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From the Director

Cooperative Extension's Broad Impact

As it is widely known Cooperative Extension (CE) is a major part of every land grant university. Each California county has a group of people from CE (farm and home advisors and staff) who attempt to help community members with many issues. These advisors have been working for local communities since 1913. They carry out research and education programs in their regions and are the conduit between the UC campuses and the fields and homes of California. That effort continues today even in the face of reduced budgets, resources and staff, and increased demands to change farming practices.

Extension advisors' activities are quite diverse; they deal with human and natural resource issues and research and education to help produce the food and fiber we all consume. Their efforts to maintain agricultural sustainability are increasingly important to both consumers and producers.

I have been traveling with members of the SAREP staff to various Cooperative Extension offices in the San Joaquin Valley to find out what projects individual farm advisors are working on so that we at SAREP can stay current, and so that we can foster collaboration with our colleagues in the counties.

In late February, we met with advisors in Stanislaus and Merced counties; in March we traveled to Fresno and Madera counties. We will soon meet with farm advisors in Tulare and Kings counties. Farm advisors in these counties continue to work on a diverse array of projects related to agricultural sustainability.

For example, Stanislaus County Director Phil Osterli is involved in a project in West Stanislaus County with the goal of reducing the amount of non-point source pollution (sediment, pesticides, and fertilizer) being carried to the San Joaquin River. This project, which is a cooperative venture with the area Resource Conservation District and Natural Resource Conservation Service staff, helps farmers develop best management practices to farm in a more environmentally friendly manner, while at the same time saving themselves money.

Other farm advisors in the area are working on projects to improve the environment while reducing farmers' costs. **Bill Weir** has found out that the total amount of nitrogen used on cotton can be reduced by up to twenty percent. **Maxwell Norton** has worked to reduce pesticide use in the treatment of apple scab, and was involved in the first commercial-scale pheromone mating disruption project with IPM Area Advisor emeritus **Bill Barnett.**

Lonnie Hendricks in Merced County has been instrumental in the development of BIOS (Biological Integrated Orchard Systems), a program which is gaining acceptance among almond growers because of its team

approach to the establishment of environmentally and economically sound farming systems.

Norton and **Hendricks** have organized IPM grower breakfasts for almost ten years. Much information is shared at these breakfast meetings and pest control advisors also attend to learn and discuss new farming methods.

Merced County Director **Jim Farley** is working with UCD collaborators on a multidisciplinary approach to swine health. In Fresno County, **Linda Manton**, like other county directors, serves not only as the office administrator, but also as the liaison with government, agricultural and private agencies and organizations. Her research interests lie in community development and public policy. **Steve Sutter**, the Ag Personnel Management advisor in Fresno County, works on issues of farm labor and safety. He has developed a checklist of labor regulations and safety programs in both English and Spanish.

These are examples of projects that touch us all, either as producers or consumers or both. We at SAREP are making special efforts to cooperate with these advisors and researchers to see to it information on their work in sustainable agriculture is available statewide. For more on these and other Cooperative Extension projects that work toward sustainability, see "From the Field," on pages 2 and 3. Fresno and other counties will be highlighted in future issues.

Bill Liebhardt, director, University of California Sustainable Agriculture Research and Education Program.

From the Field -South Central CE Highlights

by Lyra Halprin, SAREP

Editor's Note: This is the first of a series highlighting selected research projects by California Cooperative Extension personnel. Due to space limitations, this will not be a complete summary of all farm advisor, home advisor or specialist work, but rather a forum to share selected projects of interest to our diverse readership. Individuals who would like to submit information for consideration for future issues are welcome to contact Ann Mayse or Lyra Halprin of SAREP for more information. (Ann Mayse, UC SAREP, 4930 North Van Ness Blvd., Fresno, CA 93704; voice/fax: (209) 229-9033; amayse@cati.csufresno.edu ; Lyra Halprin, UC SAREP, University of California, Davis, CA 95616; voice: (916) 752-8664; fax: (916) 754-8550; lhalprin@ucdavis.edu).]

This column highlights selected research of farm advisors in Merced and Stanislaus counties and was gathered at a joint meeting of the farm advisors and SAREP staff, and from personal interviews. (See "From the Director" on page 1 for more on the SAREP county visits.)

STANISLAUS COUNTY:

Phil Osterli: County Director Osterli is involved in a water quality project to reduce furrow irrigation-induced erosion. He and his staff, the staffs of the local Resource Conservation District, the Natural Resource Conservation Service and other local agencies have formed the West Stanislaus Hydrologic Unit Area (HUA). Their goal is to significantly reduce the amount of non-point source pollution (sediment, pesticides and fertilizer) reaching the San Joaquin River. A voluntary effort, the local agencies have formulated best management practices, and growers are determining their own water plans. Growers and irrigators working for them are invited to use the services of local agencies to get the most recent information on irrigation and drainage practices for their operations. Local farmers are eligible for technical and cash assistance from the Consolidated Farm Service Agency, which has received federal money for water quality management programs.

Osterli continues to evaluate large and baby limas for lygus resistance with **Jesus Valencia**, Stanislaus CE office, and **Steve Temple**, UC Davis Agronomy Extension. The field testing is taking place in Colusa and Stanislaus counties.

Kathy Kelley: Kelley is doing Peach Twig Borer pheromone confusion work in apricots with **Walt Bentley,** an area IPM advisor. She notes that baby food producers are getting some consumer pressure to reduce pesticides and are eager to do so.

She is also investigating sprays for grape bunch rot. Kelley believes that although spray use is down, in most years growers don't need all the sprays they are using.

Kelley notes that walnut husk flies are usually handled using bait and malathion. She says malathion use can be reduced if application timing is accurate, but achieving accurate timing can be a problem. She is working with growers on this issue. She says there is a great deal of variation among growers on how they handle their husk fly traps_where the traps are placed, how accurately they are observed.

Jesus Valencia: Valencia is working to develop a forecasting model for powdery mildew in tomatoes with **Mike Davis** at UCD (also involved are **Gene Miyao** in Yolo County, **Bob Mullen** in San Joaquin County, and **Richard Smith** in San Benito County). The goal is to develop a powdery mildew forecasting technique to help growers determine if and when to apply pesticides, as opposed to applying materials solely on a calendar basis.

He is working with **Ed Perry,** also a Stanislaus County farm advisor, on a composting project funded by the California Integrated Waste Management Board. They are experimenting with composted community-derived green waste material. The project is divided in half: ornamental plants and vegetable crops. He is using compost as a source of nutrients, spread at two rates, 10 and 20 tons per acre on sweet corn, watermelon and tomatoes. The compost is being compared to the use of commercial fertilizer.

He is also evaluating nematode resistance in tomato varieties and crop rotations of both resistant and non-resistant tomato varieties in Stanislaus County. The goal is to determine what will happen if a farmer plants a resistant variety one year, and then rotates in a non-resistant variety the next year_will nematodes return, or will they cease to be a problem? He has found that the nematodes don't reproduce on resistant cultivars, so the populations are reduced equal to or greater than for a fumigation. This work is a continuation of the work of Stanislaus County Director **Phil Osterli** and Cooperative Extension Nematology Specialist **Phil Roberts** (Roberts is currently at UC Riverside). They worked with **Don May** of Fresno County in green baby limas and found that using nematode-resistant lima bean cultivars lowered the population of nematodes in succeeding crops to numbers equivalent to those found following a fumigation. In all cases, nematode-resistant crops did better than fumigation.

Ed Perry: Perry is working on the composting project with **Jesus Valencia**. He is conducting the landscape plant part of the project at Modesto Junior College and at a private nursery in Stanislaus County. He is growing five species of landscape plants (40 replications per species) using five different treatments. He is using the community-derived compost in some, and traditional ground tree bark/sand/custom mix growing material in others for comparison. The five treatments include 100 percent compost, 75 percent compost/25 percent grower mix; 50/50; 25 percent compost/75 percent grower mix; and 100 percent grower mix. The plants will be evaluated for total growth, aesthetic quality, total mass, leaf samples, and other measurements.

In another project, Perry is evaluating the effect of mulches derived from

different tree species: 100 percent chip mulch from pine, eucalyptus and walnut. The study, which began in June 1994, is measuring the growth of trees planted in containers with these mulches. There has been anecdotal information that these mulches could be toxic to trees, but no negative effect has been observed. The first part of the study is completed; the mulch in the containers has now broken down into compost. The second part of the study is evaluating the compost from the different tree mulches. The project will try to determine if compost from the trees is too acidic. So far, the containerized plants are doing well.

Perry is involved in several pest management projects. He screened pheromones that attract the Western Poplar Clearwinged Moth, a serious pest for birch, poplar and locust trees. Identifying the pheromone or complex of pheromones is the first step in setting up a management system. He has also been involved in a successful aphid-monitoring project for landscape trees for several years. He notes that city landscape maintenance staff members in the project have been very willing to monitor trees before treating for aphids. Perry's work was featured as a case study in the *Journal of Arboriculture* (Vol. 21, No. 1, January 1995) article written by **Steve Dreistadt** and **Mary Louise Flint** of the Statewide UC Integrated Pest Management Project.

