

Tools to identify heterogeneous cereals 1: constitution

Problems

Identification and traceability of genetically diverse populations is required for variety registration and seed certification. Whilst in (genetically homogeneous) varieties one individual plant can represent the whole plant grouping, making univocal identification possible, in (genetically heterogeneous) populations an individual plant cannot represent the population, and therefore a range of description and identification metrics is needed.

Solutions

A temporary experiment on the marketing of genetically diverse populations of wheat, barley, oats and maize was granted under the EU implementing decision 2014/150/EU. It assessed different tools' effectiveness at guaranteeing population identification and the identity of the seeds of a population. It was possible to conduct a SWOT analysis of the different tools used in different contexts. The first set of tools that were critiqued related to breeding goals, varieties used in the crossing, breeding schemes and production methods – or the constitution of registered populations (Table 1).

Table 1: Summary of the SWOT analysis conducted on tools relating to the constitution of populations

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Can give an overview of the intended purpose of the population • Can provide full and transparent information on the origin and genetic history of a population • Prevent breeders from registering varieties with off-types or variety mixtures as populations 	<ul style="list-style-type: none"> • A breeding goal may not translate into reality • Breeding goals may not provide sufficient detail on end-use, often they have been broad without a quantifiable/qualifiable target • Difficulty in checking pedigree information, especially for progenies of heterogeneous parents e.g. landraces
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • If set out as a tangible, quantifiable/qualifiable breeding goal, this can be verified in respective performance trials and also provide information on intended use • Useful information for end-users, that want to ensure the seed they use complies with their breeding and production standards • Can provide information about evolutionary processes (steps of natural selection) if it includes a description of selection environments and multiplication methods/conditions 	<ul style="list-style-type: none"> • May be misleading to end-users, if they assume that breeding goal is identical to the performance characteristics of the population • Useful populations can be generated from uncharacterised plant genetic resources so parental material should not be limited to registered varieties only • Breeders might not be willing to declare parental lines and crossing schemes

Practical recommendations

- It is good practice to outline the intended use of a population as a breeding goal.
- When a population's intended use is testable, it can help in identification and performance testing.
- Outlining the breeding history of a population is important to understand that it reaches the requirements of the regulation that it sits under.

Further information

1. [Text of the Commission Implementing Decision 2014/150/EU](#)
2. [Main outcomes and SWOT of experiences from marketing populations under the Temporary Experiment into the commercialisation of heterogeneous populations in the European Union](#)

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