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Ten-Year Comparison of the Influence of Organic and Conventional Crop Management Practices on the Content of Flavonoids in Tomatoes

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Abstract:

Understanding how environment, crop management, and other factors, particularly soil fertility, influence the composition and quality of food crops is necessary for the production of high-quality nutritious foods. The flavonoid aglycones quercetin and kaempferol were measured in dried tomato samples (*Lycopersicon esculentum* L. cv. Halley 3155) that had been archived over the period from 1994 to 2004 from the Long-Term Research on Agricultural Systems project (LTRAS) at the University of California-Davis, which began in 1993. Conventional and organic processing tomato production systems are part of the set of systems compared at LTRAS. Comparisons of analyses of archived samples from conventional and organic production systems demonstrated statistically higher levels ($P < 0.05$) of quercetin and kaempferol aglycones in organic tomatoes. Ten-year mean levels of quercetin and kaempferol in organic tomatoes [115.5 and 63.3 mg g⁻¹ of dry matter (DM)] were 79 and 97% higher than those in conventional tomatoes (64.6 and 32.06 mg g⁻¹ of DM), respectively. The levels of flavonoids increased over time in samples from organic treatments, whereas the levels of flavonoids did not vary significantly in conventional treatments. This increase corresponds not only with increasing amounts of soil organic matter accumulating in organic plots but also with reduced manure application rates once soils in the organic systems had reached equilibrium levels of organic matter. Well-quantified changes in tomato nutrients over years in organic farming systems have not been reported previously.

Keywords: Tomato; organic agriculture; conventional agriculture; long-term research; flavonoid; flavonol; quercetin; kaempferol

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