Marsha Campbell: One of her particular interests is in making silage production more sustainable by eliminating the scourge of Johnson grass. The problem with Johnson grass is that the seeds from even small patches on farms get into silage bunker silos. Cows ingest them, they are spread in manure, and the seeds eventually reach the dairy lagoon. The lagoon water goes throughout the farm, turning what was originally a small Johnson grass patch problem into a farmwide issue. Campbell notes that the best weed controls, whether organic or chemical, were "horribly inadequate." Fields have been left out of a silage rotation or even left fallow because there was no way to eliminate the Johnson grass seeds. She has been involved with a test of a new herbicide which can be applied in very small amounts (2/3 oz/acre) to fields for Johnson grass control. She says the active ingredient acts only on a plant enzyme, and is less toxic than many products. One of its advantages is that it is a post-emergent material, and is only applied to the visible problem. Previously, farmers had used many different chemicals on fields infested with Johnson grass, to no avail. In addition to cutting down on the use of other chemicals, she says the product also makes it possible to use non-tillage practices, which increases the efficiency of water and fertilizer use. No-till allows a harder surface to develop, which makes it easier for water to move across the fields. Currently the tilled, sandy soils make it expensive and inefficient to irrigate; nitrates are frequently washed down through the soil, which contributes to groundwater problems.

Dairy waste management is also one of her interests, as dairies are big business in Stanislaus County. Lagoon water from dairies is an issue because it is a source of nitrates as well as weed seeds. Stanislaus County has one of the worst problems in the state with nitrates in the aquifers. Campbell would like to make better use of the potassium and nitrates found in the lagoon water.

Campbell is interested in grain lupin as a forage. She notes that it would be nice to have an alternative forage to "get us out of the corn/oat rotation." Lupin is a high protein, high tonnage silage which can be used for human

consumption. "It makes a really nice pasta," she says.

MERCED COUNTY:

Jim Farley: County Director Farley and two collaborators, Carolyn Stull from UC Davis Veterinary Medicine Extension and **Jerry Koenig**, formerly of the Veterinary Medicine Teaching and Research Center in Tulare, received a DANR grant to fund data collection on the health and welfare of commercially raised swine. They have finished data collection and are beginning the analysis of extensive videotaped data. The swine were videotaped for 24 hours and then individual behavior was tracked. Farley says this is a proactive study that will help the industry track its management.

Maxwell Norton: Norton has worked on a project to reduce pesticide use in the treatment of apple scab. In prunes he was involved in a project that investigated alternate-year pruning to reduce labor costs, and a rootstock project with two objectives: better disease resistance and less suckering.

In peaches Norton was involved in one of the first commercial-scale mating trials in California with CE IPM Area Advisor emeritus Bill Barnett, an entomologist. They also worked for three years profiling a peach grower and his transition to organic production. In that project they studied the transition itself and its problems, and also provided technical assistance for the grower.

Norton and farm advisor **Lonnie Hendricks** have organized IPM grower breakfast meetings throughout the growing season for almost ten years. Much information is shared at the breakfasts, and Norton and Hendricks use that time to teach pest control advisors about IPM technologies.

In wine grapes Norton has worked on projects related to rootstock, pruning systems, use of cryolite (an organic-approved pesticide), and on a project related to timing Bt sprays for omnivorous leaf roller. He is also involved in projects related to street trees and farmland preservation.

Lonnie Hendricks: Hendricks has spent a great deal of time in the last two years with the Biologically Integrated Orchard System (BIOS) program, which started with his observations and write-ups of brothers **Glenn** and **Ron Anderson**, two Hilmar almond growers who farm side-by-side. Glenn grows organically while Ron's operation was farmed conventionally. Hendricks says their story was unique because they demonstrated that almonds could be farmed using fewer pesticides. The California Alliance with Family Farmers (CAFF) became interested in Glenn Anderson's success as an organic almond grower and pursued grants with private foundations and the US-EPA to set up the BIOS program for farmers. They were also able to obtain support from corporate sponsors, including donations of cover crop seeds and beneficial organisms. The BIOS program helps enrolled farmers develop farm management plans and provides financial incentives to reduce pesticides. Hendricks is on the Merced management team (and on the Merced/Stanislaus management team until another farm advisor can be recruited). Regular meetings are held with enrolled farmers and their pest control advisors and the general public.

He is continuing an almond cover crop plot with two replications, now in its third year. He will continue the project through this year, and either reseed or

end the project. He is also working with walnut varieties, and is testing two insect growth regulators for codling moth control.

Bill Weir: Weir is working with organic cotton growers, including **Claude Sheppard** whose almost 5,000 acres of cotton are rotated with organic tomatoes. He is also working on cotton compost trials with **Stu Pettygrove** from UCD. They have a CDFA grant to compost gin trash with manure. They are working with **John Texiera** in Dos Palos, an organic cotton grower.

Weir is conducting nitrogen rate tests, which are providing data enabling farmers to reduce N rates while maintaining yields. Two years of tests show that using 50-80 lbs "up front" (at planting time) with more added during two to three irrigations is effective. With this technique, growers only need to use between 160-180 lbs N for the season. Historically, growers applied 200 lbs N before planting cotton.

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Cover Cropping in Vineyards: Grower Profiles, Part 2

Lodi-Woodbridge WineGrape Commission

[Editor's Note: The Grower Profile series is from a chapter in a forthcoming SAREP publication on cover cropping in vineyards. The publication includes contributions by numerous UC and Natural Resource Conservation Service researchers. It is edited by ***Chuck Ingels*** *and* ***Robert Bugg*** *of SAREP;* ***Glenn McGourty****, Cooperative Extension director, Mendocino County; and* ***Peter Christensen****, Cooperative Extensive Viticulture Specialist at the UC Kearney Agriculture Center in Parlier. For another perspective on cover cropping in vineyards, please see "Integrating cover crops into grapevine pest an nutrition management: The transition phase," page 11 of this issue.]*

by Chuck Ingels, SAREP

When **Dennis Culver** first began working with the Lodi-Woodbridge Winegrape Commission in May 1992, many growers were already very interested in cover cropping. The Commission is a marketing and research organization, and includes 650 growers who farm over 45,000 acres in this important viticultural region north of Stockton. According to Culver, the Commission's IPM program consultant, growers had two primary reasons for using cover crops. First, cover cropping was viewed as an important strategy for increasing biodiversity in the vineyards. Cover crops provide a habitat and food source for beneficial insects and spiders which may reduce the need for pesticide applications. The second goal in cover cropping was to improve the soil and vine root environment by building soil organic matter and improving water penetration.

In August 1992, Culver organized a meeting on cover crops which further stimulated interest. Following the meeting, cover crop plantings increased dramatically. That fall, Culver set up side-by-side trials in several vineyards comparing cover-cropped versus fallowed middles in five-acre blocks. Although there were few pest problems in 1993, Willamette mite populations did appear to be reduced where the annual clover mixes were planted. In these clovers and in some high-nitrogen blends there may be a buildup of two-spotted mites, according to Culver, which result in increased numbers of beneficial arthropods in these cover crops. These beneficials, in turn, may move into the grapes and be responsible for reducing Willamette mite populations in the grapes. Similar trials will be conducted each year to determine the long-term effects on pests.

While the jury is still out on the effects of individual cover crops on grape pest management, Culver has specific recommendations depending on the method of irrigation, soil type, and nutritional needs. With furrow irrigation, he recommends the annual clover mix (subterranean, crimson, and rose

clovers and barrel medic) or a legume green manure mix (bell bean, field pea, common vetch, and Lana woollypod vetch), sown in alternate middles the first year. The unplanted middles are eventually furrowed out in late spring for irrigation. Depending on the grower's preference, alternate middles can be sown each year or the same middles can be used. If the same middles are used, growers are finding that the annual clover mixes, in particular, are reseeding themselves quite nicely. According to Culver, the best strategy to facilitate reseeding is as follows: 1) allow the cover crop to go to seed, 2) shred it down in late spring (rather than disking it under), and 3) after the first substantial fall rain, run a springtooth harrow lightly through the middle.

Where drip irrigation is used, the cover crops of choice are perennial native grass mixes, such as Molate fescue, Idaho fescue, and pine bluegrass. The perennial grass species used are summer obligate dormant, which means that they do not compete or compete only minimally with the vines for water and nutrients during the critical late spring/summer months. Overhead sprinkler irrigation gives the grower the flexibility of planting either the annual or perennial cover crops noted above. For vineyards with very heavy or very sandy soil, or where a hardpan is present, Culver recommends Merced rye or barley to help improve these soils.

Regardless of the cover crop species used, Culver recommends that growers create a good seedbed and pre-irrigate where possible for best results. Depending on the time of seeding, a pre-plant irrigation may be the only irrigation needed. Culver also strongly recommends that growers monitor the nutritional status of the vines, especially nitrogen, since cover crops are capable of either adding or removing nitrogen from the soil.


Dennis Culver of the Lodi-Woodbridge Winegrape Commission inspects a cover crop planted in a vinyard

Other mixes are also being used by growers in the Lodi area. Some growers have planted various insectary blends, which contain species attractive to beneficial insects and spiders. A number of these mixes have proven largely unsuccessful in this location because the species and/or seeding rates of the mixes create a stand which is poorly competitive with cool-season weeds. Also, it has been difficult to judge whether these mixes are attracting sufficient beneficials to significantly reduce leafhopper and mite populations.

Several growers have planted California native perennial grasses. Randy Lange of Lange Twins has planted over 300 acres of vineyard to a mix of various native grasses. Initially concerned about the effects of dust (from tillage) on mite predators and parasitoids, he first started using resident vegetation ("weeds") as the ground cover. However, some of the weed species became unmanageable and many became very competitive with the vines for water and nutrients. He had seen some vineyards planted to native grasses, which formed a dense cover and did not appear to compete with the vines.

