

Mark Your Calendar

5th Annual High Plains Vegetable Conference

January 25, 2007 (8:30am - 4:30pm)

Canyon, Texas

Contact: Dr. Russ Wallace

806/746-6101

East Fruit and Vegetable Conference

February 20, 2007

Tyler Rose Graden Center

Tyler, Texas

Contact: Bryan Triplett

903/535-0885

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Soil Amendments in Transition to Organic Vegetable Production with Comparison to Conventional Methods: Yields and Economics

By V.M. Russo and Merritt Taylor
HortScience 41(7) 2006

In the United States, there is a growing interest in the consumption and production of organically produced food and fiber. In the southern plains of the United States, there is also a growing interest in converting land to crops that are not traditional to the region as a result of changes in demographics and economic realities. One such use for portions of the southern plains is vegetable production.

In all types of agriculture, there are products and procedures that can be easily transposed between regions and those that cannot. The traditional use of land for row crops, or cow-calf operations, may be taken out of those types of production to be used for vegetables. In the later case, the transition would be from perennial pasture to other types of agriculture. An Oklahoma study showed, when land was converted from perennial pasture to vegetable production, using conventional methods, it was determined that it would take about 3 years for bell peppers to produce at levels that would provide an economic return. In that study, it appeared that soil A-horizon depth, pH, and NPK concentrations interacted to affect yields on soil converted from grass pasture. It is likely that as the conversion takes place, there are changes occurring in the soil structure, chemistry, and biota that could affect production of vegetables. These changes may be mediated by the type of conversion that takes place and by the inputs used.

An underlying philosophy of organic production is to improve the soil condition over the long term. The methods used to do this conform to general principles but are also amendable to conditions found at individual locations. A common thread in organic production is the amendment of soil with materials from organic sources. If these are not available on-farm, they must be transported to the site and can be, in part, responsible for additional cost in the production of organic vegetables. The concept of use of materials from organic sources may be more easily adaptable to a situation in which animals are involved on-site in the recycling of vegetable matter to the soil. Animal manure can be used in the raw form, with restrictions, or as aged compost. The latter has been successfully used for vegetable production.

Most early work on evaluation of alternatives to conventional agriculture has been on crops other than vegetables. Research has begun to report replicated trials on effects of organic concepts, including soil amendments, on protection of crops from disease and on quality of vegetables. Humic substances are a type of organic amendment. These materials, generally found at high

levels in soils relatively high in organic matter, can improve plant development and have been credited with hormone-like effects.

Many producers who have used conventional production methods for vegetables, and who want to convert to organic production, will have to pass through a 3-year transition period before their land can be qualified for organic certification. This transition can produce unique challenges. Use of several amendments has received interest for inclusion in organic production. How these affect vegetable production during the transition period was examined. Land was taken from perennial pasture and converted to production of the vegetables: bell pepper (*Capsicum annuum* L.), cv. Jupiter; processing cucumber (*Cucumis sativus* L.), cv. Earli Pik; and sweet corn (*Zea mays* L.), cv. Incredible (se endosperm genotype) using organic materials and methods with comparison made to production using conventional methods. Conventional and transition to organic portions of the field were separated by 25 m with the buffer zone planted with the same sweet corn cultivar used in the experimental plots and minimally maintained by addition of organic fertilizer. To the organic portion of the field, three levels of humates (0, 112, and 224 kg·ha⁻¹) and three levels of corn gluten meal (0, 448, and 896 kg·ha⁻¹) were applied in nine combinations. Yields for all crops were determined for all years. In the first year, bell pepper yields for plants under conventional production were higher than for the plants in the transition plots. In the remaining 2 years, bell pepper yields were similar under the two production systems. In the first 2 years, cucumber yields for plants under conventional production were higher than for the plants under transition to organic production. In the last year, cucumber yields were similar under the two production systems. In all years, sweet corn yields for plants under conventional production were higher than for plants under transition to organic production. Humates and corn gluten meal did not benefit yields of crops. An economic analysis comparing yields, prices, and costs of production of the crops under conventional and the transition to organic indicated that conventional practices generally provided more net revenue than did transition to organic production. Net revenue for the three species under the transition to organic for the 3 years was \$2749 for three hectares. Net revenue for the three crops under conventional production for 3 years was \$61,821, a difference of \$59,072. Costs, yield, and prices will have to be considered when decisions are made concerning the adoption of organic practices.

