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From the Director

Is The Answer Close to Home?

The trend toward direct marketing of produce is a way for consumers to personally connect with farmers and get the best fruits and vegetables available. At the increasing number of farmers markets all over the state, this appears to be a very positive interaction-somewhat different from the rural/urban conflict that is apparent in many parts of California. At farmers markets, growers get first-hand reactions to what they produce, which is a helpful "reality check" about what their end-users like or dislike. Farmers can also pocket some of the marketing money, which they don't usually see. For consumers, buying produce grown and picked close to home at the time it is ready to eat rather than ready to ship means fruits and vegetables that taste the way they should. Consumers learn that the best fruits and vegetables to buy are the ones that are in season, a lesson that helps both them and the farmers. The consumers get the freshest, best produce and the farmers don't have to worry about picking immature fruits and vegetables and shipping them long distances.

Another marketing strategy that seems to be catching on fairly rapidly is "community supported agriculture" (CSA) or subscription farming. In this venture, a group of people in a local area and a farmer agree on the fruits and vegetables they want to buy and produce. The farmer grows it for the local consumers and delivers it to them weekly as it is harvested. In most cases people put money up front to help with the cash flow on the farm. In other cases they may also provide labor to help with the harvesting. CSAs bring the producers and consumers into much closer contact; those who don't farm begin to understand the concept of the seasonality of fresh food and some of the problems of producing it.

These trends suggest that people do want "real" food. UC SAREP will be sponsoring a meeting on the development of CSAs at UC Davis on December 6 (see this page.) The answer to the question of getting seasonal produce to consumers when it is at the peak of taste may be closer to home than we think.*-Bill Liebhardt, director, University of California Sustainable Agriculture Research and Education Program.*

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"Community Supported Agriculture" Workshop

A workshop and tour offering practical information on community supported agriculture (CSA) or subscription agriculture, are scheduled December 6, 1993 in Memorial Union II at UC Davis. "Community Supported Agriculture (CSA): A New Marketing Opportunity," is sponsored by UC SAREP, UC Small Farm Center, Community Alliance with Family Farmers (CAFF) and UC Cooperative Extension. The morning workshop will spotlight three growers who manage three different kinds of CSAs. An afternoon tour of a local CSA is scheduled. For more information on the day-long event (8:30 a.m.-5 p.m.) contact: Tom Hailer, CAFE P.O. Box 464, Davis, CA 95616, (916) 756-8518.

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Biologically Integrated Orchard Systems (BIOS) for Merced County Almond Growers

by Robert L. Bugg, SAREP

Almond growers in Merced County are needed for a new project being developed for growers who wish to reduce the use of pesticides and/or fertilizers. The project, known as "Biologically Integrated Orchard Systems" or "BIOS," is being coordinated by the Community Alliance with Family Farmers Foundation (CAFF Foundation) with funding provided by grants from the U.S. Environmental Protection Agency (EPA) and the Pew Charitable Trust. Full participation in the project is limited to 30 farmers, many of whom will be eligible for financial incentives. However, there will also be field days, focus sessions, seminars and workshops open to all interested farmers and agricultural consultants.

Many almond growers in Merced County rely on heavy applications of pesticides and nitrogen fertilizers. Ground and surface waters may be at risk due to these practices, and increasing governmental regulation is likely. Several growers and specialists have experiences with BIOS that rely less on agrichemicals and more on ecological cycles and naturally occurring feedback loops. For example, an ongoing comparison of organic and conventional almond orchards by Merced County farm advisor **Lonnie Hendricks** confirms that cover crops can be an important tool in managing arthropod pests and their natural enemies. BIOS appear to be on the cutting edge of agricultural technology; growers can use this approach to reduce the threat of pollution while maintaining high productivity.

Who Qualifies, What is Required?

- Merced County almond growers who rely primarily on agrichemicals but wish to reduce usage qualify.
- Twenty to 30 acres per farm will be committed to the program for three years as transitional parcels.
- The farmer or pest control adviser (PCA) must be willing to monitor insects and to collect and share data on pest and beneficial 2 organisms, cover crops, soil and tree nutrient status, and yields. The target is 20 to a maximum of 30 farms in the project.

Technical Support

- Farmers and their PCAs will work with a team of experienced BIOS farmers and specialists to develop customized plans for the transitional

parcels.

- A program of pest monitoring will be developed for individual orchards.
- A newsletter summarizing the results of the monitoring and current field conditions will be sent weekly to participating farmers and PCAs.
- Farmers and PCAs with experience in bio-control will be available throughout the season to answer questions concerning the transitional process.
- Monthly problem solving meetings will be held with farmers, PCAs and researchers.
- On-farm workshops, seminars, and facilitated focus sessions will be held every two months. Topics will include pest and disease identification, cover crop management for beneficial insects, orchard floor management, and bird management.

Financial Incentives

- Subsidies of up to $14 per acre for pest monitoring by pest control advisers will be available from the Agricultural Stabilization and Conservation Service, through the Merced County Resource Conservation District. An additional $8 per acre will be available for these purposes through the EPA.

- Cost-sharing will be available through corporate sponsors for cover crop seed, beneficial insects and mites, and insectary shrubs and trees. Corporate sponsors include Beneficial Insectary (Oak Run), Biotactics, Inc. (Riverside), Bo-Biotrol, Inc. (Merced), Cornflower Farms (Elk Grove), Lohse Mill, Inc. (Artois), Germain Seeds (Fresno), Clyde Robin Seed Company (Hayward), and Ramsey Seed, Inc. (Manteca).

On August 10 in Merced, BIOS management concepts were presented to 40 growers and agricultural consultants. At press time, the number of full participant growers was not yet determined. For further information on the BIOS program, contact **Thomas Nelson** of CAFF at (916) 756-8518. More information on orchard cover crops and the beneficial insects or pests associated with them may be obtained from **Robert Bugg,** SAREP at (916) 757-3279

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Briefly Noted

Compiled by David Campbell, SAREP

Pesticide Use Tops 161 Million Pounds

Since the 1990 "100 Percent Reporting" rule took effect, all pesticide use in California must be reported to the California Department of Pesticide Regulation. According to the latest California Department of Pesticide Regulation survey, over 90 percent of the 161 million pounds of pesticide used in 1991 in the state were in agricultural production. Three crops accounted for roughly one-third of the total use (in millions of pounds): grapes (37.6), cotton (10.4), and sugar beets (8.7). Sulfur, a naturally occurring chemical element which is considered organic, is included in the survey and ranked as the most-used pesticide, at 49.5 million pounds. California's three leading agricultural counties also lead the state in pesticide use reported (in millions of pounds): Fresno (23.3), Kern (17.6), and Tulare (12.4). For more information see *Rural California Report*, Newsletter of the California Institute for Rural Studies, Summer 1993, p.5. Copies of the state's printed pesticide reports are available in two volumes, one indexed by commodity, the second by chemical. To order, send $25 to: Cashier, California Department of Pesticide Regulation, Information Services Branch, 1220 N Street, P.O. Box 942871, Sacramento, CA 94271-0001. For information on the fall computerized database of the reports, call the DPR Information Services Branch, (916) 654-1353.

