The Canadian Seed Certification System:
Use of Biochemical and Molecular Techniques

Seed certification is the process of multiplying the small quantities of seed developed by plant breeders (Breeder seed) into large quantities of seed for commercial crop production (Certified seed). This quality control process ensures that the identity and purity of the variety are maintained throughout the multiplication cycles.

The Canadian Seed Growers' Association (CSGA) is responsible for **seed crop** certification. This includes establishing procedures for pedigreed seed crop production and setting crop varietal purity standards. The Canadian Food Inspection Agency (CFIA) is responsible for inspecting pedigreed seed crops, giving 'final certification' of **seed lots**, and establishing the use of official tags.

Varietal identity is preserved throughout the seed certification system process through diligent production planning, equipment sanitation, accurate record keeping and proper labelling of seed varietal identities.

Varietal identity verification testing is carried out by the CFIA on harvested seed of certified seed crops to monitor the seed certification process. This process involves growing both the certified seed and a sample of the seed submitted at the time of variety registration and comparing the morphological characteristics. This verifies that the variety is as stated and that no mislabeling of seed has occurred in the seed certification system. (Both a random and a risk-based targeted selection of specific certified seed lots are subject to this post-control audit testing to ensure ongoing effectiveness of the seed certification system.)

Q. How are Biochemical and Molecular Techniques (BMTs) used in seed varietal identity verification testing?

BMTs are not used as primary methods for official seed varietal identity verification testing. They may be used where determining a seed variety's identity is difficult to make using morphological characteristics alone.

Varietal purity is preserved through specific production requirements established by the CSGA (e.g., parent seed identity, minimum isolation distances, previous land use restrictions). In addition, standards for varietal impurities are established by the CSGA for seed crop certification (e.g., a maximum of 5 off-types or other varieties per 10,000 inspected plants in a wheat seed crop for Certified status). The maximum varietal impurity standards of the Association of Official Seed Certifying Agencies (AOSCA) are used for seed certification.

Verification of compliance with the varietal purity certification requirements for pedigreed seed crops is carried out by CFIA Inspectors or Licensed Seed Crop Inspectors who count and report visually distinguishable varietal impurities by observing plant morphological characteristics during crop inspections.

Prepared by the Seed Sector Value Chain Roundtable.

Q. How are BMTs used in the seed crop certification system?

BMTs are not used routinely in seed crop certification except in the following instances:

1. **Certification of hybrid canola**. Seed test results are required to verify compliance with minimum hybridity and maximum erucic acid standards. Canola hybridity test methods are approved by the CFIA; erucic acid tests involve CSGA-approved labs. Most canola hybridity and erucic acid tests are BMTs.
2. **Certification of midge tolerant wheat varietal blends**. A seed test result is required to verify the refuge variety is present at the appropriate level prescribed in the Additional Certification Requirements by the midge tolerant wheat variety developer. These variety-specific, refuge verification, molecular marker tests are BMTs.
3. **Confirmation of off-types identified during crop inspection**. BMTs are used to verify whether plants identified during crop inspections are off-types or other varieties where the determination is difficult to make using morphological characteristics alone.

Seed varietal purity is monitored by CFIA lab staff conducting post-control testing which monitors seed certification. In addition, seed analysts and seed graders can identify off-types by an examination of the morphological characteristics of the seed in some cases.

Q. How are BMTs used in the seed certification system?

BMTs may be used to verify varietal off-types where the determination is difficult to make using morphological characteristics alone.

Q. How are BMTs used in CFIA's oversight activities?

The CFIA provides **oversight of the seed certification system** in various ways, including monitoring seed in the marketplace for its varietal purity and varietal identity.

The CFIA monitors the varietal purity of seed in the marketplace using BMTs for detection and quantification of specific genetic modification events which express distinguishing characteristics in varieties of some crop kinds. The monitoring activities are designed to quantify and verify the intended presence (i.e., trait purity) or unintended presence of novel traits such as herbicide tolerance.

When necessary and appropriate, the CFIA also uses BMTs to address seed-related complaints from the public and international seed trade issues.