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Specialized Section on Standardization of Seed Potatoes

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Item 7 of the provisional agenda

Revision of the position of the Specialized Section on vigour of seed potatoes

Vigour of seed potatoes - input by Potato Certification Service South Africa

Submitted by Potato Certification Service South Africa

Summary

At its 2023 session, the Specialized Section decided that more research would be required to update its position on vigour of seed potatoes. The following document was submitted by the representative of the Potato Certification Service South Africa as input to the revision.

The Specialized Section is invited to comment on the proposal from South Africa.



I. Seed potato quality

Seed quality refers to all attributes of seed potatoes, including genetic purity, physical condition (size, shape, wounds), health condition (pathogens and/or pests) and physiological age, including factors beyond a tuber's chronological age, such as growth history, storage conditions and treatments that influence tuber dormancy, sprouting and growth vigour. Seed health refers specifically to the severity and/or incidence of pests/pathogens in seed potatoes and includes the effects of seed degeneration.

II. Seed potato degeneration

Seed potato degeneration, the reduction in yield or quality caused by an accumulation of pathogens and pests in planting material due to successive cycles of vegetative propagation, has been a long-standing production challenge for potato growers around the world. In developed countries this problem has been overcome by general access to and frequent use of seed potatoes produced by specialized growers that has been certified to have pathogen and pest incidence below established thresholds, often referred to as certified seed (Thomas-Sharma and others, 2016).

The physiological status of the seed potato is affected by its chronological age and other modifying factors such as growth history, storage conditions and treatments that influence tuber dormancy, sprouting and growth vigour (Struik and Wiersema, 1999).

In vegetatively propagated crops, pathogens tend to accumulate if planting material is drawn from within a crop population over multiple generations, resulting in significant quality and yield losses. This problem, termed seed degeneration (where 'seed' refers to vegetative planting material), occurs commonly when certified, disease-free planting material is scarce and/or expensive, as is the case in many low-income countries (Gibson and Kreuze 2014; Thomas-Sharma and others, 2016) and for some specialty crops (Gergerich and others, 2015).

Seed potatoes start as disease-free micro-propagative material, which is then planted in pest-free growing medium in facilities under specified protective/controlled conditions. The tubers harvested from the micro-propagative material are certified as mini tubers, if it complies to varietal identity and purity requirements and if it is disease-free. Subsequent plantings are done in the field, which results in exposure to an uncontrolled environment with various levels of disease pressure and where varietal mixing or switching could occur. Every time the seed potatoes are planted in the field as the next generation, the seed potatoes could degenerate faster or slower, depending on the disease pressure. Early generation seed potatoes thus has less exposure to pests and disease than later generations, with stricter tolerances set for early generations.

III. Vigour of seed potatoes

Growth vigour is a combination of the number of times planted, genetic composition of the plant, nutrition, virus content, the presence of tuber borne diseases, as well as the physiological age of the seed potatoes. Although the generation of seed potatoes certified provides an indication of vigour that could be expected, it cannot be determined with the certification of a seed lot, as there are too many other factors that could influence the vigour after certification.

The only indirect reference to vigour in the UNECE Standard S-1 concerning the marketing and commercial quality control of seed potatoes is a tolerance for shrivelled tubers.

References

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 - Gibson, R. W. and J.F. Kreuze (2014). Degeneration in sweet potato due to viruses, virus-cleaned planting material and reversion: a review. *Plant Pathology*, vol 64, pp. 1-15.
 - Struik, P.C. and S.G. Wiersema (1999). *Seed Potato Technology* (1999). Wageningen University.
 - Thomas-Sharma, S. and others (2016). Seed degeneration in potato: the need for an integrated seed health strategy to mitigate the problem in developing countries. *Plant Pathology*, vol 65, pp. 3-16.
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