A modernized methodology for obtaining new varieties of potato

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Research into the potato tuber at the Basque Institute for Agricultural Research and Development and at the NEIKER-Tecnalia Technology Centre has, in recent years, focused on the development of new varieties of potato adapted to Spanish agro-climatic conditions. The Basque technology centre has updated the traditional system for improving strains of the tuber by involving novel techniques that enable obtaining new varieties that are the most resistant, productive and apt for both fresh consumption and for industrial processing. In 2009 three new varieties have been inscribed in the Spanish Office for Plant Varieties, the Basque names of which are Leire, Mirari y Harana.

The genetic improvement programme for obtaining new varieties developed by NEIKER-Tecnalia are focused on the following characteristics:

- Morphological and physiological: a good appearance of the plant, with homogeneous tubers, thin skin, eyes at a surface level, high yield, stability in production, short cycle and good conservation.

- Resistance to pests and disease: resistance to one or more of the following pathogens: viruses (mainly PVY); nematodes (Globodera rostochiensis and G. pallida) and fungi (Phytophthora infestans, Rhizocotnia solani, Alternaria solani, Fusarium spp.).

- Culinary quality: for both fresh consumption and for industrial

processing: chips, frozen potatoes and purees, amongst others.

In recent years NEIKER-Tecnalia has incorporated various complementing methodologies into the traditional and predominant one - such as the enhancement of the diploid level, the cultivation of tissues applied to the maintenance and micropropagation of varieties, selection assisted by means of molecular markers and genotyping.

Classical improvement programmes are based on the creation of variability by means of directed crosses and the subsequent selection of the desired descendent genotypes and in successive clonal generations. The three initial and fundamental phases in the process are: selection of genitors, programme of crosses and the selection of seedlings in the first generation.

The selection of genitors is one of the key elements in the NEIKER-Tecnalia programme; it has a Germoplasm Bank with 500 commercial varieties, apart from enhancement clones and species of the Solanum genus that form part of parentals employed in the crossing programmes. This database may be consulted at: www.neiker.net/neiker/germoplasma.

Crosses are mainly undertaken in winter. In the female genitors the stalks with inflorescences are cut, the buds castrated and then pollination carried out, keeping the stems in jars with water, fungicide and antibiotic, in a greenhouse. If the pollination has been successful, berries are formed, each of which may contain up to 200 seeds.

Once the seeds are mature, their extraction and conservation are carried out. The descendency of each crossing is sowed separately in seed beds. Families from parentals immune to the Y virus (PVY) are inoculated artificially, eliminating seedlings with symptoms. The rest is transplanted to pots in order to obtain the first year clones. During the gathering a more intense selection is carried out, taking into consideration the

appearance of the tuber: homogeneity, depth of the eyes, colour of the peel and the flesh.

In this way, the sowing of the selected clones is undertaken successively, following a procedure that enables an estimate of production. Based on advanced, third-year clones, the analyses of consumption quality - both fresh and industrial - are incorporated.

Third generation clones are sent to a Spanish trials network, which distributes them to different zones throughout the country with the objective of being sown and consumed. Moreover, advanced clones are also sent to countries such as Holland, Germany and Argentina.

Based on the overall data on quality, resistance and production, the best clones are selected to be sent to the Registry of Commercial Varieties at the Spanish office for Plant Varieties. After two years of trials, the National Assessment Commission decides the inclusion or otherwise in the list of new varieties.

As can be observed, the period for obtaining official registration of a variety oscillates between six and seven years. Nevertheless, it should be taken into account that it is an ongoing process, in which each year clones at all stages of selection coexist in a parallel manner.

Characterisation and evaluation of native varieties

Recently initiated has been the characterisation of varieties of the potato native to Latin America and belonging to the Solanum genus. To date, these valuable tubers have not been efficiently exploited due to the geographical isolation of their zones of origin. This is why NEIKER-Tecnalia, in collaboration with other institutions in Latin America, is undertaking a project to evaluate a series of native varieties with the goal of determining their nutritional characteristics and their quality and

resistance features.

In this way, varieties have been found with high content of dry material and resistant to fungi. The final goal is their incorporation as parentals in the NEIKER-Tecnalia programme for obtaining new varieties.

Source: Elhuyar Fundazioa

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