Look Before You Leap: Gauge a new variety's market appeal before trying it on a small scale

By Vicky Boyd, Editor
The Grower / Dec. 2006

When seed companies come out with new sweet corn hybrids, Todd Michael first examines the quality of the ear. If it's no better than his current selections, he typically looks no further.

"It has to meet all of the criteria your market wants," says Michael, who grows vegetables and potatoes near Urbana, Ohio. "In sweet corn, it has to have long dark green husks, short butts, ears filled out clear to the end, high sugar and soft pericarp."

"Then we look to see if it has the agronomics, like is it rust resistant, does it stand up in a storm, does it have a strong root base? We also look at yield and yield potential. Optimum yield may require different cultural practices than current varieties."

Bob Giampaoli has an equally focused approach to evaluate new fresh-market tomato varieties. If a variety doesn't have the proper size ratios, the Le Grand, CA, grower typically won't try it.

"We look for a 40-40-20 mix of extra large, large and medium for our clientele," he says, "We look for the right size as well as quality-it must grade No. 1 or No. 2."

The variety also has to mature uniformly, Giampaoli says, "because we don't want to handle the tomatoes any more than we have to."

If a variety is picked mature green and only 75 percent of the fruit turns red after ethylene treatment, the packer must devote additional labor and expenses to sort out the 25 percent pink fruit.

Although the two growers have different selection criteria, they both have determined the most important characteristics and use them as benchmarks for comparing new releases.

Their systematic approach should save them time and effort, says Mike Orzolek, a Penn State University vegetable crops professor in University Park, PA.

"Many times growers haven't decided what's important, so they just want to try a lot of new varieties," he says.

Michael and Giampaoli also weigh market acceptance, which is one of the most important factors to consider, Orzolek says, citing a hypothetical pepper grower.

The grower typically planted a variety that yielded 60-count fruit – 60 peppers fill a 1 1/9 bushel box.

Although a new variety had other improved attributes, it yielded only 90-count fruit.

"Because of the smaller fruit size, can he maintain the current market he has?" Orzolek asks. "That's very important to consider."

Do your homework

Before you try a new variety, Orzolek recommends attending Extension variety trial field days or studying variety evaluation results.

Seed company trials also are good information sources because they typically compare their materials side by side with the competitors', he says.

Both Michael and Giampaoli are Extension field trial cooperators, and they can see firsthand how varieties perform under their growing conditions. As cooperators, they also gain experience with varieties that have not yet been released.

"We've probably had as many as 10 varieties that come out of the universities that look really promising and are available in some kind of quantity where you can at least plant several hundred pounds." Michael says of his involvement in potato variety trials. "These are done on our soil type, and it maybe gives us one to two years of comfort with that variety before they release it."

Try it, you'll like it

Once you've selected a new variety to try, Orzolek recommends devoting no more than 10 percent to 15 percent of your acreage to it.

Michael says he has his own testing protocol based on the amount of information available.

"If we haven't seen it before but we are impressed by a single trial, we will do a small sample," he says. "If we had a small sample the year before and it looked really good, we may do a bigger sample. If the data are from several sources, like universities in the region and they all look good, maybe we'll increase the acreage a little quicker."

Record variety performance

As you conduct variety trials, Orzolek recommends keeping records of fertilizer applications, irrigation, pesticide applications, weed competitiveness and tissue sampling results, if they were conducted.

At the end of the season, the records allow you to compare how the newcomer performed to your standard.

Michael says it may take several seasons of testing a new sweet corn hybrid before he determines whether it is an improvement over his current selections.

He plants sweet corn weekly or semi-weekly over a three-to-four-month period to ensure he has a steady supply for the market. Some varieties perform better early in the season, some better late in the season and some better mid-season.

Finding the right planting schedule for a new variety is part of the challenge, Michael says.

