

transgenic lines may be rated relative to that of the parental cultivar in disease-elimination trials only if this rating can be conducted prior to the development of disease in the susceptible parent or when disease in the susceptible parent can be controlled. For the purpose of rating vigor, it is convenient to use a visual rating scale of 1–5, with the parental cultivar automatically assigned a rating of 3.

It is important to remember that plant vigor, growth aberration, and disease resistance are important only as these characteristics are reflected in yield and agronomic quality of the crop. Therefore, early season consideration of these factors is important in field tests only to the extent that they may direct harvesting and further evaluation efforts to the best lines at the end of the season. In our experience with potatoes, we have always rated the yields of all lines at least visually at harvest, and we weigh the yields only of the best lines in first year tests. Lines with poor vigor have always produced poor yields, but lines with good vigor have not always produced high yields or tubers with appropriate size and conformation. Although growth aberration is usually associated with poor vigor, it does sometimes occur in vigorous lines, but such lines have usually produced low yield and off-type tubers.

3.2.4. Agronomic Properties of Selected Lines by Multiyear and Multilocation Tests

Agronomic performance is markedly affected by a multitude of environmental and management practices. Potatoes, for example, are affected by water and fertility, soil texture and microflora, daylength and temperature, and the requirements for one cultivar may differ from those of another. Thus, testing in different regions where the crop is produced is necessary to ensure that lines selected in one region retain both their resistance and agronomic performance when grown in other regions where epidemiological and environmental conditions may differ. Testing can proceed in different regions simultaneously to save time, but it may be more cost-effective to select lines, first in one region, and then test whether the resistance and agronomic characteristics are expressed in the variety of regions where the crop will be produced.

The agronomic characteristics of transgenic lines may differ somewhat from the parental line, and the characteristics of lines intended for commercialization should be defined in detail. The new lines should be described following the guidelines provided by the International Union for the Protection of New Varieties of Plants (UPOV) (6). UPOV provides for protection of breeders' rights, based on criteria that include distinctness, homogeneity, and stability of a variety, and has published guidelines for the conduct of tests to determine these criteria. These guidelines are adapted for the special requirements of each genus and species and provide information on the detailed information needed