WATER AND LOW-INPUT SUSTAINABLE AGRICULTURE

ROY R. CARRIKER
Professor and Extension Economist
University of Florida
Gainesville, FL

Under the headline "Resistance to Chemical Farming," the Christian Science Monitor (Sept. 18, 1989) cited a recent study by the National Academy of Sciences (NAS) to assert that "...an arsenal of poisons is not needed to make a profit down on the farm." An editorial entitled "Natural Farming Techniques" in the Gainesville Sun (Sept. 17, 1989) cited the same NAS study to support the conclusion that "carefully managed farms growing diverse crops with little or no chemicals are as productive and profitable as chemical-laden farms."

In a story entitled "Survey Finds Most Want Organically Grown Produce" the Gainesville Sun (Mar. 20, 1989) reported that "an overwhelming majority of Americans say they would buy organically grown food if it cost the same as fruits or vegetables treated with pesticides or synthetic fertilizers...."

The editors of The Kiplinger Agriculture Letter began their August 25, 1989, letter with the following: "Beware: this growing anti-chemical sentiment is serious business." Kiplinger went on to express concern that the anti-chemical sentiment could lead government to clamp down hard on the use of pesticides, fertilizers, and other chemicals.

For citrus growers and other agricultural producers who are accustomed to using pesticides and commercial fertilizers as a part of their crop management programs, the tone and content of these newspaper articles strike an ominous note. Reference to "an arsenal of poisons" and to "chemical-laden farms" conjure up an image of farming that many growers might consider to be unnecessarily negative and, to that extent, unfair. Headlines referring to "natural farming," as opposed to "chemical farming" seem to reflect pre-conceived notions about the definition of acceptable agricultural practices. Headlines asserting that "Most Want Organically Grown Produce" along with editorials urging Congress to support "natural farming" and to eliminate chemical use in agriculture raise questions about the future of agriculture as we know it.

Clearly, newspaper stories and editorials may oversimplify issues and use highly colored language in order to hold reader interest. Of more significance is the increasing frequency of such articles and the likelihood that public sentiment is influenced by or is reflected in the tone and content of these stories. What then? What is "natural farming"? Who advocates it? Why do they advocate it? What are the implications for citrus growers in Florida?

What's In a Name?

Alternative agriculture, sustainable agriculture, organic farming, regenerative agriculture, environmentally sound agriculture and low-input agriculture are all terms that relate in some way to both a philosophy of farming and to a set of farming practices. Pierre Crosson (1989) cites the following example:

Organic agriculture is seen by practitioners as a holistic endeavor, with attitudes and lifestyle of the farm family being inseparable from the well-being of the other components of the farm system. The all-important holistic nature of the farm implies interactions between components such as crops with crops, crops with animals, and soil condition and fertility with insect and disease incidence in the crops and livestock. These interactions, in the minds of many, limit the degree to which component parts may be meaningfully separated in field or laboratory studies.

Farming practices consistent with the philosophy of alternative agriculture are designed to reduce, if not eliminate chemical pesticides and inorganic fertilizers that are key elements in what are now widely regarded as conventional agricultural systems in the United States. They achieve this by substituting crop rotations and mechanical cultivation for chemical pest control, and using manure or legumes in rotation for plant nutrient supply instead of synthetic fertilizers.

Who Are It's Advocates?

The growing interest in alternative agricultural technologies derives largely from objections to certain undesirable side-effects of conventional agricultural practices (Carter, 1989):

1. Groundwater contamination from agricultural chemicals is well-documented in certain parts of the country. Many people view these instances of contamination as evidence of farmers' unwillingness or inability to use chemicals in ways that do not threaten water quality.

2. Pesticide residues on agricultural commodities are, according to consumer attitude surveys, judged to be a serious hazard to health.

3. Concern for the health and safety of farmworkers is sometimes offered as justification for opposing the use of pesticides on crops.

4. Concern for wildlife species harmed by environmental contamination from agricultural chemicals has led to calls for restrictions on pesticide use in certain habitat areas.

5. Concern over dwindling supplies of nonrenewable natural resources, especially petroleum, has led to criticism of agricultural technologies that are dependent on energy-intensive inputs.

These objections to conventional agricultural technologies merge into a concept of stewardship that places a premium on environmentally benign practices that are deemed to be sustainable.

A related concern focuses on social and cultural impacts of conventional agricultural technologies. These concerns point to the manner in which purchased pesticides and fertilizers have, over the past half-century, substituted for relatively more costly land and labor inputs in agricultural production. Rapid adoption of chemical intensive technologies has been blamed for the steady decline in the number of farmers and the number of people who make their living through farming. Rural communities that depend on farmers

have declined as the number of farms has declined. The result, in this critical view of agricultural technology, has been the demise of a way of life, of a cultural tradition that deserved to be preserved and should be restored. Agricultural practices that depend less on purchased inputs and more on internal "on-farm" inputs will make greater use of human labor and management and, in this view, lead to a resurgence of agriculturally oriented rural communities.