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Look Before You Leap Continued

Weather also can play a role in how a variety performs. One variety may do well during hot, dry conditions, but may falter during cooler, more humid weather.

That's why Michael says he evaluates varieties over several years to account for weather variability.

Check for updates on our web
site:
<http://aggie-horticulture.tamu.edu>

A Field Study of the Microbiological Quality of Fresh Produce

Lynette M. Johnston, Lee-Ann Jaykus, Deborah Moll, Martha C. Martinez, Juan Anciso, Brenda Mora, and Christine L. Moe

Journal of Food Protection 68(9) 2005

The fresh fruit and vegetable industry has rapidly evolved during the past two decades. In the United States, increased awareness of the health benefits of eating fresh produce has contributed to a \$36.2 billion increase in retail and food-service sales from 1987 to 1997. Furthermore, retailers' demand for year-round fresh produce has helped sustain the growing international trade market, ensuring consistent supplies to consumers during the off-season. Despite the nutritional and economic benefits of fresh produce, issues of public health concern have arisen. Although fruits and vegetables were associated with 0.5 to 4.2% of foodborne disease outbreaks from 1988 to 1997, the Centers for Disease Control and Prevention reported that the proportion of foodborne disease outbreaks associated with fruits and vegetables doubled from 1973 to 1987 and again from 1988 to 1991. During this period, several changes occurred, including the discovery of newly identified pathogens, improvement of diagnostic methods, and the advancement of foodborne disease surveillance systems.

A broad variety of fresh produce items, including cantaloupe, herbs, and leafy greens, has been linked to various pathogens. Most well-characterized outbreaks have been caused by bacteria, namely *Salmonella*, *Escherichia coli* O157:H7, *Shigella*, and *Listeria monocytogenes*; a few outbreaks have also been linked to viruses such as hepatitis A virus and noroviruses, and parasites such as *Giardia lamblia*.

Many factors can contribute to microbial contamination throughout production and packaging of fresh produce. These include contaminated irrigation or process water, the use of biosolids or manure for fertilization, poor worker hygiene, and poor equipment sanitation. To improve the safety of produce, the U.S. federal agencies responsible for food safety (i.e., U.S. Food and Drug Administration and the U.S. Department of Agriculture) published voluntary guidelines in 1998 entitled *Guide to Minimize Microbial Food Safety Hazard for Fresh Fruits and Vegetables*. The guide's primary purpose was to provide a framework for the identification and implementation of practices likely to decrease the risk for pathogenic microbiological contamination of produce, based on good

agricultural practices and good manufacturing practices. Although the guide provides general knowledge about potential pathways by which produce can become contaminated, systematic studies are lacking to identify critical points through the production-to-consumption continuum where contamination may occur.

To address these data needs, we sought to identify and further understand routes for potential microbial contamination of produce throughout production and packaging. The objectives of this study were three-fold: (i) to monitor the microbiological quality of fresh produce from the field through the packing process by specifically enumerating various microbiological populations; (ii) to evaluate the prevalence of *L. monocytogenes*, *E. coli* O157:H7, and *Salmonella* on fresh produce; and (iii) to identify differences in microbiological quality between various produce items during production and packaging. The data reported here are part of a larger study to determine specific farm and on-site packaging practices that may be associated with microbial contamination of produce.

MATERIALS AND METHODS

Sample collection. The sampling site, located in the southern United States, comprised 13 farm locations and five packing sheds. Samples were collected from November 2000 through May 2002. Target commodities included produce items that are mostly eaten raw, except for collards and mustard greens. Samples were taken sequentially, following the same crop from harvest throughout the packing shed. Samples designated as "field" included midseason crops, harvest samples, and samples collected at point of entry to the packing shed. Samples designated as "wash tank" and "rinse" were taken immediately after the wash and rinse step, respectively, at the packing shed. Samples labeled "box" were collected from boxes just before distribution. Cantaloupe samples were also taken directly off of the conveyor belt between the rinse step and box for distribution.

