

Potato seed pieces 30 days after planting (with plants removed). Northern stock remains sound with little decay.

## PHYSIOLOGICAL BASIS FOR NORTHERN VIGOR™

Tests indicated that the yield differences were not caused by seed-borne disease. The superiority of seed-potatoes produced in northern latitudes appears to be due to some physiological change(s) in the seed-tuber.

Potato crops grown from northern seed produce more vigorous plants having delayed senescence (i.e. a longer period of active growth), and produce larger tubers with less variation between hills. This results in even crop development, higher yield, and superior grades.

The relative vigor and yield potential of the various sources was likely influenced by temperature during the seed production season. Locations with strong diurnal temperature differences (warm days and cool nights) produced more vigorous seed than sites with lower day to night temperature change.

An experiment using single-leaf cuttings showed that low yielding southern seed sources contained higher levels of a "tuberizing stimulus" than higher yielding northern seed lots. Higher levels of the tuberizing stimulus favored early tuber set and rapid tuber bulking at the expense of shoot growth. This reduces tuber yield at maturity, especially in the late maturing Russet Burbank variety.

Higher yielding seed lots originating from the northern sources had less moisture loss and decay than southern sources over the winter storage period. Northern seed was also found to be more tolerant of planting in cold soil conditions than was southern seed.

The vigor of the Saskatchewan potato seed carried over for at least one ad-



Canopy development of Russet Burbank grown from northern seed (top) compared to southern seed (bottom)



ditional year. Saskatchewan seed was planted in Minnesota in 1988. This crop was kept and planted in Minnesota in 1989. The vigor and yield potential of this seed stock was lower than that of seed directly from Saskatchewan, but it remained superior to the southern seed.

Conversely, it was also possible to increase the yield potential of Minnesota seed lots by growing them for a season in Saskatchewan. This brought the yield potential of seed originally from Minnesota to that of seed grown exclusively in Saskatchewan. Vigor of seed lots can be improved by growing them in a northern climate for one season.

Research findings and grower experience indicate that greatest benefits for using northern seed can be obtained in climates with long growing seasons and less than ideal environments. These conditions prevail in the Pacific North Western United States, and in Mexico, making them potential markets for western Canadian seed potatoes.

For more information, contact the CSIDC or the Dept. of Horticulture at the University of Saskatchewan.

Northern Vigor™ is a trademark of the Saskatchewan Seed Potato Growers Association.