Marin Ag Land Trust Saves Farmland

Thirteen years after it was formed, the Marin Agricultural Land Trust (MALT) is being recognized as a model for protecting farmland. MALT, a non-profit, membership-supported organization, conserves farmland by purchasing conservation easements. Easements usually represent the difference between the property's market value and its value when development rights have been removed. They are purchased in a legal agreement requiring property owners to permanently keep their land in agriculture and open space. By June 1993, MALT easements had protected 22,098 acres of farmland on 33 properties. For more information, see "Anyone for a MALT?," *American Farmland: The Magazine of American Farmland Trust,* Summer 1993, pp.18-20.

Bovine Hormone (BGH) Moratorium

A 90-day moratorium on the marketing and use of bovine growth hormone (bGH) has been put in place by the U.S. Congress, and a seven-year ban on the hormone has been recommended by the European Commission. The U.S.

moratorium will ban bGH use, sales, and marketing for 90 days if and when the FDA approves its use. The moratorium is in the federal budget approved in August, in legislation authored by first-term Senator **Russell Feingold** (D-WI) and was supported by a group of 2l organizations, including the National Family Farm Coalition, Community Nutrition Institute, Ben and Jerry's, Inc., Consumers Union, and the National Farmers Union. The 12 member states of the European Commission were scheduled to vote on the issue sometime in September. The recommendation to ban bGH until the year 2000 was based on research conducted over the past three years that reportedly shows smaller dairies would be driven out of business. Additionally, the Commission's recommendation pointed out that safety, quality, and efficacy standards could only be met in controlled environments.

Organic Foods Act Update

For the first time since the Organic Foods Production Act (OFPA) passed in 1990, funds have been appropriated for its implementation. The U.S. House/Senate Budget Conference Committee accepted action taken in early August in both the House and Senate to appropriate $500,000 for implementation of OFPA, which had received no recommended funding in the Administration's proposed budget. The National Organic Standards Board will be funded, but USDA has not yet decided the amount. Funding for the Board and for implementation of OFPA had not been included in either the FY 1992 or FY 1993 final budgets. As of October 1, 1993, it will be a violation of federal law to sell or label a product as "organic" unless it meets the requirements of the act, many of which are still unclear. Regular updates on the progress of OFPA are included in *Nutrition Week*, published by the Community Nutrition Institute, 2001 S. St. N.W., Washington, D.C. 20009.

Decline in Farm Numbers and New Farmers Reported

The USDA's Economic Research Service Agricultural Outlook Summary of June 1993 forecasts that farm numbers will likely decline by an average of 15-20,000 per year in the coming decade. The trend toward fewer, larger farms continues, though at a slower pace than the 1950s and 1960s when the U.S. was losing over 100,000 farms annually. A recent study by the General Accounting Office (GAO) notes that the number of individuals entering farming decreased by 25 percent during the mid-1980s, a trend that is still continuing. According to the report, high entry costs for land and equipment are a chief impediment. The USDA is currently drafting regulations to implement legislation that would target federal loans to beginning farmers. Farm Finance: Number of New Farmers is Declining (GAO/RCED-93-95) is available at no charge from the U.S. GAO, P.O. Box 6015, Gaithersburg, MD 20884-6015.

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New Book Takes a Hard Look at Controversial Dairy Technology

by Lyra Halprin, SAREP

A new book published by UC SAREP critically examines bovine growth hormone (bGH), a controversial technology proposed for use in the nation's dairy industry, and compares it to an alternative technology for milk production called rotational grazing, a flexible system of pasture management. *THE DAIRY DEBATE: Consequences of Bovine Growth Hormone and Rotational Grazing Technologies* examines the issues from the perspectives of veterinary, soil, agronomy, forage and nutrition scientists, as well as economists and public policy analysts. The 372-page book is edited by **Bill Liebhardt**, SAREP director. Individual chapters were written by two SAREP analysts, two UC agricultural economists, an independent writer, and four scientists from universities in Virginia, West Virginia and Vermont.

BGH is a synthetically produced version of a naturally occurring cow hormone also called bovine somatotropin (bST). Injecting it into lactating dairy cows increases milk production. It was developed by four major pharmaceutical companies to help dairy farmers increase milk output. Three of the four formulations of the synthetically produced bGH are different from the structure of the naturally occurring bovine growth hormone. The Food and Drug Administration has been reviewing bGH for eight years and is expected to make a ruling soon. The Clinton administration recently agreed to a 90-day moratorium on the hormone if the FDA approves it.

"The FDA is only looking at whether cows injected with the hormone are healthy and whether bGH affects human safety," Liebhardt said. "I believe bGH would hurt smaller and mid-sized dairy farms and, as a result, the economic vitality of rural communities. Our study of the issue also shows clearly that a majority of consumers will not accept milk from bGH-treated dairy cows."

In 1990 Liebhardt organized the multidisciplinary team of researchers to compare how bGH and rotational grazing affect a range of factors - individual cows, farms, farmers, farm families, rural communities and consumers. "Traditionally, scientists take a narrowly focused approach to research," Liebhardt added. "But the consequences of this new technology are so far-reaching that I felt compelled to take a broader look at bGH and compare it to rotational grazing, which in my view offers dairy farmers a profitable alternative, rural communities the assurance that more small and mid-sized farms will stay in business, and consumers the assurance that their milk is a safe, wholesome, untainted product."

Rotational grazing decreases or eliminates confinement feeding and shifts the

work of harvesting and maintaining soil fertility back to the animal, Liebhardt said. He noted that rotational grazing improves herd health in comparison to confinement feeding systems. Properly managed pasture feeding minimizes mastitis-caused bacterial infections that contaminate milk and results in economic losses for dairies, he added. According to the numerous case studies used in Liebhardt's research, pasture-grazed cows also tend to have higher reproductive performance, reduced lameness from leg or hoof problems and few metabolic and digestive orders.