To prepare the soil for planting native grasses after harvest, Lange applied two tons per acre of compost and then disked twice. In order to level the ground as much as possible during the first disking, he placed a triangular-shaped drag implement behind the disk to fill in the furrows created by the disk. Two weeks after the first disking, which tilled to a depth of six inches, he sprayed Roundup® on the berms to control the germinating weeds. The second disking was shallower, to prevent the soil from fluffing up too much, and included the use of a ring roller behind the disk to pack the seedbed before planting. In late October, he planted the seed blend at a rate of 20 pounds per acre. He calibrated the Truax drill (currently the only drill that can plant native grasses properly) frequently because he wanted to ensure uniform seeding and because of the high cost of the seed. He then sprinkle-irrigated the vineyard for three hours, and did not enter the vineyard until it was mowed in late winter. The berms were immediately treated with Roundup® in early March. Before mowing, weeds dominated the stand and had him worried. But after mowing, the thin green lines of the drilled grasses were clearly visible. No further irrigation was needed until early April. Lange admits he doesn't yet know the drawbacks involved with this mix, but he thinks the benefits will outweigh the risks.

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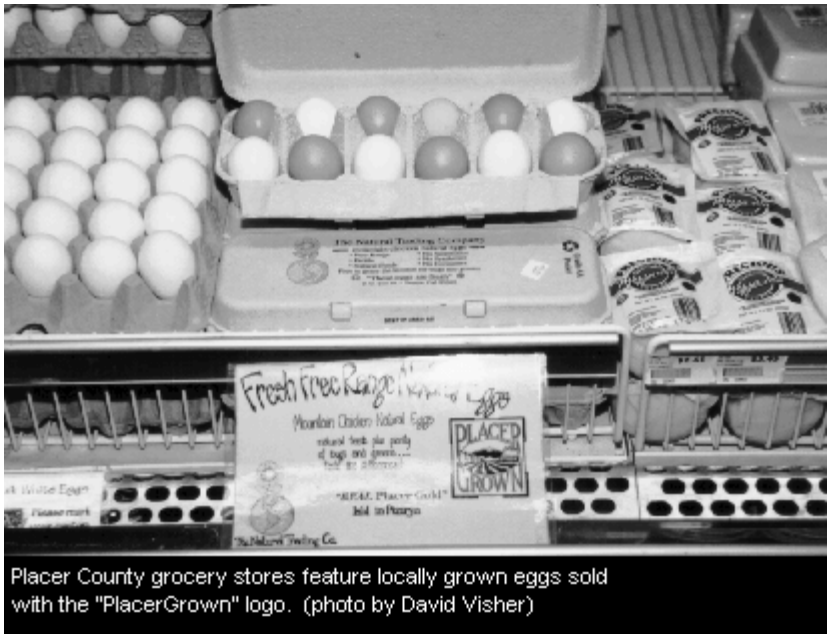
Community Food Systems in California

By David Campbell and Gail Feenstra, SAREP

Sustainable agriculture has made great strides in developing agricultural production practices more in harmony with the ecology of particular places. While progress continues on this front, a new and more complex challenge beckons: developing community food systems which integrate production, distribution and consumption patterns to sustain the economic and social life of particular regions. Examples include researchers at Wisconsin's Center for Integrated Agricultural Systems who are identifying regionally specific biological control products that can promote small business creation; participants in the Hartford (Conn.) Food System who create direct marketing links that sustain farms and improve nutrition in low-income communities; and students and administrators at Hendrix College (Ark.) who have dramatically increased the College's purchases of locally grown food.

Projects such as these give concrete expression to traditional sustainable agriculture concerns for rural community



Placer County grocery stores feature locally grown eggs sold with the "PlacerGrown" logo. (photo by David Visher)

development, social responsibility, and an improved quality of life. Participants are motivated by desires to limit community dependency on an unstable global economy, to create jobs and enhance the local economy, and to satisfy the growing hunger for a more direct and empowering connection to the food they eat. The aim is not complete local self-sufficiency, but a move in a direction that combines equitable trade with a primary focus on increasing the local community's self-reliance and food security.

Projects to develop sustainable community food systems typically encompass at least one of the following goals and are consistent with all six: 1) insuring access by all community members to an adequate, affordable diet of high nutritional value; 2) developing and maintaining a stable base of family farms using production practices which are less chemical and energy-

intensive; 3) creating marketing practices which directly link farmers and consumers and reduce the resources used to move food between production and consumption; 4) starting ag-related businesses that create jobs, reduce leakage of dollars from the community or in other ways contribute to the community's economic development; 5) improving working and living conditions of farm labor such that farmers and farmworkers can be fully contributing members of the community; and 6) implementing public policies that encourage a community's transition to sustainable agriculture by protecting farmland, developing necessary infrastructure, and providing research and technical assistance.

In California, several SAREP-funded projects exhibit unique features of community food systems. These include PlacerGrown, a county-wide cooperative agricultural marketing program; the Arcata Farm and Education Project , a student-run community farm in the city of Arcata; and a Community-Supported Agriculture/ Farmers' Market Project in a low-income neighborhood of Los Angeles.

PlacerGrown is an example of how broad-based community planning can find creative ways to sustain agriculture and contribute to a county's long-term economic development. The objectives of this non-profit agricultural marketing organization are to expand the demand for locally grown and processed foods; to increase agricultural production, profitability and opportunity; and to enhance the community's quality of life. A marketing plan has been developed by a group which includes Cooperative Extension, cattle and sheep ranchers, fruit and vegetable growers, farmers' market representatives, and the Office of Economic Development. Among the specific activities pursued are producer and consumer surveys to determine what both groups need to support a more regionally based food system; a consumer education campaign called "A Reason for the Season" to identify how nutritional needs can be met by eating locally available foods in season; and training programs aimed at increasing use of local foods by restaurants, institutional food services, grocery stores and community groups. The project, now in its second year, includes a plan to disseminate its model through a manual/report, slide sets and presentations.

The Arcata Farm and Education Project demonstrates how a small project can spark creative connections that promote a more sustainable community food system. The two-acre, student-run community farm is the result of cooperation between Humboldt State University, Cooperative Extension, local farmers and educators, and the city of Arcata. The project has five major objectives: to use the farm as an educational facility to teach university students about sustainable small farm management skills; to operate the farm as a CSA (community supported agriculture) or subscription farm; to develop and incorporate curriculum for local elementary and high schools; to facilitate communication about agriculture in the community by involving local farmers, refugee farmers and community members in classes and activities at the farm; and to give community youth groups access to the facility as a place to experiment with animal husbandry and sustainable agriculture projects. A manual, a slide set, and possibly a video are being developed that will describe the farm's activities, how it has overcome problems, and lessons for other communities.

The Los Angeles CSA/ Farmers' Market Project is an example of how the

community food system vision can be addressed in a large urban area. A 1993 study of the Los Angeles food system conducted by the UCLA Department of Urban Planning found that many inner city residents are unable to obtain a nutritionally adequate diet, while at the same time small farmers close to metropolitan areas were struggling to remain economically viable. The project addresses both problems simultaneously by organizing a subscription farming program in which farmers at the Gardena Farmers' Market sell shares of produce to inner city households or institutions on a weekly, monthly or seasonal basis. The project is now in the process of investigating how food stamps can be used to purchase food through this type of community supported agriculture project. Neighborhood residents or local food service institutions should be able to purchase fresh, local produce through the CSA arrangement as early as the summer of 1995.

As in any new area of research and community development, much conceptual and practical work remains to be done, and many questions have yet to be answered. It remains to be seen how quickly and extensively community food systems can be developed, and how appropriate they will be to all regions, or all farmers. By funding a variety of community food system projects, SAREP hopes to help find answers that work for California.

Subscribers to the Arcata Farms's community supported agriculture (CSA) project take their weekly shares from these boxes of fresh-picked produce

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New PAC/TAC Members Join SAREP

UC SAREP is required by the California Legislature's 1986 Sustainable Agriculture Research and Education Act to have both public and technical advisory committees to advise the program on its goals and make recommendations on its competitive grant awards. The Public Advisory Committee (PAC) includes individuals actively involved in agricultural production, as well as representatives from government, public organizations, and institutions of higher education. The Technical Advisory Committee (TAC) is made up of California university and college faculty and staff with knowledge and experience related to sustainable agriculture. Each PAC or TAC members serves for three years. New members in 1995 are listed below.

Public Advisory Committee

- **CATHERINE BRANDEL** has worked for many years in the San Francisco Bay Area searching out specialty growers and purveyors, first as the original forager for the Great Chefs of France cooking school at the Robert Mondavi winery, and since 1983, for the restaurant Chez Panisse in Berkeley. Now a chef at Chez Panisse, Brandel is active in promoting an understanding of sustainable agriculture within the community of cooks. She is active in the San Francisco Public Market Collaborative, and is co-chair of the Chefs Collaborative 2000, an international educational project to advance sustainable food choices. She is particularly interested in the availability of sustainably produced food, the viability of family farms, and developing a rural-urban connection through direct marketing of food.

- **MARION KALB** is the executive director of Southern California's 20-market Southland Farmers' Market Association, the largest non-profit group of certified farmers' markets in the west. She negotiates regulation agreements with state and local officials to benefit farmers involved in direct marketing, and works with cities and non-profit groups to organize and improve certified farmers' markets. She is interested in educating consumers about sustainable agriculture, food security issues and helping farmers work through bureaucracies.

- **RON MANSFIELD** is a grower, packer and shipper with Goldbud Farms in Placerville, El Dorado County. He raises cherries, plums, peaches, nectarines, pears, apples and winegrapes, and packs and ships high maturity fresh fruit. He is particularly interested in pesticide reduction, exploring the farm profit potential when it reflects the risk of implementing sustainable practices, farm labor value, and nutrition.

- **JOHN ROBERTS** is the vice-president of The Center for Living in Harmony, a nonprofit educational and charitable organization in Valley Center, San Diego County, and the director of research and applied growing operations at Little Creek Acres, the Center's 10-acre research,

education and demonstration site. Emphasis at Little Creek Acres is on small-farm/small-scale sustainable practices. Primary research developments include selection and adaptation of open-pollinated cultivars, sustainable soil fertility development and management, accelerated/enhanced plant propagation practices, and production of high-nutrition content produce and seeds. He is interested in legislation and policies favorable to the promotion of scientifically verifiable sustainable ag methods, and biotechnology compatible with sustainable agriculture.

