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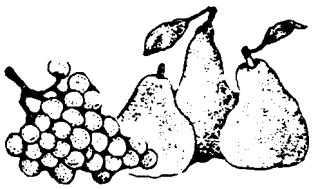

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ORGANIC WEED AND NITROGEN MANAGEMENT FOR TREE FRUITS

by Chuck Ingels

Organically grown tree fruits generally sell for a substantially higher price than conventional produce. Whether the price premium actually results in greater profitability depends on yields, fruit size, and fruit quality, as well as the cost-effectiveness of the growing practices. Organic production often requires more labor, bulkier fertilizers and amendments, and increased monitoring than conventional.

Far fewer insecticides and fungicides are available in organic pear production, so during high-pressure years (such as for diseases in wet springs), insect pests and diseases can reduce marketable yields. In most years, however, growers find that in-row weed control and providing sufficient nitrogen are the greatest challenges, and the two are linked. Surveys conducted in Washington have shown that the top three production issues in organic tree fruit production were crop load management, weed control, and soil fertility.

Organic Fertilizers

Organic fertilizers tend to have fairly low nitrogen (N) content. The most cost-effective fertilizer is often poultry manure, which generally includes wood shavings and rice hulls. It averages about 3% N, and also has phosphorus, potassium, calcium, and magnesium. Feather meal is sometimes used in Pacific Northwest orchards. It has up to 13% N, but is still much more expensive than poultry manure and it has no other nutrients. Compost is an excellent soil amendment, but the N in it is largely unavailable during the first year. To maintain organic certification, uncomposted manures may not be applied within 90 days of harvest.

A portion of the N contained in manure and compost will volatilize into the atmosphere (up to 30%) if not disked into the soil. With most orchards in this area being no-till, applied manure will lose N to the air, although less is lost if it is irrigated fairly quickly. Manure and compost also release plant-available N at different rates, which is largely based on the C:N ratio – the lower the ratio, the faster the release. With poultry manure, the majority of the N will be available to plants in the first year; poultry also has the highest volatilization potential. The "decay series" of manures was studied by UC researchers in the 1970s, and the proportion of N availability over a 3-year period (years 1, 2, and 3) was shown to be:

- Chicken (.90, .10, .05)
- Dairy (.75, .15, .10)
- Feedlot (.35, .15, .10)

These values may vary widely for any given manure based on many factors. Composts generally fall well below feedlot manure in N availability in year 1.

Cover crops often provide the most cost-effective way to add N. A vetch cover crop, often used with peas and/or bell beans, can supply up to 150 lbs. N/planted acre. But this mix is usually used in disked orchards. The reseeding annual subterranean clover, with or without other annual clovers or medics, can provide similar amounts of N, but N loss through volatilization can result from leaving the clippings on the soil surface. Perennial clovers have been shown to add large amounts of N also, but they are invasive and they compete with trees for water. All clovers also attract gophers.

Organic In-Row Weed Management

The greatest concentration of tree roots is under the canopy in the tree row, so weeds in the tree row compete with trees for nutrients and water. This competition is especially problematic for young trees, but yields and fruit size of mature trees can also be reduced by in-row weeds, especially warm-season grasses.

Organic weed management practices include mowers and cultivators that move around trunks and sprinklers, organic herbicides, flame or steam weeders, geese or sheep, and organic and synthetic mulches. In-row mowers are generally cost effective, but weeds still grow and compete with trees for nutrients and water. In-row cultivation can effectively control weeds, although tree roots near the surface can be damaged. Some implements are hydraulically driven with a vertical axis cultivating head, whereas others are ground-driven, rolling cultivators that can be used at speeds up to 8 mph. Growers have found that some implements tend to break down fairly frequently. In a 2002 Yakima Valley orchard study, cultivation-based weed control was more than four times the cost of a typical herbicide program of two applications per season.

Available **organic herbicides**, mostly based on clove or cinnamon oil, or acetic and citric acids, are effective mainly on very young weeds so they must be applied often, and they have limited efficacy on perennial weeds. Flame weeders are fairly effective on young weeds, but they often require multiple passes for some species, and they use substantial amounts of fuel. Sheep or geese can be very effective; they require fencing and they must be removed 90 days before fruit harvest.

Mulches, either organic or landscape fabric, provide a practical – but expensive – method of preventing or greatly reducing weed growth in tree rows and improving the nutrient and moisture status of trees. **Wood chips** add organic matter and nutrients but they are less effective against perennial weeds. A 2004-2006 Washington study showed that the total cost for applying a 5-foot wide, 6-inch thick layer of wood chips was $924/acre. In this study, wood chip mulch provided the best weed control in all 3 years, although it needed re-application in year 3. This treatment also produced the greatest tree growth and fruit size.