Gail Feenstra, SAREP nutritionist and food system analyst, wrote a chapter on consumer and food safety concerns about bGH. She found that numerous studies from throughout the country indicate that many consumers are concerned with both short-term milk safety, and the unknown, long-term health effects bGH may cause for both humans and animals. Furthermore, surveys cited in the book show that if farmers use bGH, many consumers will buy less of that milk and seek alternatives. In all the studies consumers overwhelmingly indicated that they want bGH milk labeled.

Feenstra also discusses concerns that bGH may increase dairy cows' susceptibility to mastitis, an udder infection that results in increased treatment with antibiotics. Although milk is tested for antibiotics, some residues enter the milk supply, she says. Antibiotic residues in milk can affect humans who are allergic to even trace amounts of residues. Excessive use of antibiotics can promote the rise of antibiotic-resistant bacteria.

The book also addresses the economics of dairy management under both bGH and rotational grazing management systems. BGH would increase dairy farmers' profits by increasing the cows' milk production. Rotational grazing's system of pasture grazing, on the other hand, increases dairy profits by cutting feed costs, and shifts much of the work of harvesting and maintaining soil fertility back to the animal, according to **Leslie "Bees" Butler**, a contributing author and a marketing economist in the UC Davis Department of Agricultural Economics.

Butler identifies a key problem associated with adopting any new technology: "If one dairy farmer adopts the bGH technology and increases milk production, he or she will benefit," he said. "If, however, a significant number of other producers adopt the technology, then milk production will increase at the national level. If milk production increases nationwide, it is likely that milk prices will eventually adjust to a point where producers are not better off financially than they were prior to the availability of the bGH technology. This is called the technology 'treadmill effect,' and is common in agriculture."

David Campbell, SAREP economic and public policy analyst and author of a chapter on the social and economic consequences of bGH on rural communities, said that the major issues about bGH are "not new and technical, but old and essentially political. They have less to do with determining whether milk is safe and cows are healthy than with deciding the proper role of government in regulating economic affairs or the amount of control ordinary citizens can have in government research and economic policies." Seven studies Campbell reviewed show that bGH would accelerate the trend toward a concentration of larger farms and hasten the demise of smaller and mid-size dairy operations. "Today 5 percent of the nation's farms

produce half the total agricultural output," he said. "If this trend continues, in 10 years one percent of all U.S. farms will produce most of our food." As a result, Campbell adds, the collapse of the small and midsize dairies is likely to have a harmful effect on the communities and regions they support.

Co-author **William M. Murphy**, professor of agronomy at the University of Vermont, noted that case studies show rotational grazing improves the quality of life for farmers. "The flexibility of a rotational grazing system allows farmers to accommodate personal goals and spend more time with family and in community activities," he said. "It also supports the continued existence of a thriving, diversified rural landscape, a less tangible but equally significant benefit of rural living."

Edward Rayburn, an Extension forage agronomist at West Virginia Extension Service, said that rotational grazing would increase pasture acreage and decrease grain crop acreage. He noted that pastures have about double the organic matter content of land devoted to grain crops. Soil organic matter is a reservoir for carbon (carbon dioxide) and nitrogen (nitrates). He concluded that land devoted to pastures indirectly contributes to improved soil, air and water quality. "Rotational grazing would reduce farm-related environmental problems, resulting in 24 to 31 percent less soil erosion and 23 to 26 percent less fuel use in crop production," he said.

Other authors include **David Kronfeld**, the Paul Mellon Distinguished Professor of Agriculture and professor of veterinary medicine at the Virginia Polytechnic Institute and State University in Blacksburg, VA; **John Kunkel**, a veterinarian at West Virginia University; **Gerry Cohn**, a graduate student in the UC Davis Department of Agricultural Economics, and **Kathleen Byrnes**, a Davis-based writer specializing in rural/urban issues and sustainable systems.

The book, which includes an executive summary of the chapters, may be purchased through ANR Publications, University of California, 6701 San Pablo Ave., Oakland, CA 94608-1239 for $31.50 (includes postage, handling and applicable sales tax). Checks should be made payable to UC Regents. For VISA or MasterCard orders call (510)642-2431 or FAX (510) 643-5470.

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$2 Million Kellogg Grant Creates California Alliance for Sustainable Agriculture

Funded by a three-year, $2 million grant from the Kellogg Foundation, the California Alliance for Sustainable Agriculture (CASA) has been formed to move the state toward more sustainable food and agricultural systems. The new coalition is one of seven model projects funded by Kellogg around the United States as part of its Integrated Farming Systems Initiative.

The grant provides a unique opportunity to build a productive collaboration between the University of California and innovative non-profit groups. In addition to SAREP members of the coalition include the Bio-Integral Resource Center (BIRC), California Institute for Rural Studies (CIRS), Community Alliance with Family Farmers (CAFF), Lodi-Woodbridge Winegrape Commission (LWWC), Rural Development Center (RDC), UC Division of Agriculture and Natural Resources, and UC Santa Cruz Agroecology Program.

"The formidable task of redirecting agriculture policy and practice onto a more environmentally sound and socially just path will occur only if diverse groups find ways to work together," notes **Sheila Daar** of BIRC: "We need to draw upon the talents, vision, and commitment of people across the entire spectrum of food and agricultural systems if we are to evolve realistic alternatives that will sustain our society into the next century and beyond."

SAREP's economic and public policy analyst, **David Campbell**, will be working with other members of CASA to identify and implement concrete strategies for linking sustainable agriculture to rural community economic and social development. Information will be gathered from community roundtable discussions, lighthouse farm observations (successful examples), and from previously funded SAREP economic and public policy projects. The result will be a document outlining policy recommendations and promising strategies for rural community decision-makers and community leaders.

Other activities planned by CASA are community discussions to identify barriers to sustainable food and agricultural systems, collaboration with innovative growers to create "how to" guides for reducing chemical use on farms, organization of broad-based community coalitions that work toward marketing and public policy innovations, and a program to identify and train emerging agricultural leaders.

CASA members will work directly with farmers to find better ways of growing and marketing crops grown with fewer or no chemicals. For example, LWWC is using a marketing commission form of organization to inform its 650 winegrape grower members about sustainable winegrape production in the San Joaquin Valley. CIRS is encouraging organic cotton

production by forging an industry-wide coalition that links growers, marketers, environmentalists, and pest control advisers.