- **BRYTE STEWART** is a partner in a family farm in Rio Vista, Solano County and its native grass seed business, Conservaseed. The operation produces winegrapes, pears, cherries, and California native grass seed, and partners are interested in introducing new organic philosophies to existing conventional practices. Stewart is also interested in educating the public about the positive aspects of the U.S. agricultural system.

- **DON VILLAREJO** is an agriculture policy analyst at the non-profit California Institute for Rural Studies in Davis. His areas of interest are agricultural policy, business and credit investigations, the farm labor market, immigration policy and western agriculture, water policy, agricultural pesticide use and policy, the structure of agriculture and agricultural land ownership.

Technical Advisory Committee

- **EDITH B. ALLEN** is a natural resources Extension Specialist in the Department of Botany and Plant Sciences at UC Riverside. She is interested in the agriculture/wildland interface, and specializes in restoration ecology and plant community ecology. She has done research on weed competition, plant response to mycorrhizae, and nitrogen deposition from air pollution and other human activities that promote weed growth. She is the associate editor of Restoration Ecology.

- **SCOTT JOHNSON** is a pomology Extension Specialist at the UC Kearney Agricultural Center in Parlier. He works with many cultural practices, but emphasizes irrigation, nutrition, planting systems, crop manipulation, and rootstocks of peaches, plums, nectarines and kiwifruit. He is cooperating with pest management researchers and Extension personnel in integrating these cultural practices into more sustainable orchard systems. Additionally he is interested in fruit quality, nutrient cycling and water conservation and quality.

- **JUAN VICENTE PALERM** is a professor of anthropology at UC Riverside and the director of UC MEXUS, a statewide program that focuses resources of the nine UC campuses on U.S./Mexico issues and people, and collaborative research between Mexican and U.S. scientists. A Mexican anthropologist with research experience in Spain, Mexico and California, he is interested in farm labor, migration and rural communities.

- **TOM SHULTZ** grew up on a dairy farm in Northern California, and is now a dairy advisor with the UCCE office in Tulare County. His

specialties are all phases of dairy management, feeds and feeding, animal stress from the environments, waste recycling and labor efficiency. His is particularly interested in resource use, environmental issues, and reducing misinformation or lack of information on ag issues. He was formerly a ruminant nutrition professor at the University of Venezuela.

- **LUCIA G. VARELA** is a North Coast Integrated Pest Management advisor. She works in pears, apples and grapes in California's North Coast.

- **ANGUS WRIGHT** is a professor of environmental studies at California State University, Sacramento. His areas of research include pesticides and farmworkers, immigration and farm labor, comparative agriculture development of the U.S. and Latin America, environment and equity in rural society, and biodiversity and agriculture. The author of The Death of Ramon Gonzalez: The Modern Agricultural Dilemma, Wright is working on a book on property rights and the environment in the U.S. and Latin America.

Continuing PAC/TAC

Public Advisory Committee: Peter Cooey, Jennifer Curtis, Frank Dawley, Gail Gant, and Craig Underwood.

Technical Advisory Committee: Ben Faber, Donald Klingborg, Holly George McCann, Don Nielsen, Ellen Rilla and Carol Shennan.

Biographies of the continuing PAC/TAC members appeared in the Summer 1993 (Vol. 5, No. 3) and the Fall 1994 (Vol. 6, No. 4) issues of *Sustainable Agriculture.*

SAREP Offers Grant Money

For the eighth year, UC SAREP is offering funding for research and education grants that lead to production or policy alternatives for the agricultural community which support environmentally and economically sound productions and food systems. This year SAREP is offering a total of $200,000 in grant money for crop or livestock production options; environment and natural resources; marketing, use and other economic and public policy issues. Additionally, small grants are being offered for graduate student support ($2,000 per individual) and educational meetings ($1,000 per meeting). The deadline for applications is August 1, 1995. The Request for Proposals (RFP) is available by mail or via the World Wide Web (http://www.sarep.ucdavis.edu/). The RFP has been sent to everyone on SAREP's mailing list. If you have not received an RFP, contact SAREP at (916) 752-7556.

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Summer 1995 (v7n3)

Integrating cover crops into grapevine pest and nutrition management: The transition phase.

Rachid Hanna, Frank G. Zalom, and Clyde L. Elmore

Article written for Sustainable Agriculture Technical Reviews. 1995

Introduction

Cover crops are being studied because they may have substantial effects on several components of agroecosystems. In various locations cover crops have been used to enhance the natural control of arthropod pests, to suppress weeds, and as an alternative to synthetic nitrogen fertilizer. These uses of cover crops are usually examined independently, but there is reason to consider the interactions among them as well. In fact, cover crops can impact agroecosystems through a number of pathways, both direct and indirect (figure 1). If , for example, cover crops affect the nutritional quality (and water status) of crop plants, then we should expect these effects to also impact the performance of herbivores feeding on the crop plant, since plant nutrient and water status can significantly affect population dynamics of herbivores (Slansky and Rodriguez, 1987; Dale, 1988). Moreover, these indirect effects may increase incrementally through time, as the cover crop system undergoes a transition phase. A long-term, comprehensive assessment of the role of cover crops in crop production is necessary if we are to understand and successfully utilize them for arthropod, weed, and crop-nutrition management.

The research reported in this article assessed the value of cover crops in vineyard pest and nutrition management. Four experiments helped us determine the effect of various vineyard floor management systems on: 1) two species of leafhoppers, the variegated grape leafhopper (Erythroneura variabilis Beamer), and the western grape leafhopper (Erythroneura elegantula Osborn), which are major pests of grapevines in the San Joaquin Valley (Flaherty et al., 1992); 2) weed suppression and the need for soil-applied herbicides; 3) vine-nutrient status and the need for synthetic nitrogen fertilizer; and 4) vine growth, and grape yield and quality. We also developed a partial budget for each system.

Experimental Design and Cultural Methods

Fowler and Earlimart sites. Two experiments were initiated in 1992 comparing three vineyard floor management systems: 1) a 'conventional' clean-cultivated system with chemical weed suppression in row berms, 2) a fall-planted, oat-vetch cover crop mix which was mowed and placed on row berms for weed suppression without the use of soil-applied herbicides, and 3) a fall-planted, oat-vetch cover that was mowed and placed in row middles, with complete chemical weed control in row berms. These systems were compared at two locations: a 60-acre 'Thompson Seedless' vineyard located about eight miles west of Fowler

(Fresno County), and a 33-acre 'Thompson Seedless' vineyard located about ten miles east of Earlimart (Tulare County). In both cover crop systems, the cover was mowed twice and then allowed to re-seed before soil incorporation, which typically occurred in early July at the Fowler site, and October at the Earlimart site. All systems were clean-cultivated for the remainder of the season at the Fowler site (a raisin grape vineyard), while a ground cover was maintained during the summer by per-iodic mowing of resident vegetation in all plots at the Earlimart site (a table grape vineyard).

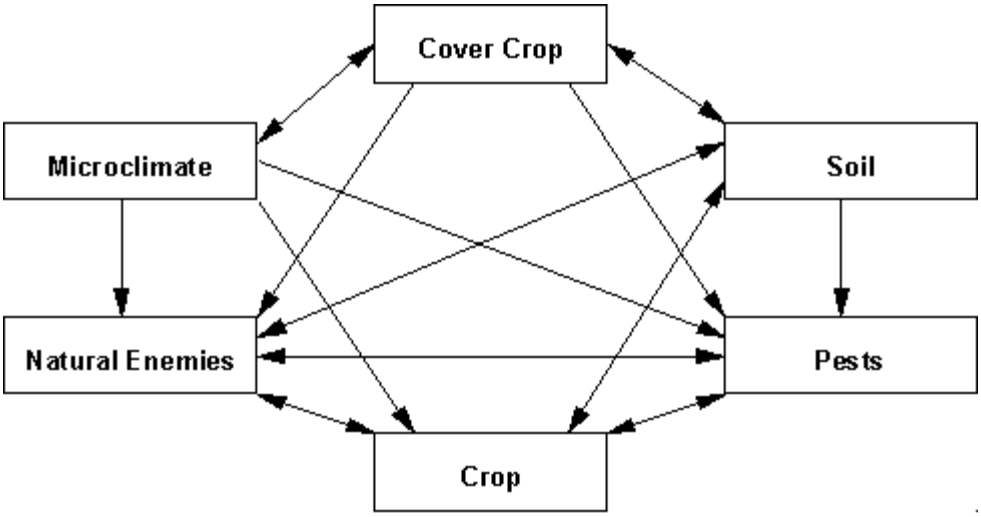

Figure 1. Diagram showing effects of cover crops on agroecosystems.

Insecticide and miticide use differed between the Fowler and Earlimart sites. At the Fowler site, a low rate of Omite (two pounds per acre) was applied on 14 June, 1993 to control an outbreak of Pacific spider mite (Tetranychus pacificus McGregor). No other miticides or insecticides were applied for leafhopper and mite control at any other time during the experiment. At the Earlimart site, Pyrenone was applied in late May 1992 and 1993, and Lannate was applied in mid-August 1993, despite low numbers of leafhoppers. In 1994, the vineyard operator withheld insecticide applications for leafhopper control. Miticides were not used at any time during the experiments at the Earlimart site, where spider mites generally occurred in low densities.

