

TRANSGENIC POTATO PLANTS WITH ALTERED TUBERIZATION PATTERNS

by

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Genetically engineered potatoes with improved quality could help potato growers to maintain a competitive edge at the national and international markets. Washington potato growers produce the highest yield per acre in the world. There are 13 traditional potato breeding programs in the U.S. Yet, almost 40% of total production in the U.S. is made up of one cultivar, Russet Burbank, which was derived from a selection made by Luther Burbank in 1871. Potato has not been a major beneficiary of traditional plant breeding techniques. However, recent advances in molecular biology/genetic engineering have made it possible to alter the expression of existing genes to improve yield and quality. These advances should open up some exciting possibilities for crop improvement.

In our earlier studies we demonstrated that calcium and calmodulin play an important role in the tuberization process. To further understand the role of calmodulin, we cloned a calmodulin gene from Russet Burbank potato and demonstrated that the expression of this gene is intimately linked to tuber development. One unique feature of the calmodulin gene is that it codes for a protein which is multifunctional and regulatory in nature. As a result, altered expression of this gene is expected to induce changes in growth behavior. We have produced a set of transgenic plants carrying the calmodulin gene in sense and antisense orientation. This was done to alter the expression of the calmodulin gene in Russet Burbank plants. Distinct differences in growth behavior was observed in some of the transgenic lines. Of special interest is the variation in the tuberization pattern and also tuber characteristics, including size and shape of tubers. These transgenic plants may have potential benefits to the potato industry.

Washington State University has recently filed a patent application for these transgenic plants. Since the calmodulin gene was originally cloned from potato, we do not foresee problems in obtaining governmental approval for possible commercialization of transgenic plants that exhibit desirable growth characteristics. Field trials will be conducted to evaluate the commercial benefits as well as the potential use of these plants in future breeding programs.

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