A fundamental commitment of the project is to work together with people involved in the many aspects of food and agriculture. CASA views diversity as an asset and believes no one should be excluded from the task of developing an ecologically based and socially responsible agriculture. As **Patricia Allen** of the Agroecology Program explains, "We need to give a voice to under-heard elements, especially women and people of color, and to seek food and agricultural systems which directly address social issues of hunger, gender and ethnic equality, and economic justice."

The California project is the largest of the seven funded nationally by the Kellogg Foundation. Kellogg funding will facilitate information networking among all the projects, and help project leaders work together to address policy, economic, and information bafflers to more sustainable food and agricultural systems. Kellogg has committed more than $8.1 million during the first phase of its Integrated Farming System Initiative. A second round of similar Kellogg grants is anticipated during the coming year.

In addition to CASA, community demonstration projects funded by Kellogg include:

- The Alternative Energy Resources Organization in Helena, Montana; to increase resource conservation and foster economically viable family farms and rural communities.

- The Arkansas Land and Farm Development Corporation in Brinkly; to help farmers identify and adopt ecologically sound and sustainable crop and livestock systems and increase farmer and community understanding and support for integrated farming systems.

- The Kansas Rural Center in Whiting; to empower farmers and rural communities to develop and practice integrated farming systems that balance profit with resource conservation.

- The Nature Conservancy in Arlington, Virginia; to empower the agricultural community of the Big Darby watershed to implement economically and ecologically sound land-use practices.

- The Practical Farmers of Iowa; to develop a model to help rural communities provide the support, guidance, and teamwork needed for acceptance and use of sustainable farming systems.

- The Rodale Institute Research Center in Kutztown, Pennsylvania; to develop a regional infrastructure model for sustainable agriculture as a prototype for farmers, policymakers, marketing and technical support professionals, and consumers.

For more information about Kellogg's Integrated Farming Systems Initiative, contact **Tom Thorburn** (616)968-1611 or Oran Hesterman (517) 353-3209.

Sources of Funding

SAREP Meeting Grants

UC SAREP is offering funding of up to $1000 to individual UC Cooperative Extension farm and home advisors and other California non-profit organizations to conduct meetings, conferences and other training events in sustainable agriculture. Proposals are due November 19,1993. For more information, contact **David Chaney**, Information Group-UC SAREP University of California, Davis, CA 95616; tel: (916) 757-3280.

SAREP Graduate Student Grants

UC SAREP is offering competitive grants for graduate students conducting research in sustainable agriculture. The Sustainable Agriculture Graduate Awards (SAGA) are open to registered graduate students attending any accredited institution of higher education in California. Proposals should reflect a concern for the environmental, economic, and social sustainability of California agriculture. The total amount available for SAGA grants in this funding cycle is $10,000. Individual awards will range from $500 to $1,000. Each candidate may receive one such award during her or his graduate career. For more information on SAGA priorities and proposal requirements, contact **Robert Bugg**, Information Group-UC SAREP University of California, Davis, CA 95616; tel: (916) 757-3279. The deadline for receipt of proposals and letters of recommendation is February 14, 1994 at 5 p.m. Awards will be announced and made by April 1, 1994.

USDA Western Region SARE/ACE Grants

The Administrative Council of the USDA Western Region's Sustainable Agriculture Research and Education programs are accepting proposals for two companion competitive grant programs: The first is Sustainable Agriculture Research and Education (SARE), formerly known as LISA. This program is funded through the USDA Cooperative State Research Service. The second program, with many of the same goals is Agriculture in Concert with the Environment (ACE), funded jointly by the Pollution Prevention Office of EPA and the SARE program. Approximately $400,000 is available to fund new SARE proposals and $250,000 is available from the ACE program for new competitive grants for the next cycle (FY 93-94). Due to the limited funds, issues identified in the Call for Proposals will receive priority. Proposals must be received by 5 p.m. on October 8,1993. FAX copies will not be accepted. Proposal authors will be notified of decisions by early April 1994. For further information contact **Denise Bodie,** University of California, Division of Agriculture and Natural Resources, 300 Lakeside Dr., 6th Floor, Oakland, CA 94612-3560; tel: (510) 987- 0033.

Fertilizer Research Awards

A Request for Proposal will be out in mid-January 1994 from the California Department of Food and Agriculture's Fertilizer Research and Education Program. Funding will be available for projects directed toward the environmentally safe and agronomically sound use and handling of fertilizer materials. For details and to be put on the proposal request mailing list, contact **Jacques Franco** or **Gwen Cristoni** at CDFA, (916) 654-0574.

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 systems, and education of the public about organic farming issues. Projects should involve farmers in both design and execution, and take place on working farms whenever possible. Proposals of $3,000-$5,000 are encouraged. Most projects will be less than $10,000. Matching funds from other sources and/or in-kind contributions from cooperators are encouraged. Proposals are considered twice a year; the next round of proposals must be received by January 31, 1994. To receive copies of grant application procedures and the "OFRF Research and Education Priorities" which describes target areas, write Grants Program, Organic Farming Research Foundation, P.O. Box 440, Santa Cruz, CA 95061 or call (408) 426-6606.

Resources

Dairy Book

The *DAIRY DEBATE: Consequences of Bovine Growth Hormone and Rotational Grazing Technologies.* UC SAREP, 1993. 372 pages. Edited and co-authored by **William C. Liebhardt**, UC SAREP director and nine other authors. Compares the effects of bovine growth hormone and rotational grazing on the dairy industry and society (see story p.4). To order, send $31.50 (includes postage, handling and sales taxes) to ANR Publications, University of California, 6701 San Pablo Ave., Oakland, CA 94608-1239; tel: (510) 642-2431; FAX: (510) 642-5470. Checks are payable to UC Regents; MasterCard and VISA may be used for FAX orders. Publication SA-001.

Weed Video

Cultural Weed Control in Vegetable Crops, 1993 (V93-E), produced by **Tom Lanini**, UC Davis Botany Extension, funded by UC SAREP The 18 minute video describing sustainable weed management is narrated by **Robert Bugg**, UC SAREP cover crops and restoration analyst. It examines California organic growers' row crops weed control practices from bed preparation prior to planting through the growing seasons. The videotape's technical narration explains why and how these practices work. Although it is aimed at growers interested in reducing herbicide use, the video is suitable for a general audience. The video includes two versions of the same information: The first is a straight-forward presentation, while the second is narrated in a light-hearted "down-home" style. It may be ordered in VHS format for $40 (includes postage, handling and sales taxes). Checks should be made payable to UC Regents. Checks, VISA or MasterCard payment should be sent to UC Visual Media, University of California, Davis, CA 95616-8748; FAX: (916) 757-8991. The video may be rented for $7 in California and $10 out of state. For other tape formats call (916) 757-8980.

