Genetic improvement of potato plants

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Abstract

Genetic improvement in potato can be carried out through several approaches, as sexual crosses, somatic hybridization, mutation and genetic engineering. Although the approach is different, but the goal is the same, to get a superior cultivar. Mutation and genetic engineering are very interesting methods for genetic improvement of potato plants. Mutation by gamma-ray irradiation have been performed to get some new potato cultivars which are more resistant to disease and have higher productivity. We have carried out a mutation of some potato cultivars and obtained some excellent clones to be potentially released as new superior cultivars. By the mutation method, we have released one potato cultivar for the French fries industry, and we registered one cultivar of potato for chips, and two cultivar for vegetable potatoes. Actually we are doing multi-location trial for three clones to be released as new cultivars. Through genetic engineering, several genes have been introduced into the potato plant, and we obtained several clones of transgenic potato plants. Transgenic potato plants containing *FBPase* gene encoding for fructose bisphosphatase, have a higher rate of photosynthesis and higher tuber productivity than non-transgenic plants. This result suggests that FBPase plays an important role in increasing the rate of photosynthesis and potato tuber productivity. Some transgenic potatoes containing the *Hd3a* gene are currently being evaluated for their productivity. Over expression of the Hd3a gene is expected to increase tuber productivity and induce flowering in potatoes. Transgenic potato plants containing *MmPMA* gene encoding for plasma membrane ATPse are more tolerant to low pH than non-transgenic plants, indicating that plasma membrane ATPase plays an important role in the potato plant tolerance to low pH stress. Transgenic potato plants containing *c-lysozyme* genes, are highly tolerant of bacterial wilt diseases caused by *Ralstonia solanacearum* and bacterial soft rot disease caused by *Pectobacterium carotovorum*. Expression of *c-lyzozyme* gene plays an important role in increasing the resistance of potato plants to bacterial diseases.

Keywords: potato, mutation, genetic engineering, plasma membrane ATPase, Fructose bisphosphatase, Hd3a, lysozyme, low pH tolerance, tuber production, resistant to pathogenic bacteria.

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