In a related trial, a Gala apple block was used to compare a 4-inch wood chip mulch in the tree row with a herbicide strip. In the first year, mulched plots consistently had 15 to 20% higher soil moisture at the end of each irrigation cycle than the bare ground plots. In the second year, the 2 treatments were watered independently according to need, and mulching reduced cumulative irrigation application by 20 to 30%.

Synthetic fabric allows water penetration but it excludes light to act as an effective barrier to weed growth. A 3 to 4 ft. width of fabric is placed on either side of the row and they overlap and are pinned where they join, although weeds sometimes grow between the overlapped fabric. The outside edges are buried or pinned. Weed seeds may germinate on top of woven fabric and roots may grow through and establish in the soil, so some growers pull back the fabric each year and apply fertilizer or compost before re-pinning the fabric. Mulches, especially fabric, can also lead to the buildup of voles (meadow mice).

In a 5-year study begun in a newly-planted cherry orchard in Hood River, Oregon, researchers reported over 30% greater tree growth and fruit yield where 6-foot wide, in-row synthetic fabric was used compared to herbicide strip alone. Cumulative cash costs for the first 4 years before fruit production were $2,123/acre higher with ground cover relative to no cover; however, these costs were offset quickly by the increased returns from enhanced fruit yield and size.

References

Weed management in organic pear orchards, http://www.ipm.ucdavis.edu/PMG/r603700511.html

Organic weed management in walnut orchards, http://www.sarep.ucdavis.edu/bifs/organicweedmanagement.pdf

Organic Orchard Floor Management – Papers and presentations from the WSU Tree Fruit Research & Extension Center, http://www.tfrec.wsu.edu/. Click on Organic and Integrated, then on Orchard Floor Management.

OSU's Organic Fertilizer Calculator

by Chuck Ingels

Oregon State University Extension Service has developed an Excel spreadsheet-based calculator that can be downloaded free of charge. The calculator helps growers easily compare the cost, nutrient value, and nutrient availability of organic fertilizers, chicken manure, and compost to plan a cost-effective fertilizer program for your farm. A separate worksheet is available for home gardeners and small farmers.

The first worksheet displays the nutrient content of 26 different fertilizer products and one compost product. It allows you to make changes to the nutrient content if the analysis of your product differs from theirs, and it gives the percent Plant Available Nitrogen (PAN) at 28 days and for a "full season" (actually only 125 days).

The second worksheet allows you to select a rate of material to apply, then it links to the first worksheet to calculate the pounds per acre of each nutrient that are applied, including total nitrogen and PAN at 28 days and at the end of the season.

In the third worksheet, which is linked to the first two worksheets, you enter the cost per pound of the product(s) and it tells you the total cost per acre, as well as the cost per pound of nutrient, including PAN.

Examples described on the User Guide include:

1. Comparison of bone meal and rock phosphate as sources of phosphate for tomatoes,
2. Calculating how much of the N from alfalfa meal (2.5% N) and soy meal (6.5% N) will be available to your crops, and
3. Determining different products to use to supply specific amounts of N, P, and K, and how much the whole program will cost.

Since nitrogen mineralization can vary greatly depending on many factors, including moisture, soil texture, and tillage vs. nontillage, it is not possible to determine PAN accurately for every situation. But the calculator, which is based on extensive research in tilled crops, gives probably the best estimate available.

The calculator can be downloaded from this Web site: http://smallfarms.oregonstate.edu. Click on Organic Fertilizer Calculator.

Grow Local and Buy Local for Sacramento County

by Jenny Broome, Charlotte Mitchell, and Bill Myers

The Sacramento County Farm Bureau, with the leadership of the County Board of Supervisors, received County Economic Development funding for a new project called "Grow and Buy Local".

The goal of the project is to address barriers faced by local farmers to sell what they grow through local supermarkets, restaurants, and direct markets in Sacramento County. The larger goal is to redesign the food system so that fresh, wholesome products produced locally are consumed locally, thereby providing healthy fresh food, reducing transportation expenses and related carbon emissions, preserving agriculture in the county, and spending more dollars locally.