Compost Video

How to Make Compost: An Instructional Video, 1993, 15 minutes, produced by the UC Santa Cruz Agroecology Program's Apprenticeship in Ecological Horticulture staff. Learn the magic formula for making grass clippings, fallen leaves, straw and other organic materials into a fertile soil additive with this instructional video. Tips are provided on the best way to construct a backyard compost pile, how to choose the correct proportion of "brown" (carbon-rich) to "green" (nitrogen-rich) organic material, and how to add enough air and water to begin the composting process. The cost is $15 (includes tax and postage); checks should be made to UC Regents. Orders include a 10-page brochure on composting. Send orders to Agroecology Program (attn: Compost

Video), University of California, Santa Cruz, CA 95064; tel: (408) 459-4140.

Vineyard Booklets

Cover Crops: A Practical Tool for Vineyard Management, and *Vineyard Pest Management: Alternatives for the Future*, are available from the American Society for Enology and Viticulture (ASEV). The cover crops booklet was prepared for a seminar at the 44th ASEV annual meeting. It addresses beneficial insects, in-row weed management, water, wine quality and cover crops, and managing cover crops. It is available for $25 parcel post or $30 air mail. The pest management booklet was compiled for the May 1992 ASEV workshops. It provides a general overview of pest management, integrated pest management, and organic farming and is available for $15 parcel post or $20 airmail. Checks are payable to ASEV must accompany order and must be in U.S. dollars, international postal money order or cashiers check. No credit card payments or FAX orders are accepted.

Free Farmworker Nutrition Guide

Farm worker Nutrition Education Resource Guide, prepared by the Association of Farmworker Opportunity Programs, is available free of charge from the Association of Farmworker Opportunity Programs, 1925 North Lynn St., Suite 701, Arlington, VA 22209; tel: (703) 528-4141. The resource guide lists hundreds of pamphlets, booklets and videos for farm workers, but is also appropriate for general nutrition education. Topics include diabetes, breast feeding, cancer, alcohol, and food preparation and storage.

Organic Wholesale Directory

National Directory of organic Wholesalers, 1994 edition, produced by the Community Alliance of with Family Farmers, is in production. Farmers and other wholesalers of organic commodities may be included by calling (800) 852-3832. A limited number of the 1993 directory are available at the reduced price of $29.95 plus $4 shipping and handling (California residents add $2.17 sales tax). The directories include farmers of organic commodities nationwide, U.S. and international food wholesalers, farm suppliers, updated federal and state organic laws, support businesses serving the organic industry, certification groups, cross-referenced Organic commodities of who buys and sells. Contact: Community Alliance with Family Farmers, P.O. Box 464, Davis, CA 95617; tel: (800) 852-3832, (916) 756-518; FAX: (916) 756-7857. Credit card orders accepted.

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Modeling the fate of nitrogen in the root zone: Management and research applications.

L Warden; B. W House, L.E. Jackson and K.J. Tanji

Proceedings: 1992 California Plant and Soil Conference, *Decision-making in an Uncertain Environment.* California Chapter American Society of Agronomy. 1992

Intensive vegetable production systems, with high inputs of both water and nitrogen fertilizer, have been identified as a major source of nitrate pollution in California. This paper, presented at the 1992 California Plant and Soil Conference, describes a simulation model whereby best management practices (practices that minimize non-point source pollution, while remaining economically viable for the farmer) can be determined for a given set of climatic conditions and agronomic variables.

Methods

Lettuce was chosen as the case study crop. Specific objectives were to "demonstrate how physical-chemical-biological modeling approaches can assess environmental and economic consequences of nitrogen fertilizer and irrigation water management." The USDA Erosion/Productivity Impact Calculator (EPIC) was the model chosen for this study because it uses easily-obtained input data, and is able to account for irrigation and fertilization practices.

EPIC first had to be calibrated to real field circumstances. This was accomplished using 1990 data for spring- and summer-planted lettuce grown on a 11-hectare field in the Saloons Valley, California. After calibration, the model was applied to hypothetical simulations of different rates of applied irrigation water and nitrogen fertilizer.

The conditions for the case study simulation were as follows:

- maximum rate of N fertilization 168 kg nitrogen per hectare
- maximum rate of irrigation water 300 mm per crop
- residual nitrate from previous crop assumed to be 60 kg N03- nitrogen in the soil profile
- nitrogen fertilizer incorporated at a 50 mm depth on June 5 at 168 kg per hectare, and August 28 at 128 kg per hectare; 40 kg nitrogen per hectare was applied with irrigation water on October 5
- each crop was furrow irrigated in equal amounts six times during the growing seasons at 10- to 14-day intervals

Model simulations were run with decreasing irrigation and fertilizer rates

(100% to 0% of maximum at 10% increments). Economic modeling involved calculating profit as the difference in revenue from lettuce yield and marginal costs of applied water and fertilizer.

Results

The authors present break point analyses for water and fertilizer inputs (figures 1 and 2). These data show that "leaching of nitrate was most effectively reduced up to 5O percent of the 'normal' quantity of applied irrigation water, and at 65 percent of applied fertilizer nitrogen." Beyond these break points, reductions in irrigation and fertilizer rates become less effective at reducing nitrate leaching.

A combined analysis of the two variables showed that both fertilizer nitrogen and irrigation water could be reduced up to 50 percent of normal with no reduction in yield. The authors stress, however, that water and fertilizer management go hand-in-hand: If, for example, nitrogen fertilization is reduced without reducing irrigation water, crop uptake efficiency goes down because nitrate is flushed past the root system.

The 50 percent reduction in fertilizer and irrigation water is also the point at which profit is maximized. Optimal rates were determined to be 150 mm of applied irrigation water and 84 kg nitrogen per ha per crop. Implementation of these management practices would reduce nitrate leaching by about 75 percent.

The authors caution that this modeling work is still in the developmental stages, and that calibration of the model was conducted using data from a lettuce crop grown under near-optimal, disease-free conditions. Areas that require further study include: the effect of corky root disease on water and nitrogen uptake, crop quality considerations, and the low salinity tolerance of head lettuce.

For more information write to: L. Jackson, USDA Ag Research Station, 1636 E. Alisal St., Saloons, CA 93905.

Figure 1. Effect of irrigation reduction on nitrate leaching.

