Compost As An Alternative To Methyl Bromide

With phase out of the chemical only a few years ahead, North Carolina researchers and farmers look to compost-based growing methods.

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Compost used in the study was produced on the John Vollmer strawberry farm, where three-year trial plots were each four beds wide and 40 feet long.

A n important component in making strawberry and vegetable growing profitable on small to mid-size farms in the Southeast has been the use of methyl bromide dependent plasticulture. Fumigation with methyl bromide is used to control soil borne pathogens, weeds and nematodes. It is currently used on 48,000 acres of vegetables and 3,000 acres of strawberries in the Southeast. This represents 85 percent of strawberries, 85 percent of tomatoes, 75 percent of cantaloupe, 50 percent of watermelon and 25 percent of peppers grown in this region.

However, farmers are facing a forced phase out of the use of this method of pest control. Methyl bromide has been designated as a Class I ozone depletor, making it subject to the phase out protocols according to the U.S. Clean Air Act and the Montreal Protocol. A 50 percent reduction was required by this year, followed by a 70 percent reduction by 2005 and a total phase out by 2005. Even before a total ban occurs, an expected result of the phase out plan is that the price of methyl bromide used for soil applications will increase dramatically, therefore growers are being advised to find an alternative by 2003.

Ranking fourth in the nation in strawberry production, North Carolina has approximately 1,300 acres of strawberries using methyl bromide as a soil fumigant. Because the majority of growers use annual plasticulture production to produce strawberries, researchers in the plant pathology and horticulture departments at N.C. State University have been conducting field experiments since 1997 to explore alternative products or farming systems to minimize the impact expected from the loss of methyl bromide as a soil fumigant. Researchers are using a participatory model that includes on-farm research and stakeholder input from growers, agricultural companies, nursery suppliers, field agents, consultants and specialists. Two-to-three year strawberry trials are being conducted at four sites across the state, and vegetable trials are underway at multiple farm sites and at three research stations in North Carolina. In addition to several chemical alternatives being studied, compost is under consideration and researchers are finding favorable results.

Compost-Based Farming System

One three-year experiment evaluated the potential of a compost-based farming system as compared to methyl bromide and Telone C35-based systems for commercial strawberry production. Telone C35 (TC-35) is the chemical alternative to methyl bromide preferred by North Carolina growers, and although it is an effective fungicide and nematicide, it is a poor herbi-
The summer green manure crop was produced on the farm, except for the first year when compost was purchased from a Virginia straw grower. John Vollmer, the farmer who participated in the study, produced the compost by layering feedstocks in 300-foot long windrows: 30 percent dairy cattle manure, 30 percent waste hay, 30 percent waste silage, 5 percent finished compost and 5 percent clay soil. The materials were watered to 55-60 percent moisture and turned with a Sandberger sidearm compost turner. If pile moisture fell below 55 percent, water was added. The windrow was turned if moisture levels exceeded 60 percent or carbon dioxide levels surpassed 12 percent. During the first four weeks, pile temperatures quickly achieved (and remained at) 65° to 70°. Then the windrows began to cool and were allowed to cure for four to six weeks before using the compost. New compost was produced before each planting season.

Prior to applying compost to the test plot, a legume-grass cover crop mix of soybeans and millet that was grown on the site during the off-season was flail mowed. The cover crop residues and compost were tilled to a depth of one foot with a rotary spader. The compost was applied to the field at rates of 30 cubic yards per acre the first year, and 20 cubic yards per acre the second and third years of the study. The plots were tilled in the third or fourth week of September, and two weeks later, beds were raised and covered in plastic. The fumigated plots were injected with 220 pounds per acre of methyl bromide or TC-35. The planting date in the third year had to be postponed due to the delayed application of fumigant products and the required interval for dissipation. A delay would not be necessary for compost application.

"Converting to these (compost cover crop) production systems are much more information and management intensive rather than input intensive. Whole farming systems need to be adjusted and there are many more considerations about what cover crops to use, how to make and apply the compost, and when to plant," says Louws. "This project was successful because of the level of interaction that occurred between a motivated grower, a dedicated graduate student, Michelle Grabowski, and an interdisciplinary approach, particularly with Dr. Gina Fernandez in the Department of Horticulture. The participatory model provided a learning environment for all participants and we have been able to take that experience and extend it to a wider audience."

The summer green manure crop was a combination of a legume and grass (typically soybean and pearl millet).