Two sets of composite samples (400 to 600 g each) of each produce commodity, except cantaloupe, were obtained from each location with hands protected by

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A Field Study Continued

sterile, disposable gloves. Three cantaloupes were sampled from each location in the same manner. Samples were placed in sterile Whirl-Pak bags (Nasco, Fort Atkinson, WI). One of these composite sets was used for enumerative analyses and was numerically and alphabetically coded by the collection technicians to ensure anonymity. At the request of our scientific advisory committee, the other composite sample (intended for pathogen assay) was unmarked and therefore could not be traced after testing. All samples were immediately shipped on ice to our location at North Carolina State University by overnight courier. Microbial analyses were initiated within 24 h after sample collection.

A total of 398 produce samples (leafy greens, herbs, and cantaloupe) were collected through production and the packing shed and assayed by enumerative tests for total aerobic bacteria, total coliforms, total *Enterococcus*, and *Escherichia coli*. These samples also were analyzed for *Salmonella*, *Listeria monocytogenes*, and *E. coli* O157:H7. Microbiological methods were based on methods

recommended by the U.S. Food and Drug Administration. For all leafy greens and herbs, geometric mean indicator levels ranged from 4.5 to 6.2 log CFU/g (aerobic plate count); less than 1 to 4.3 log CFU/g (coliforms and *Enterococcus*); and less than 1 to 1.5 log CFU/g (*E. coli*). In many cases, indicator levels remained relatively constant throughout the packing shed, particularly for mustard greens. However, for cilantro and parsley, total coliform levels increased during the packing process. For cantaloupe, microbial levels significantly increased from field through packing, with ranges from 6.4 to 7.0 log CFU/g (aerobic plate count); 2.1 to 4.3 log CFU/g (coliforms); 3.5 to 5.2 log CFU/g (*Enterococcus*); and less than 1 to 2.5 log CFU/g (*E. coli*). The prevalence of pathogens for all samples was 0, 0, and 0.7% (3 of 398) for *L. monocytogenes*, *E. coli* O157:H7, and *Salmonella*, respectively. This study demonstrates that each step from production to consumption may affect the microbial load of produce and reinforces government recommendations for ensuring a high-quality product.

Effects of Mulch Types and Concentrations of 1,3-Dichloropropene plus Chloropicrin on Fumigant Retention and Nutsedge Control

Bielinski M. Santos, James P. Gilreath, Timothy N. Motis, Marcel von Hulten, and Myriam N. Siham
HorTechnology Oct.-Dec. 16(4) 2006

SUMMARY. Field trials were conducted to: 1) determine the effect of mulch types and applied concentrations of 1,3-dichloropropene + chloropicrin (1,3-D + Pic) on fumigant retention; and 2) examine the influence of mulch films and 1,3-D + Pic concentrations on purple nutsedge (*Cyperus rotundus*) control. 1,3-D + Pic concentrations were 0, 600, 1000, and 1400 ppm, and mulch types were white on black high-density polyethylene mulch (HDPE), white on black virtually impermeable film (VIF-WB), silver on white metalized mulch, and green VIF (VIF-G). Regardless of the initial 1,3-D + Pic concentrations and mulch types, fumigant retention exponentially decreased over time. When 1400 ppm of 1,3-D + Pic were injected into the soil, 1,3-D + Pic dissipation reached 200 ppm at 3.2, 2.9, 2.2, and 1.5 days after treatment (DAT) under VIF-G, VIF-WB, metalized, and HDPE mulches, respectively. At 5 weeks after treatment

(WAT), HDPE mulch had the highest purple nutsedge densities < 5 plants/ft², regardless of the applied fumigant concentration, while VIF-WB and metalized mulch reached this weed density with 696 ppm of the fumigant. In contrast, 1186 ppm of 1,3-D + Pic were needed to reach this weed density with HDPE mulch. Correlation analysis showed that mulch fumigant retention readings at 3 DAT effectively predict purple nutsedge densities at 5 WAT ($r = -0.94$). These findings proved that 1,3-D + Pic activity on purple nutsedge can be improved with the use of more retentive films, which cause longer fumigant retention, thus improving efficacy. Growers might elect reducing 1,3-D + Pic rates to compensate for the relatively higher costs of fumigant-retentive mulches, without losing herbicidal activity.

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