Soil amendments also differed between the two sites. All plots at the Earlimart site received a yearly application of four tons per acre of steer manure in the fall, and two tons per acre of gypsum in June. At the Fowler site, all plots received 75 pounds of nitrogen per acre in June 1992, and four tons per acre of steer manure in October 1992. During the 1993 season, we added fertilized and unfertilized subplots to each treatment. Fertilized subplots received 75 pounds nitrogen per acre in June, and unfertilized plots did not receive any nitrogen fertilizer. The same design was maintained during the 1994 season, but nitrogen fertilizer was not added as vine nitrogen levels were adequate in all treatments.

Kearney and Madera sites. In 1993 we initiated two additional experiments using a Merced rye and vetch cover crop mix: one in a two-acre 'Thompson Seedless' vineyard located at the University of California Kearney Agricultural Center (Parlier, Calif.), and the other in a 53-acre commercial 'Thompson

Seedless' vineyard located near Madera, Calif. The Kearney experiment compared a clean-cultivated system with a system that used the cover crop as dry mulch for partial weed suppression on row berms. The Madera experiment compared a clean-cultivated system with two cover crop systems: one in which the cover was mowed and incorporated as green manure in early April, and another
in which the cover crop was mowed once (also in early April) and then allowed to re-seed before incorporation in early July.

Insecticides and miticides were not used for leafhopper or mite control in the Kearney and Madera sites. Fertilizer was not added at the Kearney site, since the irrigation water at the UC Kearney Agricultural Center normally supplies vines with approximately 20 pounds of nitrogen per acre. All plots in the Madera vineyard received 20 pounds of nitrogen per acre in June 1993, but fertilizer was not added in 1994.

Sampling

We used several sampling methods (direct observations, sticky traps, D-Vac, sweep net, pitfall traps and vine shakes) to estimate the abundance of leafhoppers and their natural enemies (spiders and other generalist predators, and egg parasitoids) on vines and on the cover crops. In general, sampling of cover crops was conducted from March until plow down, while grape vines were sampled from May through September or mid-October. Controlled shoot-cage experiments were also conducted in 1993 at the Madera site, and in 1994 at the Fowler, Kearney, and Madera sites. The purpose of these cage experiments was to determine the impact of each treatment on leafhopper reproduction and survivorship in the absence of the actions of their natural enemies. We also conducted trace-element marking experiments in the Madera vineyard during the 1993 and 1994 seasons, to further determine the impact of cover crops on leafhoppers and spiders.

The effect of berm mulching with cover crop biomass on weed suppression was assessed at the Earlimart, Fowler and Kearney vineyards. Prior to each mowing and in the middle of summer, we determined weed species frequency, percent cover and total biomass on berms, and percent of berm area covered with mulch residues. Weed suppression was evaluated at each time by identifying and counting plant species using four 100-foot transects, and counting plants at each foot.

We used leaf petioles to determine vine nitrogen, phosphorus, and potassium status at two stages of vine growth: full bloom and beginning of berry ripening (veraison). At harvest, we estimated berry size and sugar content (all vineyards), pH and titratable acidity (Earlimart vineyard), and raisin yield and quality (Fowler, Kearney and Madera vineyards).

Results and Discussion

Leafhoppers. Our findings to date indicate that, if properly managed, winter legume/grass cover crops can reduce leafhopper abundance. Where leafhopper numbers were not very low and cover crops were properly maintained through early July, reduced infestations of leafhoppers were observed in the presence of cover crops. These reductions may be attributed in part to enhanced activity of

certain groups of spiders, which are consistently found at higher densities in the presence of cover crops compared to the clean-cultivated systems. Trace-element marking of cover crops indicated that cover crops may also influence leafhopper populations by serving as non-host vegetation which interferes with their movement patterns and perhaps other aspects of their life history (Hanna et al., unpublished data). Although cover crops may affect vine physiology (through changes in soil fertility, soil-water status, etc.), which may in turn affect leafhopper biology, the changes we have observed in vine conditions to date were not sufficient to explain the differences in leafhopper abundance observed between the cover crop and clean-cultivated treatments. Cage data indicated that leafhopper reproduction and survivorship in the absence of predation were not affected by cover crop treatment.

Vine Nutrition. The effect of cover crops on vine-nutrient status varied between years and vineyards. Cover crops produced positive effects on vine nutrient status by the second or third year if the cover crops were well-managed, but produced negative effects if the cover or vineyard was poorly managed. The positive effects were usually delayed, and were best illustrated by the results from our Fowler site where by the third year, nitrogen levels (nitrate-N in petioles) in unfertilized cover cropped vines were similar to nitrogen levels in fertilized clean-cultivated vines, independent of the type of weed management in row berms. Potassium levels were also enhanced by cover crops by the third year at the Fowler site. We have not observed these effects in the Earlimart vineyard where the cover crop was not incorporated until fall, while weeds were allowed to grow in row middles during the summer. Under this system of ground cover management, much of the nutrient content of the cover is apparently either lost by volatilization, or used to grow the resident vegetation during the summer. At the Kearney and Madera sites (second year), although we have not detected statistically significant changes in vine-nutrient status in the cover crop treatments compared to clean-cultivated treatments, we have observed non-significant trends toward higher levels of nitrogen and potassium in vines associated with cover crops compared to clean-cultivated vines. Based on results from the Fowler site, we expect to see higher levels of nitrogen and potassium in cover crop treatments at the Kearney and Madera sites during the third and later years, since the impact of cover crops on vine nutrient status is often delayed and may not be statistically significant during the transition phase.

Weeds. The amount of dry biomass produced by cover crops for weed suppression varied between vineyards. During late winter and early spring, the mulched berms received 1,800 to 8,726 pounds of dry biomass per acre, with a total nitrogen content of 33 to 109 pounds per acre. Results to date from the San Joaquin Valley sites and from a north coast study indicate that with sufficient levels of biomass production, berm mulching should reduce the use of pre-emergence herbicides. The mulch, however, will not control all weeds equally. Perennial weeds such as field bindweed were not controlled.

Yield. The effects of cover crops on grape yield and operating costs depended on grape culture, and represented a trade-off in water, fertilizer, pesticide and resource use. Although significant differences in yields have not been realized in the Earlimart (third year) and Madera (second year) vineyards, berry weight and raisin yields were significantly higher by the second year at the Kearney site where cover crop biomass was used as dry mulch for weed suppression in row berms. Berry weight was also significantly greater by the third year in cover crop compared to clean-cultivated treatments at the Fowler site. Greater berry weights

should have translated into greater raisin weights, but this effect could not be measured as the raisins at the Fowler site were badly damaged by early fall rain. The partial cost budget indicated that the use of cover crops (despite greater water demand) may significantly reduce operating costs if savings were realized by reducing chemical inputs for insects and mites. These savings are expected to increase if cultural methods (e.g., raised beds with adjacent furrows for irrigation are used instead of flood irrigation) are modified to maintain satisfactory cover crop growth while reducing water use.

Conclusions

Despite these encouraging results, some critical questions remain to be addressed in order to assess the long term impact of cover crops on several elements of grape production. At present we do not know what impact these cover crop systems will ultimately have on several aspects of soil fertility and water use in vineyards. For example, we do not know if the increased yields at the Kearney and Fowler sites were due to the greater amount of water used to grow the cover crop. In this case, water usage should be controlled as an experimental variable so we can understand why higher yields were obtained in the presence of cover crops.

Studies of more than three-year duration are needed to adequately determine the complex relationships between cover crops, arthropod pests, and weeds, and to evaluate their impact on soil fertility, vine nutrition, and vineyard water use. Our hypothesis is that benefits of cover crops to grapevines will increase incrementally through time, and can be measured. We are continuing our research in the Fowler, Kearney, and Madera sites, and have initiated a similar study in Napa. We are expanding our multidisciplinary expertise to include a soil scientist (Dr. R. Miller) and a grape physiologist (Dr. L. Williams).

Funding for this research came from the USDA Sustainable Agriculture Research and Education Program, the American Vineyard Foundation, the California Raisin Advisory Board, and the California Table Grape Commission.

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For more information write to: Rachid Hanna, Department of Entomology, University of California, Davis, CA 95616.

(DEC.527)

Contributed by Rachid Hanna

Summer 1995 (v7n3)

Survey of annual crop growers regarding cover crops.

Ann Marie Ridgely and Mark Van Horn

Summary of Final Report to UC Sustainable Agriculture Research and Education Program. 1994

This detailed survey was designed to collect information from annual crop growers that would help focus future research and extension efforts regarding the use of cover crops in field and vegetable crop systems. Participants in the survey were selected through a three step process. First, a list of all tomato and safflower growers in the year prior to the survey was obtained from the County Agricultural Commissioners in each of five counties (Yolo, Solano, Sutter, San Joaquin, Colusa). Second, a random sample of 200 growers was selected from this list and combined with a targeted list of 48 producers in the five counties who were thought to be using cover crops. From this combined list of 248 growers, 119 agreed to participate in the telephone interview.

Survey participants were asked about cover crop usage, and their perceptions of the benefits and drawbacks of cover crops. The results give a clearer picture of the current status of cover cropping in annual cropping systems in California, the types of practices currently in use for managing cover crops in these systems, the barriers to more extensive adoption of cover cropping, and areas in need of further research and extension activities. Tables 1 and 2 summarize some of the key findings from the survey.

Barriers to the Use of Cover Crops

Thirty-four of the 119 growers surveyed used cover crops. The main reasons cited for not growing cover crops were that: 1) the cover crop could not be incorporated in time for spring planting, 2) a cash crop with a direct economic benefit could be planted instead, and 3) the overall cost of growing the cover crop was too high (including seed, labor, equipment, fuel, and water costs). Those who grew cover crops responded similarly when asked why they didn't use cover crops on more of their land, noting problems with timing and economics. Those who grew cover crops and those who did not had very similar perceptions about the potential disadvantages of growing a cover crop. In addition to the three problems discussed above, farmers also mentioned increases in harmful insect populations, and tillage complications due to cover crop residue.

