

Spinach genes beef up citrus trees' resistance to greening

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Citrus + Vegetable Magazine Staff

Spinach, that same green leafy vegetable used by Popeye to pump up, also may help citrus trees resist greening disease, or huanglongbing.

Erik Mirkov, a Texas AgriLife Research plant pathologist in Weslaco, has transferred two genes from spinach into citrus, apparently imparting greening resistance, according to a news release.

After passing greenhouse trials, the transgenic trees will soon be planted in Florida for field testing.

The research is funded by Southern Gardens Citrus of Clewiston, Fla.

Mirkov's work, which originally sought resistance for citrus canker, took a turn when citrus greening began ravaging Florida's citrus industry.

He knew that spinach proteins provided broad-spectrum resistance to several bacteria and fungi.

"We injected canker into the leaves of transgenic plants with one spinach gene and found that the bacterial lesions didn't spread," he said in the release. "But we also showed that transgenic plants infected in the rootstock with citrus greening disease flourished and produced lots of leaves, while the non-transgenic trees produced just one leaf."

Those trees were moved to the field in 2009. After 25 months of growth, some of the transgenic trees showed no infection whereas 70 percent of the non-transgenic control trees did.

Mirkov developed subsequent generations by adding a second spinach gene and improving how and where the genes expressed themselves.

During the research, he found that the genes are synergistic and work better as a pair than each one did individually.

Mirkov's work involves Rio Red and Ruby Red grapefruits, Hamlin and Marris sweet oranges, Rhode Red Valencia oranges and the Flying Dragon, C22 and Carrizo rootstocks.



Courtesy Texas AgriLife Research

Texas AgriLife researcher Erik Mirkov inspects a citrus tree that contains two spinach genes to ward off citrus greening.

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