

Seed production, dormancy and commercialisation of *Solanum phureja*
in Ecuador

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Abstract

Andean countries are the original source of the potato. In Ecuador there is a traditional market for the fresh product, and an increasing demand for processed potato products. The processing industry uses about 10% of the total production, which is almost 100% local raw material from *Solanum andigena* and crosses mainly with *S. tuberosum* and *phureja*.

During the last decade, *S. phureja* cultivars have attracted international interest due to their special characteristics such as flavour, texture, shape and colour in comparison with *S. tuberosum* and *S. andigena*. However, there are problems with inconsistency in quality and quantity of raw material supplied to the processing industry, related mainly to seed quality, lack of tuber dormancy and weak supply chain relationships between suppliers and the industry. Competition from high quality, lower cost production in neighbouring countries poses a commercial threat.

The aim of this research was to generate new knowledge on seed production and dormancy of *S. phureja* and on marketing related cultivars to the processing industry in Ecuador. Studies covered factors affecting microtuber production, effects of cytokinin in controlling tuber dormancy and effects of tuber storage regimes on sprouting and field performance. On the socio-economic side, potato production, post-harvest and relationships between suppliers and the processing industry were examined.

In vitro plants of *S. phureja* cultivars began tuberisation later than *S. tuberosum* under inductive conditions. Microtuber initiation in *S. phureja* was accelerated in the dark or when supplemented with cytokinins. *S. phureja* cultivars have a lower yield than *S. tuberosum* but produce higher microtuber numbers. The main characteristics of the cultivars *in vitro* conditions also were presented in the field, e.g. tuber initiation, tuber number, haulm growth and yield.

Plant growth, tuber yield and post-harvest behaviour were monitored. Overall, Egg Yolk c.v. exhibited minimal dormancy and sprouted before harvest. Storage temperature and CO₂ experiments revealed several significant effects on sprouting. Twelve endogenous cytokinins (CK), were detected in immature tubers through the crop cycle, which were found in higher levels in *S. phureja* cultivars than in *S. tuberosum*. In addition, a novel CK was found from the iP group, which has very high levels in *S. phureja* cultivars, which may explain the lack of dormancy of this species.

Marketing research revealed favourable economic, environmental and infrastructure conditions for potato production in order to satisfy the requirements of the processing industry. Despite this, very little technology regarding varieties, crop management and post-harvest handling has been developed in Ecuador to assist farmers to supply the processing industry. Moreover, mistrust between suppliers and processors results in poor commercial relationships such that uncertainty is the main feature in term of quality, volumes and prices in the supply chain.

The biological and socio-economic findings of this research regarding the availability of technology, crop management, and quality product facing growers and processing industry are highlighted by a SWOT analysis. Finally, recommendations in both areas of biological and socio-economic analysis are made in order to improve the yield and quality of the raw material to meet the requirements to the processing industry.