

# Building Disease and Pest Resistance through Breeding

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Increased levels of resistance to pathogens and other pests are desirable components in the development and identification of improved potato cultivars whether it is for conventional or organic potato production. In some cases, inherent resistances offer a means to reduce the requirement for pesticides whereas in other instances, built-in resistance may be the only known or economic means of control. This is particularly relevant for potatoes and other vegetatively propagated crops where disease and pests may be harboured in the seed piece.

Potato breeding efforts at AAFC seek to increase the levels of resistance in cultivars which also combine good quality and acceptable agronomic traits. This has been primarily directed towards the requirements of conventional cropping systems but plant breeders do try to foresee future trends. Sustainable and organic production requirements are in that picture. There is already overlap in that both conventional and organic production systems require many of the same traits. A few selections may exist that were not quite suitable for conventional production but upon re-examination may meet sustainable or organic production criteria.

In North America and Europe, potato cultivars can be traced to relatively few introductions from South America which have been adapted and selected for performance in northern latitudes over the course of several hundred years. As a result, the genetic base of many commercial cultivars is rather narrow and the extent of variation is limited.

Yet variation is the cornerstone of a breeding and selection program. Parents are chosen for crossing according to the objectives of the program and by their particular attributes. Progeny from these crosses are assessed for many traits; those individuals with improved levels of the desired characteristics are distinguished from the chaff. High priority is given to disease and pest resistance.

The potato has many close cultivated and wild relatives that possess sources of resistance to many pathogens and pests. Breeders dip into this gene pool to broaden the base of genetic resistance and increase diversity, but utilizing these sources of resistance is not without its hurdles. This presentation will describe the incorporation of multiple resistances and the lengthy process of selection and evaluation required to identify improved potato cultivars suitable for producers and consumers.

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