This project provides the first steps toward solving an irony that attends the extension of urban growth into the rural areas of southern Sacramento County: Local farms near urban areas struggle to make a decent living as the market for food both expands and comes nearer to them. There is a mismatch between what local farmers produce and what the nearby urban people consume, as well as a lack of easy access by farmers to urban markets and of urban consumers to local products. The result is that consumers who don't eat as well as they could by having

access to farm-fresh seasonal foods produced nearby, farmers who do not earn as much as they could by selling superior produce to nearby consumers willing to pay for it, and local economies that lose employment and revenues that could flow from invigorated local business flows between the urban and rural sectors. All would gain from establishing farm-consumer links that expand between local urban dwellers and nearby farmers.

The gains to be made by bringing farmers and consumers together have long been recognized in California through the provision of certified farmers' markets. More recently, various parts of the U.S. have seen sharply expanded interest by both consumers' and farmers' organizations in still other innovations for joining local food consumption to local food production. That interest has now become a movement. "Eat local" is now a familiar maxim regularly heard and acted on as close to Sacramento as the Bay Area and Yolo County.

This project enables local governments and concerned grass roots organizations in Sacramento County together with local agricultural producers to explore the potential of this new movement. The effort could not only raise the income of farmers and the quality of food for urban consumers, but it could also provide one important means for encouraging the preservation of agricultural lands and rural life. This is especially important for the southern Sacramento County area, where agricultural land and rural communities are under particular pressure from rapid urbanization.

Specific objectives of the project:

Review of California and National Best Practices for 'Locally Grown' programs and related marketing strategies to inform and potentially include in the Sacramento County program.

Research into Market Opportunities. Survey farmers, consumers, providers (wholesalers, distributors etc.), food service operators for institutional buyers (high tech industry campuses, hospitals, schools, etc.), and markets (retail supermarkets) to identify consumer/buyer preferences. This information will then be cross-referenced to current products grown, competitive pricing environments, barriers to local markets and new opportunities for commercial and specialty producers. Farm operation size and degree of product diversity will be considered in the analysis, recognizing that Sacramento County agriculture includes commodity-focused growers as well as smaller, more diversified operations.

Develop Marketing, Education and Public Outreach Campaign. Develop specific strategies to brand and promote locally grown products and the benefits (fresh, healthy foods, land preservation, new farming and marketing opportunities) associated with eating locally produced foods and supporting a sustainable agricultural industry in Sacramento County. Develop educational materials and workshops, and engage Sacramento County youth through UCCE Sacramento County 4H clubs and Master Gardeners involved in school gardens, as well as Future Farmers of America, in support of growing and eating locally.

Implementation Plan for Outreach Campaign. Establish resource infrastructure including centralized Internet-based information, reports, and action plan with specific strategies for a successful Grow and Buy Local initiative.

The project will be managed by the Sacramento County Farm Bureau with input from an advisory committee made up of representatives of local growers, consumers, marketing outlets, rural community organizations, city governments, environmental organizations, University of California Davis, and Sacramento County's UC Cooperative Extension, Economic Development Department, and Agricultural Commissioner's office.

While it is only just getting started, already as of October the project has completed a preliminary review of national programs, gotten some good press coverage, been highlighted at the State Fair at the Sacramento County booth, and produced a map with strawberry farm stands and farmers markets indicated throughout the county.

To learn more about the project and to get involved please contact Charlotte Mitchell, at 916-685-6958 or visit www.sacfarmbureau.org and link to the Grow and Buy Local web page.

Sacramento County Farmers' Markets and Urban Farm Stands on the Web

by Chuck Ingels

A useful map of all certified farmers' markets and "urban farm stands" has been created by Jennifer Sowerwine, a UC Berkeley post-doc with whom we have been working on marketing and production efforts for Southeast Asian strawberry and vegetable growers. This map locates all Sacramento County certified farmers' markets using green bubbles, and urban farm stands are in blue. Bubbles with black dots are year-round markets. Fruits and vegetables sold at certified farmers' markets are grown by the sellers themselves. Urban farm stands may also sell locally grown produce, purchased and resold from local growers in Sacramento, Placer, Yolo and El Dorado counties. You can find the link on our Web site (http://cesacramento.ucdavis.edu); click on Agriculture and Horticulture and the link is on the left.

Wild Turkey Study

by Chuck Ingels

The wild turkey was first released into California by ranchers on Santa Cruz Island in 1877. The California Department of Fish and Game (CDFG) released wild turkeys starting in 1908 with the intent of establishing a new species for hunting, and the releases continued until 1999, with most occurring from 1959 to 1999. Wild turkeys are currently established in much of the lower elevation oak woodlands throughout the state.

The wild turkey population has recently increased noticeably in many regions. The latest CDFG research estimated there were 242,000 wild turkeys, up from an estimated 100,000 a decade ago. Surveys show a marked upward trend in turkey numbers starting around 1980 and continuing through the present.

