# Introduction to Ohio's Organic Vegetable Crops Transition Experiment

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For even experienced vegetable farmers, a transition from conventional to organic production presents numerous challenges, including the mastery of new methods for crop nutrient, weed and disease management. For example, successful fertility management demands that soil-based phenomena dictating nutrient availability (especially nitrogen) be synchronized with crop demand. So, farmers often ask if leguminous rotation crops *and* soil amendments, particularly during transition, are needed to optimize profit potential. Likewise, cultivation is a primary weed management tactic for organic farmers. Yet, the relative effects of removing weed seedlings for different portions of the cropping season are inadequately documented, as are the effects of crop nutrient and weed management tactics on plant disease. Indeed, studies involving tests of strategies in single areas of organic vegetable management (fertility, weed, disease) -- particularly in arid and semi-arid climates -- outnumber multidisciplinary studies. Therefore, we set out to document the individual and combined effects of major fertility and weed management strategies on cabbage and processing tomato crop, weed, disease and soil variables under transitional-organic conditions in Ohio.

A 5600-$m^2$ experimental area at the Ohio Agricultural Research and Development Center (OARDC) in Wooster, Ohio, USA containing a Wooster silt loam soil (average pH 5.8) and cropped to Berseem clover (*Trifolium alexandrinum* L.) and orchard grass (*Dactylis glomerata*) from 1997-2000 was used. In 2001, the experimental area was divided into four, 1400-$m^2$ sections and a processing tomato-cabbage-wheat-oat/clover field rotation was established, with all crops planted in all years (2001-2003), one crop per section. Within the cabbage and tomato sections, a factorial set of soil amendment (none, raw dairy manure, composted dairy manure), and weed management (no seed threshold, critical period) treatments was arranged in a modified split plot with amendment as the main plot (112 $m^2$) and weed management as the subplot (56 $m^2$) and four replications per treatment. Soil amendments were applied at a rate based on anticipated crop N requirements (101 kg N $ha^{-1}$) and seasonal N availability from amendments. Estimates for plant-available N in manure assumed that 70% of the total N was organic, 30% was mineral, and that 30% of the organic and 100% of the mineral N would be available in the cropping year. Estimates for plant-available N in compost assumed that 20% of the total N in the material would be available in the cropping year. In the critical period weed treatment plots, crops were kept weed-free for the first 6 weeks of growth while weed seed production was disrupted throughout the season in the no seed threshold plots. Plant growth, yield, and quality characteristics were recorded during vegetative stages and at crop maturity. Foliar disease severity (% disease) on tomato was evaluated using a modified Horsfall-Barratt rating scale throughout each growing season. Disease ratings were converted to midpoints (% disease) and the Area Under the Disease Progress Curve (AUDPC) was calculated.