Figure 2. Effect of fertilizer reduction on nitrate leaching.

(DEC.315)

Contributed by David Chaney

Fall 1993 (v5n5)

Arthropod fauna of conventional and organic rice fields in California.

Louis S. Hesler; Albert A. Grigarick, Michael I. Oraze and Andrew T Palrang

Econ. Entomol. 86(1):149-158. 1993

This study assessed the composition and abundance of pest and nonpest arthropods inhabiting conventional and organic rice production systems in California. The study was conducted in four pairs of conventional and organic rice fields located in the Sacramento Valley: three paired sites in 1988 and one paired site in 1989. Conventional and organic rice fields differed in two key respects: 1) Organic fields were free of synthetic pesticides or fertilizers during the growing season, and for at least 12 months prior to rice planting; and 2) Organic fields underwent less intensive disk plowing and harrowing in preparation for rice planting; this reduced tillage resulted in greater amounts of coarse plant material that was not as extensively incorporated into the seedbed. All fields were subdivided by levees into six or more discrete basins. Sampling was restricted to three basins within the interior of each field.

Rice fields were sampled for major arthropod pests at the early seedling stage, early tillering stage, and just before or during the reproductive phase. Populations of each pest species were compared using a paired *t* test. Additional sampling measured the relative abundance and activity of other aquatic arthropods in the rice fields. Populations of non-pest species in each system were compared using the paired *t* test, and also by determining the degree of taxonomic overlap between treatments, termed the "quotient of similarity," with values ranging from 0 (no taxa in common) to 1 (all taxa in common).

Results

The results of this research concur with findings of other studies comparing arthropod populations in organic and conventional farming systems. First, although differences in the numbers of pests can be found, the levels of most species remained below treatment thresholds in both systems. For the seven major pests in this study, the differences in abundance or in level of damage between conventional and organic treatments were not significant ($P > 0.05$). A summary of the data for two major rice pests is shown in table 1. Rice water weevil, and aster leaf hopper are the principal arthropod pests in rice during the early tillering and early reproductive stages. Pest damage in the seedling stage appeared slightly higher in organic systems, but this did not affect final plant densities in the field.

Table 1. Infestation levels of rice water weevil and densities of aster leafhopper in rice fields in California.

			No. aster leafhoppers	
			Early sample	
Site	**Treatment**	**% plants [a] scarred by weevil feeding**	**No. per 0.073 m^2**	**No. per plant**
Pleasant Grove	Conventional	16.8-9.4	6.78-4.20	0.49-0.51
(1988)	Organic	6.0-7.3	1.11-1.44	0.12-0.18
Erickson	Conventional	8.2-4.7	15.78-10.65	2.75-1.71
(1988)	Organic	1.8-1.5	1.22-1.71	0.28-0.39
Gage	Conventional	3.7-5.5	*no data*	*no data*
(1989)	Organic	8.7-5.1		

[a] Differences between treatments were not significant (t=.83, df=2, P> 0.05).

[b] Differences between treatments were not significant (per area t=3.23, df=1, P> 0.05). Differences in densities recorded for a second sample taken later in the season were not as marked as the early samples.

Second, populations of the nonpest species were generally higher in organic fields [notably three predatory taxa-a giant water bug *(Belostoma flumineum)*, back swimmers *(Notonecta* spp.), and an adult predacious diving beetle *(Thermonectus basillaris)]*. Where this study differed from previous ones is that the variety of taxa collected did not differ significantly between conventional and organic rice fields. The quotient of similarity between the two treatments was 0.923 indicating that many of the same species were present in both organic and conventional systems. Previous studies in other crops showed that organic systems had greater diversity (Dritschilo and Wanner, 1980; Brown and Adler, 1989; Goh and Lange, 1989; Kromp, 1989 and 1990).

Some preventive control measures are available for the rice pests observed in this study. Damage from rice water weevil, for example, can be reduced by using tolerant varieties, draining fields, disking grassy levees and other pest habitat, and delaying the time of planting. Good weed control is an effective means of controlling aster leafhopper and army-worms. Preventive measures are not always sufficient, so more research is needed to determine how to control outbreaks of these key pests in organic systems.

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(DEC.51 5)

Contributed by David Chaney

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Fall 1993 (v5n5)

The biodiversity of microorganisms and invertebrates: Its role in sustainable agriculture.

D.L. Hawksworth, (Editor)

C.A.B.International, Wallingford, Oxon, UK. 1991

This book addresses the important relationship between biological diversity and agricultural production. When we hear the term biodiversity, many of us think of the highly publicized decline in certain species of plants and larger mammals. This book builds a case for turning our attention to changes taking place in the much more numerous invertebrates and microorganisms. In fact, a decline in these less visible species could have far-reaching effects on the sustainability of many agricultural production systems around the world. The reason the impact could be so great is that invertebrates and microorganisms play a vital role in maintaining and enhancing soil fertility, detoxifying pesticides and other pollutants, and in biological control of agricultural pests.

The book is based on a workshop organized by C.A.B. International in association with the Committee on the Application of Science to Agriculture, Forestry and Aquaculture, the Commonwealth Science Council, and the Third World Academy of Sciences. Twenty-one chapters are organized into four main subject areas: the importance of invertebrates and microorganisms as components of biodiversity; the importance of biodiversity in sustainable soil productivity; the importance of biodiversity to pest occurrence and management; and biotechnology and biodiversity among invertebrates and microorganisms.

Among the key findings of the workshop are the following:

1. We need to increase our knowledge of the nature, extent, and potential usefulness of the genetic resources present in microorganisms and invertebrates and how to protect different ecosystems as reservoirs of such biodiversity.

2. To do so will require that:

(a) Research is undertaken to describe the diversity, gene pool, and ecological interactions of different organisms in agricultural and natural systems;

(b) Existing genetic potential in invertebrates and microorganisms is conserved by the preservation of natural and managed systems, and, where necessary, by maintaining culture collections of organisms of current and potential value.

3. The promotion of biodiversity alone will not eliminate the need for

improvements in farming skills and management. It will, however, contribute to the development of diverse systems able to sustain production on both marginal lands (albeit at low levels) as well as in more fertile areas.

4. The need to support effective conservation and utilization of biodiversity requires development of skills in biosystematics and related disciplines worldwide.

5. The benefits of maintaining biological diversity should be more clearly communicated. Maintaining the diversity of invertebrates and microorganisms has importance for agriculture and other aspects of human welfare. Soil organisms, for example; have been used to produce antibiotics.