During the severe recession that gripped much of the nation's agricultural economy between 1981 and 1986, "alternative agricultural technology" was sought as a way to reduce dependence on purchased inputs by farmers strapped for operating funds.

Who Could Oppose It?

Pesticides and commercial fertilizers were developed, introduced, and adopted because they offered the promise of greater yields, improved product quality, lower production costs, lower food prices, greater food abundance, and better farm income. To a large extent that promise has been fulfilled. Moreover, farmers are not in favor of water contamination, species extinction, food contamination, resource depletion, or social disintegration in rural communities. Many, perhaps most, farmers view their customary production practices with favor and view the negative side-effects as unintended, and as unfortunate isolated instances, rather than as a general phenomenon. They may be inclined to view the occasional isolated misfortune as an acceptable price to pay for the generalized benefits of better yields and improved product quality that otherwise result from conventional agricultural practices.

Further, the well-publicized examples of organic farms that turn a profit are widely viewed as isolated case examples, and the lure of a market for organically grown produce is typically viewed as a "niche," as a specialized market, available for a subset of producers who feel inclined to produce for that market. Many agricultural producers are skeptical that organic farming practices, if forced upon all farms in the nation, would achieve anything like the successes claimed for them in those isolated cases where they have been implemented recently. There is concern that overall yields will decline; quality, variety, and availability will become variable or will decline; and food prices will rise.

Some agricultural production areas did not thrive, historically, until commercial fertilizers and pesticides became available. This is especially true of much south Florida production. Talk of mandatory restrictions in pesticide and fertilizer availability is cause for unease in these producing regions. It is for these reasons that much of the farming sector in the U.S. continues to make liberal use of pesticides and synthetic fertilizers in their management practices.

Implications

It is not likely that farmers in general, or citrus growers in particular, will be willing or able to voluntarily depart radically from production methods currently in vogue during the near future. In certain critical areas, however, there is already mounting pressure from environmental agencies for farmers to reduce adverse environmental impacts. Groundwater contamination from certain nematicides has resulted in cancellation of one product and further label restrictions on another. Water pollution from animal wastes has resulted in

mandatory changes in management practices by dairy operations in certain parts of Florida. Similar environmentally oriented regulations will probably affect other parts of Florida agriculture in future years. Nitrate contamination of groundwater is a current concern of the Florida Department of Environmental Regulation.

In response to environmental concerns and to technical problems with earlier pesticide compounds, researchers at the University of Florida's Institute of Food and Agricultural Sciences, as well as other agricultural research establishments around the country, have developed alternative technologies to reduce dependence on chemicals and to reduce adverse environmental impacts. Integrated Pest Management is one such alternative. It is a systems approach to reduce pest damage to tolerable levels through the use of predators and parasites, genetically resistant hosts, natural environmental modifications, and, when necessary and appropriate, chemical pesticides. Better pesticide management will result from current research into the factors that determine how much, if any, of a pesticide applied at the land's surface (or on crop vegetation) will find its way into groundwater supplies.

Similar research offers prospects for better fertilizer management and reductions in fertilizer costs and water contamination. If successful and widely applied, these procedures help to insure that crop production does little or no damage to water quality. Integrated Landscape Management and Integrated Crop Management are labels for a systems approach to landscape management in the urban environment and crop management in agriculture that combine species selection, site selection, and selection of management practices in ways that reduce adverse off-site impacts, reduce purchased inputs and maintain profitability and function.

The next technological revolution is likely to come from biotechnology, particularly recombinant DNA. The ability to build drought tolerance and pest resistance into commercially grown species will improve the ability of farmers to reduce adverse environmental impacts of farming.

Commentary

Those who lambast "chemical agriculture" and who deplore the "arsenal of poisons" used in pest management are typically responding to concerns about water contamination, food safety, resource depletion, environmental safety, and socioeconomic change in rural communities. These advocates of "alternative agriculture" render a positive service by calling attention to valid environmental and social concerns. To some extent, however, those calling for change in farming technology are guilty of oversimplification and of generalizing from limited evidence.

It will be very important for farmers and researchers to cooperate in the development and adoption of viable production methods that guard against adverse health and environmental impacts. Advocates of "alternative agriculture" will probably find a more receptive audience among farmers if they cast their recommendations for change in terms that consider the very real social and economic needs of farmers in the wide variety of climatic and geophysical conditions under which agricultural production occurs.

References

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Crossen, Pierre. 1989. What is alternative agriculture? Am. J. Alt. Ag. 4:28-31.