Table 1. Major findings reguarding cover crop usage (n=119)

Parameter	% of Respondents

Growers using cover crops	29
Cover crop growers using:	
Winter cover crops only	69
Summer cover crops only	9
Both	22
Cover crop growers farming organically	68
Cover crop growers farming conventionally	8
Cover Crop growers using vetch (mostly purple vetch) alone or in mix	86

Table 2. Desirability of certain cover crop characteristics to growers who use cover crops (n=34)

Characteristic	% of Cover Crop Growers
Fixes nitrogen	52
Produces high biomass	38
Competitive with weeds	21
Seed availablilty	21
Rapid growth	14
Drought tolerant	7
Flood tolerant	3

The survey data indicate that one of the major barriers to adoption of cover cropping in annual systems, especially among conventional farmers, is that they are not convinced that the benefits of cover cropping outweigh the costs. The two perceived benefits most often mentioned by farmers not currently growing cover crops were increases in soil organic matter and the addition of nitrogen to the soil and crops, benefits that can be obtained through means other than cover cropping (e.g., compost, manure, conventional fertilizers). It

was interesting to note that many other potential benefits of cover cropping, mentioned by the cover crop growers, were apparently unknown or unappreciated by those who did not grow cover crops. These include: increased beneficial insects, reduced weed problems, increased water holding capacity, increased nutrient availability to the following crop, and reduced soil compaction.

Research and Information Needs

Growers' responses to questions about research and education needs indicated two areas where information is most needed: 1) New or existing cover crop varieties that can fit into a particular type of crop rotation, grow well in a particular soil or weather conditions, or possess certain characteristics (such as high biomass, fast growth, extensive root system or high nitrogen content), and 2) the effects of cover crops on various aspects of the farming system, such as soil structure, soil fertility, insect populations, and weed composition. Other categories included economic information, such as cost-benefit analyses, and operational information, such as different types of equipment and best times for planting and incorporating the cover crops.

For more information write to: Mark Van Horn, Student Experimental Farm, University of California, Davis, CA 95616.

(CI-FMCC.105)

Contributed by Chuck Ingels

Summer 1995 (v7n3)

Reflective mulches repel aphids and protect cucurbitaceous crops from virus diseases.

James J. Stapleton, Charles G. Summers, Roger A. Duncan and Albert S. Newton

Adapted from Plant Protection Quarterly 5(1):4-5. 1995

Introduction

Virus diseases carried by aphids can hinder the production of cucurbits (e.g., melons, squash, cucumbers) in California. Aphid feeding causes some direct damage to the plant, but the loss due to disease is far greater. Numerous studies have shown that reflective mulches covering the soil can repel aphids and delay or reduce the incidence of non-persistent virus diseases in susceptible vegetable crops. The lack of suitable materials for mulching impeded adoption of this practice in California up until a few years ago.

A number of silver polyethylene mulches are now commercially available and have been used with some success. This film must be removed and properly disposed of in order to prepare the ground for the following crop. Another material being explored, but not yet commercially available, is water-soluble, biodegradable synthetic latex spray mulch. This product can be applied more economically than polyethylene films, and can simply be incorporated into the soil after harvest. This report details field experiments to compare the effects of reflective spray mulch and plastic film products in repelling aphids, delaying the onset of virus disease, and increasing yield of zucchini squash and cantaloupes.

Materials and Methods

Replicated field experiments were conducted for two years (1993 and 1994) near Fresno, California from August to October, and compared silver-painted spray mulch (Styrofan, BASF Corp.) with several silver and white pigmented plastic film mulches. Experimental sites were pre-irrigated, fertilized and treated with pre-plant herbicides according to standard practices for the area. Treatments consisted of 5-6 replications, 3.1 x 7.6 meters. Plots were separated by fallow areas 3.1 meters wide. Each plot was three beds wide. The center bed was used as the data row, with a guard row on either side. Treatments in the 1993 zucchini experiment included two silver polyethylene films, white polyethylene film, silver nylon film and silver nylon net mulch, silver-painted spray mulch and white spray mulch, no mulch with two applications of the insecticide diazinon to plant foliage, and a non-mulched control.

Planting holes were made in the mulches, and zucchini squash (*Cucurbita pepo var. melopepo* vv. sunre 7918) was seeded on August 3. After emergence, the crop was raised according to standard cultural practices. Plants were rated for appearance of first foliar symptoms of virus disease infection at the first squash harvest, and one and two weeks following the first harvest. Plants were picked 12 times, about every other day. Squash were rated for marketability (size and presence or absence of virus symptoms) and yield. Procedures for the 1994 cantaloupe experiment were similar, except that treatments included complete bed coverage (1.7 meters) with silver polyethylene mulch; complete, 75 percent, 50 percent, and 25 percent bed coverage with silver spray mulch; and the nontreated control. Melons were harvested three times.

Results and Discussion

1993 Squash. Cotton/melon aphid (*Aphis gossypii*) were found on squash plants shortly after emergence. On the date of first squash harvest, foliar virus symptoms were visible on more than 95 percent of the plants grown on bare soil, with or without insecticide sprays. White-colored spray or plastic mulches gave moderate (36-42%) relief from virus infection , while only seven to 17 percent of plants grown on silver-colored spray or plastic mulches exhibited symptoms (figure 1). Suppression of foliar virus symptoms was not documented after the fourth picking. Multiple infection by zucchini yellows mosaic (ZuYMV), watermelon mosaic-2 (WaMV), and cucumber mosaic (CMV) viruses occurred in the field. Infection by watermelon mosaic-1 or squash mosaic viruses was not detected, and cucurbit aphid-borne yellows virus (CABYV) was not tested.

All mulch treatments allowed significant ($P < 0.05$), 3- to 5- fold increases in cumulative, marketable yield of squash, as compared to the non-mulched controls. The silver spray mulch was as effective as silver polyethylene (figure 2). Early infection of control plants drastically reduced their ability to produce fruit, and the plants were essentially nonproductive.

1994 Cantaloupe Melon. As in the squash experiment, aphid populations and virus pressure were high from the time the plants emerged. Non-mulched plants were nearly 100 percent infected with CMV, WaMV, and ZuYMV prior to the first harvest. Mulched plots did not approach 100 percent infection until six weeks later. All mulch treatments gave large increases in yield, ranging from 4-fold (25 percent bed coverage) to 25-fold (polyethylene 100 percent bed coverage). The mulch treatments gave early protection to the emerging and developing squash plants, allowing production of a marketable crop which otherwise would not have been possible.

Figures one and two

Conclusions

The results of this work, conducted under conditions of severe aphid and virus pressure, indicated that sprayable mulches can be as effective as plastic film mulches in reducing disease losses. Additional studies to refine biological and economic considerations of using spray mulch for virus suppression in vegetable crops are currently underway.

For more information write to: James Stapleton, UC Kearney Ag Center, 9240 S. Riverbend Ave., Parlier, CA 93648.

(DEC.526)

Contributed by James Stapleton

Summer 1995 (v7n3)

A dietary, social and economic evaluation of the Philadelphia urban gardening project.

Dorothy Blair, Carol C. Giesecke and Sandra Sherman

Journal of Nutrition Education 23(4): 161-167. 1991

Urban gardening has been widely promoted as a strategy for improving the food security of people in inner cities, particularly in low income areas. This study evaluates the nutritional, social and economic contributions of the Philadelphia Urban Gardening Project, one of the country's largest urban gardens. Sponsored by the Pennsylvania State University Cooperative Extension and the Philadelphia Horticultural Society, the project involves 560 sites and nearly 5,000 families, including the urban poor, the elderly and diverse ethnic groups.

Methods

One hundred forty-four gardeners (40 black, 40 Korean, 40 white and 24 Hispanic) were selected from a stratified random sample of 64 selected sites throughout the city. Sixty-seven non-gardening controls (21 black, 20 Korean, 20 white and 6 Hispanic) were selected from nearby neighborhoods using the same ethnic and geographic criteria as the gardeners. Trained interviewers conducted oral surveys with study participants at either their gardens or their homes from July 1987 to November 1987. Survey participants were asked how frequently they consumed various foods during the previous month, specifically, 23 categories of vegetables, six categories of fruits, and six other categories of food. Additional questions addressed vegetable use in meals and four questions measured life satisfaction. The potential yields of 151 garden plots were estimated based on a scale of very good (90 percent of potential yield) to poor (25 percent of potential yield). Early harvest yields were not estimated for 100 plots due to a delay in recruiting gardener subjects. The market value of the vegetables and fruits in these gardens was estimated using the assessed potential yield and the 1987-1988 dollar market value for each food item.

Results

Description of gardeners and controls. A demographic comparison of gardeners and controls found that gardeners were significantly older than controls (60.3 years vs. 45.5 years) and had a lower mean education. Gardeners were longer-time Philadelphia residents than non-gardeners and had also lived in their neighborhoods significantly longer. Gardeners had maintained their plots a mean of 4.1 years, working about 11.7 hours per week in the gardens, yet over half (51%) had never gardened before the 1987 season. On average, gardeners ate fresh produce from the garden for five

months of the year with almost 10 percent harvesting vegetables all year. Sixty-two percent preserved food from their gardens by freezing, canning or drying. Home preserved food was consumed for an average of 7.2 months of the year. Additional produce was shared with neighbors and relatives, often on a weekly basis and more than 40 percent of gardeners shared produce with a church or community organization.

Gardeners were motivated to garden for several reasons including recreation (21%), mental health (19%), physical health/exercise (17%_especially the Korean population), produce quality/nutrition (14%_especially the black and white populations), spiritual reasons/contact with nature (10%), self-fulfillment (7%) and cost/convenience (7%). The authors note that quality of life issues outweighed the economic benefits of gardening for these gardeners.

