



FROM THE GROUND UP

Compost News for Landscape and Agricultural Professionals

Sponsored by the City of San Jose • Spring 2004

Research on effects of compost and cover crops

Soil health, weed pressure, profitability will be tracked

A University of California Specialty Crop Program Grant will fund research on use of yard trimmings compost and cover crops for organic vegetable production. Eric Brennan, Research Horticulturist with the USDA Organic Research Program, Salinas, is lead scientist on the project. The research will draw on the skills of collaborators to provide information on weed control, soil health and water-holding capacity, and crop production system profitability.

The two-acre USDA research plot is certified organic, so all inputs used will be approved for organic production and vegetables produced can be sold as organic. Z-Best Organic Compost, which is approved for use in organic crop production by the Organic Materials Research Institute, will be used. The compost, which is produced in Gilroy, is made from yard trimmings collected in San Jose.

There are eight different treatments, designed to reflect actual Salinas Valley organic farming practices, including:

1. Mustard cover crop at a low (1x) seeding rate with compost.
2. Mustard cover crop at a high (3x) seeding rate with compost.
3. Legume/Merced rye cover crop at a low (1x) seeding rate with compost.
4. Legume/Merced rye cover crop at a high (3x) seeding rate with compost.
5. Merced rye cover crop at a low (1x) seeding rate with compost.
6. Merced rye cover crop at a high (3x) seeding rate with compost.



USDA research plots, Salinas. Eight different treatments will explore the effects of yard trimmings compost and cover crops on organic vegetable production. Photo courtesy Eric Brennan.

7. No cover crop with compost.
8. No cover crop without compost.

The treatments without cover crop will allow for isolating the effect of the compost on the research parameters. Since incorporation and decomposition of cover crops can delay planting of early spring vegetable crops, most Salinas Valley organic farmers keep a few fields free of cover crop for early planting each year. Treatments without cover crop will be flame weeded during the winter months. Higher cover crop seeding rates generally result in greater weed suppression. Plots are 40 by 64 feet to allow for four replications of each

Compost and cover crop research

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treatment. “Working with plots this size requires some planning to avoid mixed results,” says Brennan. “Instead of a disk we will use a soil spader to avoid mixing soil from different plots. Compost will be applied with standard spreading equipment, and the plots without compost will be covered with a tarp during application.”

The research is funded for 2.5 years, and Brennan is hopeful additional funds can be found to extend the research period. He will work with a group of local organic farmers called the Organic Farmer Research Advisory Group to ensure the project will be useful to farmers. All compost treatments will receive five tons of compost when the cover crop is incorporated (February or March) and five more tons after harvest of the first spring vegetable crop. At least two crops will be grown on the plots each year. Fertility inputs will be the same for all eight treatments, and will include drip irrigation-applied soybean and fish-waste products typical for Salinas Valley organic crop production.

Howard Ferris, Professor for the Department of Nematology, UC Davis, will track beneficial nematodes in the plots. “The abundance and diversity of beneficial nematodes can be bio-indicators of soil health because they correlate well with nitrogen cycling and decomposition, critical processes for organic production,” says Brennan.

Michael Kahn, Irrigation and Water Quality Farm Advisor for Monterey County, will track changes in water storage capacity for the plots. Steve Fennimore, Weed Science Specialist, U.C. Davis, will assist with tracking changes in the weed seed bank in the eight treatments. Fennimore’s previous research has pointed to a link between use of organic amendments and weed control. (See article at right.) Richard Smith, Vegetable Crop and Weed Science Farm Advisor, Monterey County, will help with vegetable production aspects of the project. Laura Tourte, Agricultural Economist Farm Management System Advisor, Santa Cruz County, will track the profitability of the eight treatments, weighing the cost of weed management and other inputs against the revenue produced by crop yields.

Research links weed control to use of organic amendments

Research in the Salinas Valley has established a link between the use of organic amendments and weed control. The two-year on-farm study compared the use of cover crops and compost in reduced tillage and conventional (deep) tillage plots. The objective of the research was to monitor the effect of soil organic amendments and tillage variations on weed survival and soil microbial biomass in an intensively managed vegetable field. The research was completed by Steven Fennimore, University of California-Davis Department of Vegetable Crops and Weed Science.