6. Education and training must reflect the need to increase awareness of the significance of biodiversity in agriculture and the environment, including the problems of protecting ecologically vulnerable areas.

The Biodiversity of Microorganisms and Invertebrates: Its Role in Sustainable Agriculture is available for $76.00 from the University of Arizona Press, 1230 N. Park Ave. #102, Tuscon, AZ 85719. Tel. (800) 426-3797.

(DEC.51 6)

Contributed by David Chaney

Energy and alternatives for fertilizer and pesticide use.

Z.R. Helsel

In:Fluck, R.C. (ed.) *Energy in Farm Production.* vol.6 in Energy in World Agriculture. Elsevier, New York. pp.177-201.1992

This review (32 references) looks at the use of pesticides and fertilizers worldwide, as well as the energy required to produce, package, transport, and apply them. In 1972, agriculture used about 3.5 percent of the world's commercial energy; this figure was generally lower for developed countries. Of the total energy used in agriculture, about 51 percent was used for farm machinery operation and manufacture, 45 percent was invested in chemical fertilizers (mostly nitrogen), and only 2 percent went to production and application of pesticides. Although the total amount of energy used for pesticides is small, on a per unit weight basis more energy is used in the production of pesticides than any other agricultural input. On average, production of pesticides takes four to five times more energy per pound than nitrogen fertilizer production.

Fertilizers

Table 1 shows the overall world average of energy required for production, packaging, transportation, and application of nitrogen, phosphorus, and potassium (NPK) fertilizers. In the last decade, the production process has been made slightly more energy-efficient. Nitrogen requires the largest energy input for production. In 1983-84 74.5 million short tons of nitrogen were produced in the world, requiring the equivalent of about 32 billion gallons of diesel fuel. When packaging, transportation, and application are added in, the equivalent of 36 billion gallons (about 650 million barrels) of diesel fuel were used to supply nitrogen to the world's farms.

Table 1. Estimate of average energy requirements for nitrogen, phosphate, and potash (BTUs/lb).

Nutrient	Production	Packaging	Transportation	Application	Total	Equivalent [1]
N	29,899	1,119	1,936	688	33,642	0.240
P_2O_5	3,313	1,119	2,452	645	7,529	0.054
K_2O	2,753	774	1,979	430	5,936	0.042

[1] Gallons of #2 fuel oil (diesel) to produce one pound of nutrient.

The author also assigned energy values to organic sources of nutrients. Based on the average amounts of NPK contained in a material, he calculated the

energy equivalent it would take to produce the same amount of nutrients as chemical fertilizer. To replace the nutrients contained in a ton of beef manure (4.4% N) or sewage sludge (4.0% N) would require over 1300 BTUs (equivalent to less than 0.01 gallon of fuel); for crop residues (1.1% N) and municipal refuse (0.70% N), the value would be less than 500 BTUs per ton. These energy figures provide further evidence that "wastes" (usually viewed as a liability or disposal problem) may actually be an important resource for agriculture. In addition to providing some nutrients, organic materials also have value in terms of their effect on soil structure. *(Reviewer's note: There is an energy cost to handling, transporting, and applying organic materials; this cost is not accounted for by the author.)*

Another organic source of nutrients, biological nitrogen fixation by legumes, produces about 88 million tons of nitrogen each year for agriculture, compared. with chemical nitrogen fertilizer production of about 55 million tons. The amount of energy used to fix the legume nitrogen was nearly four times that used to make chemical nitrogen fertilizer. It is important to note, however, that the source of energy for nitrogen fixation is sunlight, not natural gas as is the case for chemical fertilizers.

Pesticides

In 1984, the equivalent of over $16 billion was spent on pesticides worldwide. Over half of this money was spent on herbicides, and the U.S. contributed to nearly half the world's expenditures on herbicides-primarily on corn and soybeans. Herbicides were the major type of pesticide used in all countries except for some Central American and Asian countries where insecticides were predominantly applied. The U.S. spent one-third of all pesticide dollars, using more than three times as much pesticide as any other country. Japan and France ranked second and third, respectively.

Pesticide manufacturing is energy-intensive. Most pesticides are derived from ethylene and propylene, which are obtained by catalytic cracking of crude petroleum oils, or from methane from natural gas. Some pesticides are more energy-intensive than others (table 2), however, pesticides also vary in their energy use per unit area of application. The trend in pesticide manufacturing is towards production of pesticides that are more energy-intensive per unit, but that are applied at a very low rate per acre.

Following manufacturing *per se,* more energy (on the order of 4,300 to 13,000 BTUs per pound of material) is required to formulate these compounds into marketable products. Packaging, distribution, and transport require an additional 3,000 to 15,000 BTUs per pound.

Table 2. Energy inputs required to manufacture selected pesticides (BTUs/lb). (To obtain equivalent in gallons of #2 fuel oil/lb, divide by 140,000).

Pesticide	**Energy Input**
Herbicides	
2,4-D	36,567
Alachlor	119,597

Atrazine	81,739
Diuron	116,155
Fluazifop-butyl	222,846
Glyphosate	195,313
Paraquat	197,894
Trifluralin	64,531
Fungicides	
Benomyl	170,791
Captan	49,473
Maneb	42,590
Insecticides	
Carbofuran	195,313
Cypermethrin	249,518
Malathion	98,517
Methyl parathion	68,833
Parathion	59,368

Reviewer Comments

This chapter presents substantial data on energy requirements of pesticides and fertilizers, but it lacks quantitative comparisons to alternative systems. A valuable addition to the analysis would be to assign energy values to specific alternative practices (e.g., rearing and releasing beneficial insects, crop rotation). This information could be a valuable measure of agricultural sustainability, especially considering the growing limitations and constraints placed on world supplies of fossil fuels.

Another weakness in the article is the reasoning by which the author justifies the use of pesticides. He states that there is a significant return (in terms of food energy) on the energy expended to produce and apply pesticides. His primary example is that of the yield increases obtained through the use of herbicides in corn. The calculations, however, fail to account for the environmental and social costs incurred beyond manufacturing and application. Such extra costs include farmworker medical expenses, monitoring of food for residues, pesticide container disposal, drift of pesticides onto neighboring farms or urban areas, litigation involving pesticides, as well as the effects of pesticides on air and water quality and on wildlife. An accurate cost/benefit analysis of pesticides should account for both the up-front production costs and any hidden costs that might result from their use.

For more information write to: Z. Helsel, Department of Agriculture, Rutgers University, New Brunswick, NJ 08903.