The growing wild turkey population and expanding range have resulted in conflict with human interests. Complaints include turkeys causing a nuisance in residential areas, damaging gardens and landscaping, and fouling yards and walkways. Complaints of agricultural damage have also increased, particularly from wine grape growers. Primarily in response to these complaints, the state legislature adopted changes in 2004 to the Fish and Game Code that provided for the issuance of depredation permits to landowners. The permit would allow the killing of wild turkeys damaging crops or other property.

UC researchers Mike Delwiche and Terry Salmon are attempting to assess actual damage caused by wild turkeys in vineyards and to develop effective aversion strategies that could be used in vineyards and other agricultural areas. Working in Yolo, Solano counties, they have collected 13 turkey calls and related sounds that could be useful in hazing turkeys. Calls were randomly selected and played to wild turkeys and their response was recorded.

Videotaped UC Grapevine Leafroll Class Online

Integrated Viticulture Online (http://groups.ucanr.org/iv/) is a very useful UC Web site that provides information and resources on grape production practices. A new page on this Web site features videotaped seminars and events. It has all the variety focus seminars, Syrah Decline Day, RAVE 2006, and the long-awaited leafroll seminar video links. To go directly to the Leafroll Seminar, visit http://ucanr.org/leafrollseminar.

Special Edition of California Agriculture on Sustainable Viticulture, October – November 2008

California's wine and wine grape industries are known for economic resilience amid fierce global competition, with the wine sector now contributing nearly $52 billion year to the state economy. This sector is now becoming well known for its adoption of sustainable practices over the past 15 years, more so than any other commodity. Several factors may account for this, including the fact that wine grape growers and vintners are often passionate about their craft, as well as the fact that wine grapes are frequently cultivated in areas characterized by high population growth, high land values, and charged environmental politics. Growers have developed sustainable practices through their historically strong local organizations, while providing educational outreach to environmentally conscious neighbors. They have differentiated their product through creative matching of grape varieties with unique regional environmental conditions, and added economic value to wines by geographic branding. They have also been able to draw on the fruits of many years of UC research and extension.

The next California Agriculture looks at the present and future of California's sustainable viticulture, presenting the most recent information on pest and disease management, management of natural resources such as soil and water, and cultural practices including cover crops and water use.

See http://californiaagriculture.ucop.edu/

Upcoming Meetings

1. Local Food Systems Symposium. Tues.-Wed., Dec. 2-3, 2008. The conference will begin with an inspirational address by Paul Muller of Full Belly Farms. Michael Dimock, President of Roots of Change, will share his vision of sustainable food systems. Learn about UC SAREP-funded regional food system projects. The conference will include panel presentations and smaller break-out groups. Register at www.sarep.ucdavis.edu or call (530) 752-7556.

2. UC Organic Soil Fertility Management Symposium. Thurs., Jan. 15, 2009, 8:30 AM-4:30 PM. UC Davis.

The program will combine the latest technical information on nutrient dynamics in organically managed soils with practical results of on-farm nutrient management research. Topics include:

- effects of organic management on soil microbes
- soil and plant testing
- cover crop selection and management
- compost as a fertilizer
- in-season fertilization
- environmental protection
- food safety implications
- economics

The program is intended for growers, consultants, students, and government agency personnel who work with people in this fast-growing segment of agriculture. The symposium is sponsored by the UC Vegetable Research and Information Center (VRIC). Register on the VRIC website (http://vric.ucdavis.edu) or call (530) 752-1748.

3. Cherry Research Review. Tues., Jan. 27, 2009. UCCE office, Stockton, CA. For more info., call (209) 953-6100.

4. EcoLandscape Conference. Sat., Feb. 7, 2009, Sacramento. Topics: Rainwater harvesting, innovations in biopesticides, native grasses, compost use for landscape and environmental enhancement. Also a pre-conference workshop: Managing the Health and Vitality of Your Landscape Through Soil Ecology with Elaine Ingham, Thurs. & Fri., Feb. 5-6, 2009. Visit www.ecolandscape.org.

4. California Small Farm Conference. Sun.-Tues., Mar. 1-3, 2009. Radisson Hotel, Sacramento.

There will be six short courses with tours from which to choose on Sunday, including one on cherry production and marketing. There will also be a tasting of local products on Sunday. On Monday and Tuesday are five workshop tracks from which to choose, including production agriculture, with five workshops each. For more information, visit this Web site: www.californiafarmconference.com.