Organic amendment plots received compost applications twice per year and were planted with cover crops between crops of lettuce and broccoli. Due to management schedules, weeds actually had the potential to set seed for a longer period of time in the organic amendment plots. However, they had lower levels of weed emergence than the no amendment plots. Specifically, the plots that received amendments had lower densities of burning nettle and shepherd’s-purse.

According to Fennimore, soil microbes, which tend to proliferate in amended soils, could have degraded the weeds seeds or attacked the seedlings in the amended plots. He points out that while the research results suggest that increased organic matter and microbial biomass may have the potential to affect weed densities, further research must be done to understand the interactions between weed levels and organic amendments in intensive vegetable production.

Currently, Fennimore is looking at the impact of carbon to nitrogen ratios on microbial biomass and weed seed degradation. “There are a number of researchers in the U.S. looking at the impacts of the soil environment on weed seeds in the soil,” he says. “The potential for modifying the soil microbial community with crop residue management or organic amendments in order to control weeds is an exciting new area of research.”

For more information, call Karin Grobe at (831) 427-3452 and request a copy of “Organic Amendment and Tillage Effects on Vegetable Field Weed Emergence and Seedbanks,” Steven A. Fennimore and Louise Jackson.

Compost and Mulch Product Suppliers

BFI Organics, (408) 945-2844

Zanker Road Resource Management, (408) 263-2384

Z-Best Composting Facility, (408) 846-1574

City of San Jose Organics Diversion Programs

Michele Young, (408) 277-3780, Michele.Young@ci.sj.ca.us

From the Ground Up Newsletter

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From the Ground Up is funded and administered by the City of San Jose Environmental Services Department. The purpose of From the Ground Up is to disseminate information on production and use of compost, compost tea and mulch to landscape, agricultural and horticultural professionals. Information submissions and inquiries should be directed to Karin Grobe, Newsletter Editor, (831) 427-3452, kgrobe@pacbell.net, or to Michele Young, City of San Jose Environmental Services, michele.young@ci.sj.ca.us. Reproduction of From the Ground Up Newsletter permitted without fee or permission. Please acknowledge From the Ground Up and send a copy to Michele Young, City of San Jose Environmental Services, 777 N. First St., #300, San Jose, CA 95112. Printed on recycled paper.

Green landscaper program makes business sense

Arlie Middlebrook has found that getting certified as a Green Business is helping her to attract new customers. Middlebrook Gardens is a design and build firm specializing in sustainable landscaping and use of California native plants.

Marvin Laurence, one of Middlebrook's newest customers, noticed her Green Business listing at the Green Festival in San Francisco. "I like to support Green Businesses whenever I can," says Laurence. "It helps to promote a more sustainable society."

"Many people make decisions based on their commitment to the environment and they want their home landscape to reflect that commitment. The Green Business Program is one more way for me to connect with potential clients."

The Bay Area Green Business Program is a collaboration of environmental agencies, professional associations, local governments, utilities and community members. The Program's goal is to recognize and assist businesses in implementing sound environmental practices that conserve resources and reduce pollution and waste.

Certified Green Businesses receive free business promotion designed to increase recognition with potential clients and in the community. Green Businesses are promoted through newspaper and journal articles, ads in newspapers, yellow pages and consumer guides. A Green Business Directory and web page provide consumers with comprehensive lists of certified business and links to connect with goods and services.

Deva Luna, Earthcare, is a recent applicant to the Green Business Program. She runs a full service landscape design, installment and maintenance company with an ecological focus. "The program is very much in alignment with the market we want to reach," she says. Luna anticipates that one result will be a network of ecologically-oriented businesses that help each other with customer referrals.

Luna says the application process was fairly easy. "There was some paperwork and an office interview, then they toured the yard to see some of the materials we use," she says. She enjoyed taking the Green Business certifiers to a job site. "They were very enthusiastic about our use of broken concrete," she says.



Middlebrook Gardens residential installation uses native grasses and drought tolerant landscaping.