(CI-PEST.1 29)

Contributed by Chuck Ingels

Fall 1993 (v5n5)

Pesticides in the diets of infants and children.

Committee on Pesticides in the Diets of Infants and Children, National Academy of Sciences

National Academy of Sciences, National Academy Press, washington, DC. 1993

This National Academy of Sciences (NAS) study was congressionally mandated in 1988. Its purpose was to examine the scientific and policy issues faced by government agencies in regulating pesticide residues in foods consumed by infants and children. The report concluded that the federal government should change some of its scientific and regulatory procedures to give infants and children greater protection from possible adverse health effects of pesticides in their diets.

The NAS report found age-related differences in susceptibility, toxicity and exposure to pesticides between adults and children. Children may be more or less sensitive than adults, depending on the pesticide to which they are exposed. Due to rapidly changing processes in infants and children, there is no simple way to predict the sensitivity to these chemicals from data derived entirely from adults. The NAS committee found, however, that quantitative differences in toxicity between children and adults are usually less than a factor of 10. Lack of data on pesticide toxicity in developing organisms was a recurrent problem for the committee, so they had to rely mostly on incomplete information derived from studies of adult animals and on chemicals other than pesticides.

Differences in exposure to pesticides were generally more important than were age-related differences in toxicological vulnerability. The committee found that infants differ both qualitatively and quantitatively from adults in their exposure to pesticide residues in foods. Children consume more calories of food per unit of body weight and much more of certain foods, especially processed foods, than do adults. Water consumption, both as drinking water and as a food component, is very different between adults and children. Unfortunately, information on pesticide residues and the effects of processing on residue concentrations is inadequate for foods eaten by infants and children.

To characterize potential risks to infants and children, the committee used a statistical technique that took into account variations in food intake and pesticide residue levels. The committee applied this technique to determine health risks under three different scenarios-acute toxic effects, chronic toxic effects, and simultaneous exposure to several pesticides.

On the basis of its findings, the committee recommends that changes be made in current regulatory practices. Estimates of total exposure to pesticide residues should reflect the unique characteristics of the diets of infants and

children and should account also for all nondietary intake of pesticides. The committee also recommends that the Environmental Protection Agency (EPA) modify its decision-making process for setting tolerances so that it is based more on health considerations than on agricultural practices. Now, although tolerances establish enforceable legal limits for pesticide residues in food, they are not based primarily on health considerations and do not provide a good basis for inference about actual exposures of infants arid children to pesticide residues. The committee states that "Children should be able to eat a healthful diet containing legal residues without encroaching on safety margins." Specifically, six areas should be addressed:

Toxicity testing. Laboratory tests should be developed for studying toxicity in immature animals to evaluate the sensitivities of infants, children, and adolescents.

Uncertainty factors. Currently, if animal tests show no adverse effects at a certain exposure level, an uncertainty factor of 100 is used to establish guidelines for human exposure. EPA uses an additional factor of 10 if studies have shown effects on the developing fetus. The report recommends expanding the use of this additional uncertainty factor when there is evidence of postnatal toxicity or when data from toxicity testing relative to children are incomplete.

Food consumption data. The committee recommends that additional data on the food consumption patterns of infants and children be collected within narrower age groups. This would include at every one-year interval up to age 5, between ages 5 and 10, and between ages 11 and 18. These narrower groupings would result in a more accurate portrayal of the ways children's diets differ from those of adults.

Pesticide residue data. The committee recommends the use of comparable analytical methods and standardized reporting procedures and the establishment of a computerized database to collate data on pesticide residues from different labs.

Risk assessment. All exposures to pesticides- dietary and nondietary-need to be considered when evaluating the potential risks to infants and children. Nondietary environmental sources of exposure include air, dirt, indoor surfaces, lawns and pets.

Estimation of cancer risk. The committee recommended the development of new methods that account for changes in exposure and susceptibility that occur as a person matures.

In summary, the NAS committee's recommendations support the need to improve methods for estimating exposure and for setting tolerances to safeguard the health of infants and children.

Pesticides in the Diets of lnfants and Children is available for $47.95 plus $4.00 shipping from the National Academy of Sciences, Office of News and Public Information, 2101 Constitution Avenue NW, Washington, DC 20416. Tel. (202) 334- 3313 or (800) 624-6242.

(GWF.012)

Contributed by Gail Feenstra

Fall 1993 (v5n5)

Pesticides in children's food.

Richard Wiles

Environmental Working Group, Washington, DC. 1993

This report from the Washington-based Environmental Working Group (EWG) found widespread, generally low pesticide levels in food. Based on data from nearly 20,000 food samples tested between 1990 and 1992 by the Food and Drug Administration and private labs, the EWG reported that more than half of the food samples had detectable pesticide residues of at least one pesticide. Of the samples that had detectable residues, there were few violations of current tolerance limits.

The EWG report noted that the Environmental Protection Agency (EPA) assesses the health risks from pesticides as though people are exposed to them one at a time. Richard Wiles, the author of the report, noted that using an additive approach to risk assessment, just eight pesticides in 20 fruits and vegetables resulted in the average child exceeding the EPA lifetime one-in-a-million risk standard from pesticides in food by his or her first birthday. Risks of this magnitude are unacceptable according to Wiles. To address these issues, the EWG recommended phasing out pesticides that pose the greatest risks to children, applying strict health standards for all pesticides and developing alternative farming practices.

Pesticides in Children's Food was released just prior to the National Academy of Sciences (NAS) report *Pesticides in the Diets of Infants and Children.* The Clinton administration appears to agree with both the NAS and the EWG recommendations. On June 25, the EPA, United States Department of Agriculture and the Food and Drug Administration issued a joint statement saying that they expected to use the reports of the NAS and the EWG on children and pesticides "as a basis for formulating the legislative and regulatory policies needed to put the Administrative principles into effect." Although both reports show valid concerns with pesticides in children's food, their recommendations are quite distinct. Whereas the NAS report focuses on improving risk management techniques for pesticides in the food supply, the EWG prescribes reducing pesticide applications and eliminating known cancer-causing pesticides whenever practical alternatives exist. The EWG report also supports the development of alternative farming systems. It is still unclear how the administration will reconcile these differences and which kinds of policies will be supported.

Pesticides in Children's Food is available for $15.00 plus $3.00 shipping and handling from the Environmental Working Group, 1718 Connecticut Avenue NW, Suite 600, Washington, DC 20009.

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Contributed by Gail Feenstra