Nutritional contributions. Gardeners consumed significantly more of six vegetable categories than non-gardeners, including cole crops, okra/eggplants, sweet and hot peppers, summer squashes, tomatoes and herbs. Their vegetable consumption frequency was also almost always higher than controls. Gardeners, however, consumed less fruit, especially citrus fruits and juices, than controls. They also consumed less milk products, sweets and sweet drinks. Gardeners and non-gardeners ate similar amounts of vegetables; however, gardeners were more likely to eat vegetables in meatless meals (vs. side dishes, salads, stews and snacks).

Community participation/life satisfaction. Gardeners were more likely than controls to regard their neighbors as friendly. They were also significantly more likely to participate in food distribution projects, neighborhood clean-ups and neighborhood social events. Gardeners gave significantly more positive responses to questions on psychosocial well-being and frequency of meaningful life events.

Garden plot evaluations. Average garden plantings yielded 77 percent of their potential with a mean of 8.1 plant species per garden. The mean economic value of the 151 plots was $161 per year. The authors note this was likely an underestimate since early plantings and flowers were not included. Gardeners spent an average of $47 per person on plants, inputs and fencing, thus netting $113 after expenses.

Ethnic differences. Each ethnic group tended to regard their community gardens differently. According to the authors, the older gardens, mainly in black neighborhoods, served as social centers; smaller, newer Hispanic gardens were sources of pride; the Korean gardens provided social cohesion as the gardeners worked together on their plots; and whites tended to garden in larger sites distant from their neighborhoods.

Conclusions

Low income, inner city residents may find it difficult to obtain fresh produce due to a lack of availability or high cost in small neighborhood stores, the exodus of large supermarkets and a lack of adequate transportation. This study finds that access to community gardens is an important strategy for improving vegetable consumption, gaining control over the quality and variety of produce consumed, and facilitating community relationships and

development. The authors conclude that urban gardening is related to an increased frequency of vegetable consumption and a decrease in dairy, sweets and sweet drink consumption. Cole crops may have provided some of the calcium that gardeners did not get from dairy products; however, nutrition advice that encourages foods high in calcium would benefit these gardeners.

Reviewer's Comment. Community gardens provide an alternative for people in low income communities to simultaneously improve food security and their participation in a local food system. For low income families, urban gardens are a potential source of fresh, nutritious produce at relatively low cost. These benefits take on greater significance in light of recent debate at the national level about government food programs. Urban gardens also provide a focal point for people to come together in community and build neighborhood relationships at a time when disappearing resources put a strain on inner city families.

Readers who are interested in the development of urban gardens in California should contact their local UC Cooperative Extension office; Sibella Kraus, Center for Urban Education about Sustainable Agriculture, 1417 Josephine Street, Berkeley, CA 94703, Tel. (510) 526-2788; or Bob Gottlieb, UCLA Department of Urban Planning, 405 Hilgard Ave., Los Angeles, CA 90095, Tel. (310) 825-1067.

For more information about the article write to: Dorothy Blair, Ph.D., S-125C Health and Human Development Building, Nutrition Department, Penn State University, University Park, PA 16802; (814) 863-2912.

(gwf.495)

Contributed by Gail Feenstra

RESOURCES

Organic Cost Studies

Organic Walnut Production and Processing, a new organic cost-of-production study is available from UC Cooperative Extension. The study includes both a narrative and an economic analysis. Topics include production and processing practices, risk and marketing, state and federal regulations for organic agriculture. It includes a sample cost and returns estimate, and enterprise budgets are generated in several formats: cost per acre by operation or by inputs, monthly cash costs, investment and business overhead, and a profitability ranging analysis. The study was funded by the Clarence E. Heller Charitable Foundation, the USDA National Agricultural Pesticide Impact Assessment Program, and UC SAREP. Other organic cost-of-production studies are available for apples, coastal vegetables, almonds, wine grapes and rice. Contact **Laura Tourte**, Department of Agricultural Economics, University of California, Davis, CA 95616; Tel: (916) 752-9376; Fax: (916) 752-5614 or e-mail: tourte@primal.ucdavis.edu. The publications are also available in selected Cooperative Extension offices.

Sustainable Videos

Two new compost videos and a series on environmental design and architecture have been released by San Luis Video Publishing. *Integrated Compost Systems* demonstrates design, implementation and operation of compost systems and includes on-site interviews with professionals involved in agricultural and city compost systems, recreation landscapes, landfills, and mushroom and worm farms. *The Science of Biological Decomposition: Effective Composting Methods* explains the basics of composting and demonstrates sheet, pit and worm composting. The compost videos are $95 each. The video series on designing for sustainability *(Sustainable Environments, Sustainable Architecture and The Sustainable Landscape)* is aimed at environmental design/architecture, horticulture and agriculture teachers and professionals. Series videos are $95 each or $255 for the set of three. For ordering information or for a free catalog on other sustainable agriculture titles contact: San Luis Video Publishing, PO Box 6715, Los Osos, CA 93412; Tel: (805) 528-8322; Fax: (805) 528-7227.

Groundwater Contamination

Pesticide Contamination of Groundwater in California, published by the School of Public Health at the University of California, Berkeley, assesses the role pesticide use plays in degrading California's groundwater and evaluates efforts to protect it. Groundwater supplies 60 percent of large public drinking water systems and 80 percent of small water systems in the state. Some Central Valley communities obtain 100 percent of their water supply from groundwater, while Los Angeles receives only 17 percent of its supply from

groundwater. Using data from California's pesticide monitoring programs, this report examines the extent of pesticide-related contamination and resulting environmental health risks. The report outlines the challenge for policy analysts regarding groundwater pollution: Why hasn't information on pesticides with the highest leaching potential and geographic areas that are vulnerable to groundwater contamination been incorporated into more effective, prevention-oriented strategies? It includes tables of the top ten pesticides detected in well water, an evaluation of management strategies, and suggestions about tax liability incentives to prevent groundwater contamination. Copies of the report are $20 with checks payable to "UC Regents," from the California Policy Seminar, 2020 Milvia St., Suite 412, Berkeley, CA 94704; Tel: (510) 642-9103.

Ecological Soil Management

The Soul of Soil: A Guide to Ecological Soil Management, by **Grace Gershuny** and **Joe Smillie**, third edition, 200 pages, 1995. This is an introduction to managing soil for long-term productivity. The latest edition of the handbook offers guidelines on making management decisions based on ecological principles, with minimal reliance on off-farm fertilizers. Topics include green manures, crop rotations, on-farm composting and mineral fertilizers. Tables, a glossary, lists of resource groups and organizations, and a bibliography are included. To order send a check for $16.95, plus $4.00 shipping and handling (CA residents add 7.25% sales tax) to agAccess, PO Box 2008, Davis, CA 95616; Mastercard/VISA orders available by phone at Tel: (916)756-7177; Fax:(916)756-7188.

Methyl Bromide

Two free USDA publications are available on methyl bromide, an ozone-depleting substance that will be withdrawn from use in more than 100 countries. *Methyl Bromide Substitutes and Alternatives: A Research Agenda for the 1990s, January 1993, and Alternatives to Methyl Bromide: Assessment of Research Needs and Priorities; Proceedings from the USDA Workshop on Alternatives to Methyl Bromide*, July 1993 are available in limited quantities from **Carol A. Singer** at the National Agricultural Library, Rm. 1052-S/USDA, 14th & Independence Ave., SW, Washington, DC 20250-7201; e-mail: csinger@nalusda.gov.

Sources of Funding

UC SAREP RFP

SAREP is requesting grant proposals for new and continuing research and education projects for production or policy alternatives for the ag community which support environmentally and economically sound production and food systems. SAREP is offering a total of $200,000 in grant money for crop or livestock production options; environment and natural resources; marketing, consumer education and community food systems; and labor, land use and other economic and public policy issues. Additionally, small grants are being offered for graduate student support ($2,000 per individual) and educational meetings ($1,000 per meeting). The deadline for applications is **August 1, 1995**. The Request for Proposals (RFP) is available by mail or via the World Wide Web (http://www.sarep.ucdavis.edu/). The RFP has been sent to everyone on UC SAREP's mailing list. If you have not received an RFP, contact SAREP at (916) 752-7556.

Ag Energy Loans

The California Energy Commission has extended the deadline to **July 31, 1995** for agriculture operators seeking low-interest loans of up to $150,000 to purchase energy efficient equipment and services. The list of projects that qualify for the funds also expanded and the amount of money available increased. The loan fund now totals $929,000, and is made available at 3.3 percent interest through the state's Agricultural Energy Assistance Program. Loans will be made to individual farmers or to groups interested in implementing energy efficiency programs in three areas: irrigation districts, high efficiency motors, and greenhouse technologies (environmental control curtain systems, root zone hearing systems, thermoclear roofing systems.) For loan application forms or more information, contact the California Energy Commission, Efficiency Services Office, Agricultural Energy Assistance Program, 1516 Ninth St., Sacramento, CA 95814, Attention: Elizabeth Boynton; or call (916) 654-4089.

Organic Research Grants

The Organic Farming Research Foundation is offering funds for organic farming methods research, dissemination of research results to organic farmers and growers interested in making the transition to organic production, and consumer education on organic farming issues. Projects should involve farmers in design and execution, and take place on working farms when possible. Proposals of $3,000-$5,000 are encouraged. Matching funds and/or in-kind contributions are recommended. Proposals are considered twice a year; the next round of proposals must be received by **July 31, 1995**. To receive copies of grant application procedures and the OFRF Research and Education Priorities describing target areas, write Grants Program, Organic Farming Research Foundation, PO Box 440, Santa Cruz, CA 95061; Tel: (408) 426-6606.

