Gene leads to longer shelf life for tomatoes, possibly other fruits

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The tomato with increased spermidine (top) stays fresh longer than those that do not have an increased level of the natural organic compound. Credit: Purdue University photo/Avtar Handa

A Purdue University researcher has found a sort of fountain of youth for tomatoes that extends their shelf life by about a week.

Avtar Handa, a professor of horticulture, found that adding a yeast gene increases production of a compound that slows aging and delays

microbial decay in tomatoes. Handa said the results, published in the early online version of The *Plant Journal*, likely would transfer to most fruits.

"We can inhibit the aging of plants and extend the shelf life of fruits by an additional week for tomatoes," Handa said. "This is basic fundamental knowledge that can be applied to other fruits."

The organic compound spermidine is a polyamine and is found in all living cells. Polyamines' functions aren't yet fully understood. Handa and Autar Mattoo, a research plant physiologist with the U.S. Department of Agriculture's Agricultural Research Service and collaborator in the research, had shown earlier that polyamines such as spermidine and spermine enhance nutritional and processing quality of tomato fruits.

"At least a few hundred genes are influenced by polyamines, maybe more," Mattoo said. "We see that spermidine is important in reducing aging. It will be interesting to discover what other roles it can have."

Savithri Nambeesan, who was a graduate student in Handa's laboratory, introduced the yeast spermidine synthase gene, which led to increased production of spermidine in the tomatoes. Fully ripe tomatoes from those plants lasted about eight days longer before showing signs of shriveling compared with non-transgenic plants. Decay and rot symptoms associated with fungi were delayed by about three days.

"It increased the quality of the fruit," Handa said. "If a tomato goes to market, people won't buy it if it has started to shrivel. If we can stop that wrinkling, we can extend the market time of the fruit."

Mattoo said the finding could have implications for areas that don't often get fresh fruit.

"Shelf life is a major problem for any produce in the world, especially in countries such as in Southeast Asia and Africa that cannot afford controlled-environment storage," Mattoo said.

Handa said tomato growers and possibly other fruit growers could use the finding soon if they wanted through either transgenic plants or natural breeding methods.

"We can add this gene to the tomatoes or look at natural variation and select the cultivars that already have a high level of this gene's expression," Handa said.

Handa and Mattoo will continue to study polyamines to discover how they control biological functions in fruits.

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