Michele Young, City of San Jose, finds that in addition to business promotion, the Green Business Program attracts applicants who want to become more efficient and reduce costs. "The Programs's Resource Conservation Checklist and expert advice can help businesses to apply best management practices and save money on utilities and landfill fees," she says.

Developing positive, proactive relationships with local compliance inspectors is an added benefit of the program. "Business owners have told me it helped them to develop good rapport with the inspectors and regulators they see in the regular course of doing business" says Young.

For certification, Green Landscapers complete a Resource Conservation and Pollution Prevention Checklist detailing methods they currently use or will use to reduce waste and pollution and conserve water and energy. Many applicants find they are already using many of the green practices because they make good business sense. Businesses get credit for any practices they are already doing and can request an exemption if a measure is not applicable or feasible for their operation.

Best of all, there is no fee to be certified and no hidden costs. Complete information on the Green Business Landscaper Certification Program is available on-line at www.greenbiz.abag.ca.gov. In Santa Clara County, call (408) 441-1195.

Alternative feedstocks for commercial mushroom production

The economic potential of compost and vermicompost in commercial production of mushrooms will be investigated at two Santa Clara County mushroom farms. UCCE, in partnership with collaborators, has been awarded a three-year grant from the California Department of Food and Agriculture's Buy California through the University of California Specialty Crop Research Program.

Experiments at Royal Oaks Mushrooms, Morgan Hill, will evaluate vermicompost as a substitute for peat moss in the casing step in the production of white button mushrooms (*Agaricus bisporus*).

Vermicompost is produced at the mushroom farm, using mushroom stump waste and shredded paper as worm food. Surface-dwelling earthworms (*Eisenia foetida*) were established in three windrows in a small barn in May 2003. Approximately 3/4 cubic yard of compost was harvested in September 2003. The City of San Jose provided an automated, self-contained modular vermicomposting unit, BioSystem 500® (BioSystem Solutions) which will augment vermicompost production at Royal Oaks Mushrooms in 2004.

The vermicompost was screened and tested as a substitute for peat moss which is typically used in the casing step of production. To promote mushroom formation, casing material is added as a surface layer. The transition from the vegetative to the reproductive stage of *A. bisporus* takes place in the casing layer.

A standard mushroom growing bed was top-dressed with a two-inch layer of pasteurized vermicompost as casing nine days after spawning (following industry practice). The experimental bed was located in a production room, together with control beds that received the standard peat moss casing. All beds were maintained under the standard watering and environmental conditions.

Experiments at Countryside Mushroom Farm, Gilroy, will evaluate oyster mushroom (*Pleurotus ostreatus* and *P.*

pulmonarius) production in alternative substrates, including (a) 2:1 mixture of composted wood-overs and fine yard trimmings compost; (b) 2:1 mixture of composted wood-overs and



Vermicomposting windrow at Royal Oaks Mushrooms, Morgan Hill. Photo courtesy Mickey Neff.

vermicompost; (c) 100% composted wood-overs; (d) 100% fine yard trimming compost. Z-Best Compost Facility, Gilroy, provided the composted wood-overs and fine yard trimmings compost. Vermicompost was produced at Royal Oaks Farm (as previously described).

Experimental data will include total yield, number of breaks or flushes, yield per flush, size and weight of mushrooms, color, grade and biological efficiency.

UCCE-Santa Clara County is lead on the project. Principal Investigator is Maria de la Fuente, UCCE-Santa Clara County. Collaborators include Royal Oaks Mushrooms, Countryside Mushrooms, Browning-Ferris Industries (BFI) Organics Division, Z-Best/Zanker Road Landfill, California Integrated Waste Management Board (CIWMB), City of San Jose Environmental Services Department, and County of Santa Clara Integrated Waste Management Program.

Preliminary research results included in the project's December 2003 report indicated that there is great potential for vermicompost as a substitute for peat moss as casing material in the production of white button mushrooms. Farm managers were impressed with the similar physical characteristics of peat moss and vermicompost. More information is available at <http://vric.ucdavis.edu/scrp/sum-dela Fuente.html> or by contacting Rosa Maria Gordillo, rgordillo@ucdavis.edu.

Oyster mushroom experimental unit. Photo courtesy Rosa Maria Gordillo.