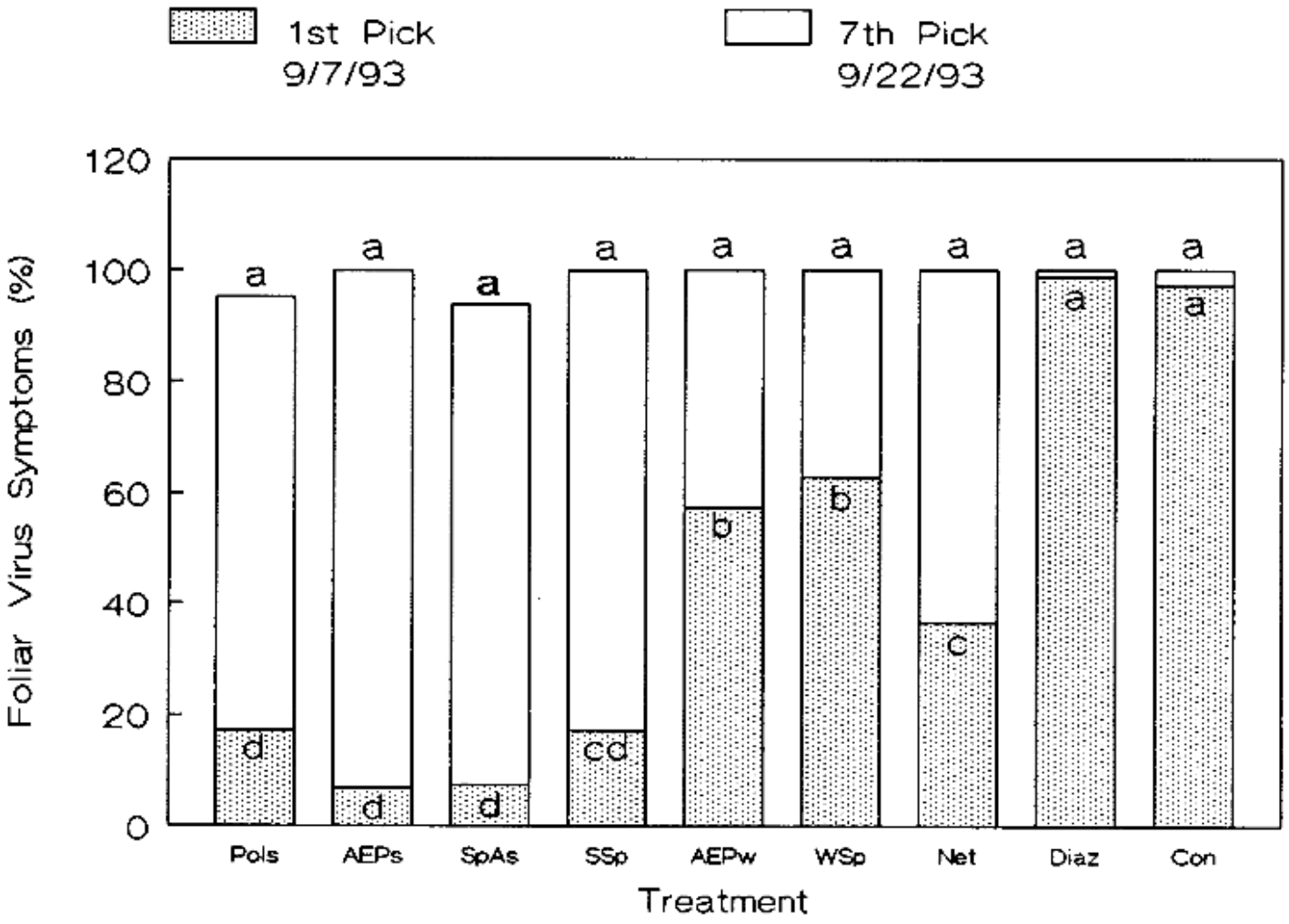

Figure 1. Development of foliar virus disease symptoms in 'Sunre 7918' zucchini squash as influenced by reflective mulch or insecticide treatments. Bars tended by the same letter are not different (P<<>0.05).

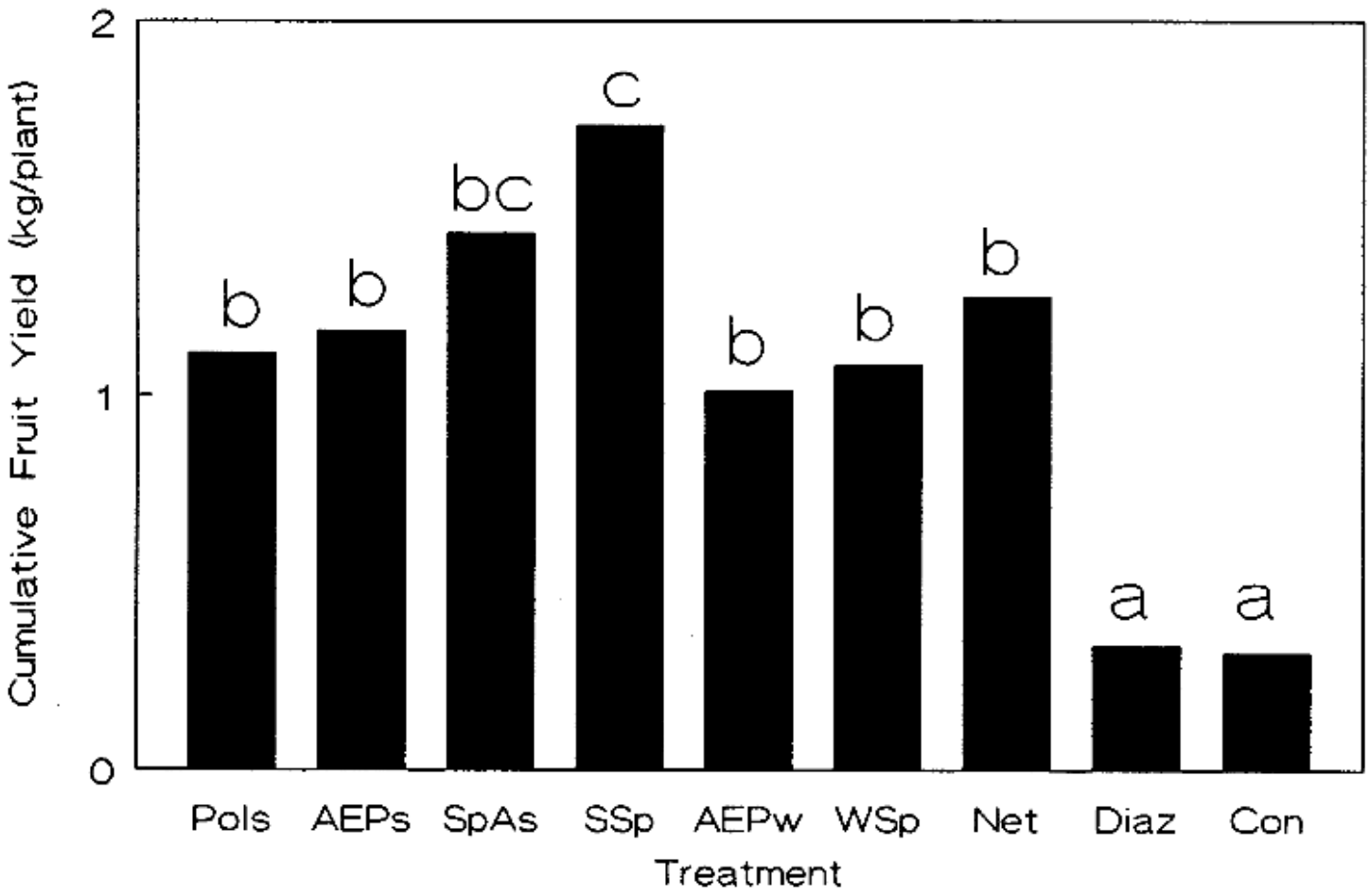

Figure 2. Cummulative, marketable fruit yield of 'Sunre 7918' zucchini squash as influenced by reflective mulch or insecticide treatments. Bars tended by the same letter are not different (P<<>0.05).

Treatments: Pols=Polyon silver polyethylene; AEPs=AEP silver polyethylene; SpAs=Specialty Ag silver mylar; SSp=BASF spray mulch (painted silver); AEPw=AEP white polyethylene; WSp=BASF white spray mulch; Net=Specialty Ag silver mylar net; Diaz=diazinon insecticide control; Con=bare ground control.

Return to Reflective mulches repel aphids and protect cucurbitaceour crops from virus diseases.

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US-EPA

The US-EPA will issue a total of $22 million in research grants in its next granting cycle. Under its new Science to Achieve Results (STAR) program, EPA's Office of Research and Development (ORD) will be soliciting applications from universities and non-profit, research-intensive institutions in approximately September 1995. EPA will work with the National Science Foundation to jointly solicit and evaluate proposals. The grants program will fund research in the areas of ecosystems, environmental technologies, global change and socio-economic issues. For more information, contact the EPA ORD at Tel: (202) 260-9266. EPA solicitation announcements can be accessed through the Internet on Gopher at gopher.epa.gov and the World Wide Web at: http://www.epa.gov.

Funding Resource Note:

Funding-seekers may want to investigate Environmental Grantmaking Funding 1995 Directory (January 1995), published by Environmental Research Institute, 1655 Elmwood Ave., Suite 225, Rochester, NY 14620, tel: (800) 724-1857; fax: (716) 473-0968. The 700-page directory with information on 600 grantmaking foundations is available for $70 plus $5 shipping and handling.

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