Organic Farming Becomes "Legitimate"

Bergland sees the USDA's forthcoming report on organic practices as a much-needed boost for a promising mode of agriculture

The "organic farmer" seems to have been regarded by most of the agricultural establishment as, at best, a dedicated gardener, and, at worst, back-to-nature romantic left over from the 1960's. But organic farmers may soon find themselves taken seriously as practitioners of a mode of farming that offers at least partial relief to what some farm experts believe is an emerging crisis in American agriculture. If they do take on this new and more favorable image, it will be due in part in to a report that the U.S. Department of Agriculture (USDA) expects to issue this July.

The report, which represents the USDA's first systematic look at organic farming since chemical farming became dominant in the 1940's, does not suggest that a sweeping conversion of farmers to organic methods is either likely or desirable. But it suggests that many farmers can, and perhaps should, adopt organic farming practices, combining them with conventional practices if necessary or desired.

The report speaks of increasing concern "about the adverse effects of our U.S. agricultural production system, particularly in regard to the intensive and continuous production of cash grains and the extensive and sometimes excessive use of agricultural chemicals." It cites the following: the sharply increasing costs of energy and chemical fertilizer; declines in soil productivity and tilth from excessive erosion and loss of organic matter; water pollution from erosion, sedimentation, and runoff of farm chemicals; hazards to food safety and human and animal health from heavy use of pesticides; and loss of localized farm marketing systems and "demise of the family farm."

Secretary of Agriculture Bob Bergland told *Science*: "We think it is an important report—the first recent report to look at organic farming as a legitimate and promising technique. The past emphasis has been on using chemicals, but this has been driven by availability of low-cost oil [and natural gas]. The economics of farming have now changed substantially. We now depend on imported oil and exported wheat, and farmers are worried about these forces over which they have no control. People are looking for ways to reduce their fuel-related inputs."

The organic farming report was prepared by a team of mostly mainstream biologists, soil scientists, and social scientists assembled by the USDA's Science and Education Administration (SEA) and chaired by Robert L. Papendick, a prominent soil scientist with SEA's land management and water conservation research unit at Pullman, Washington. Although cautiously worded, the report is on the whole quite upbeat in its conclusions.

"Contrary to popular belief," the report says, "most organic farmers have not regressed to agriculture as it was practiced in the 1930's. While they attempt to avoid or restrict the use of chemical fertilizers and pesticides, organic farmers use modern farm machinery, recommended crop varieties, certified seed, sound methods of organic waste management, and recommended soil and water conservation practices."

The study team was impressed by the ability of organic farmers to control weeds in crops such as corn, soybeans, and cereals through "timely tillage and cultivation, delayed planting, and crop rotations," with little or no use of herbicides. These farmers' efforts to control insect pests are also regarded by the team as having been "relatively successful."

The report says that the organic farming movement represents a "spectrum of practices, attitudes, and philosophies," with some of its practitioners rejecting all use of chemical fertilizers and pesticides and others making selective and sparing use of such chemicals "when absolutely necessary."

The report includes a long list of recommendations which, taken together, call for redirection of a significant part of the research carried on by the USDA and the cooperative research supported by the department in state land-grant colleges and universities. Productive organic farming systems are said to be complex and to involve poorly understood chemical and microbiological interactions. According to the report, a holistic research approach is needed for a thorough investigation of these interactions and their relationship to organic waste recycling, nutrient availability, crop protection, energy conservation, and environmental quality.

The report had its genesis in a Christmas visit that Secretary of Agriculture Bob Bergland made in 1978 to his home town of Roseau, Minnesota, a small farming community in the northwest corner of the state. While in Roseau, Bergland received a visit and some surprising information and advice from a friend and neighbor, Paul J. Billberg, a prosperous and respected Roseau County grain and livestock farmer.

Billberg and his son, Dale, wanted the Secretary to know about their successful switch, some 6 years earlier, from chemical to organic farming. The Billbergs farm some 1500 acres, raising cash crops such as wheat, flax, and barley on about 1000 acres and maintaining sheep (up to 400 ewes in some years) and cattle. In the early 1970's there was a disturbing amount of disease in the livestock—for instance, with the sheep and lambs suffering from pneumonia, scours, and overeating. The Billbergs did not know why their animals were having health problems, but suspected that the heavy use of chemical fertilizers and pesticides on the farm might be to blame. They were also concerned lest the chemical harm them and their families, although they had not experienced health problems.

Also, the Billbergs had noticed that, while they were applying more fertilizer each year and were on a full pesticide program, their crop yields were not increasing and were even going down a bit. In addition, over the previous decade there had been a progressive hardening of the soil. "The life and tilth of the soil were just not there any more," recalls Dale Billberg.

What led the Billbergs to switch to organic farming was a meeting held in Roseau by the Wonder Life Corporation of Des Moines, Iowa. The effectiveness of this company's product—a lignite-based trace element fertilizer to which soil microbes and small amounts of rock phosphate and potash are added—is a matter of some dispute among soil scientists. But the farming practices prescribed as part of the so-called "Wonder Life Program" are regarded as highly ef-

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fective by all organic farmers and by a number of soil scientists as well.

These practices include giving up inorganic farm chemicals (the Billbergs still use a mild herbicide occasionally); adopting a rotation system that allows alfalfa to provide, through symbiotic fixation, the nitrogen grain crops require (manure spread on the land also contributes nitrogen and other nutrients); and going to shallow tillage instead of practicing the deep tillage that inverts the soil and brings up weed seeds, uses more tractor fuel, and results in greater loss of organic matter through oxidation and erosion.

The Billbergs were highly pleased with their new farming regimen and are now convinced that it has brought major benefits. Crop yields per acre have been as good as or a bit better than they were before, they say, and so has their net farm income, as lower production costs compensate for the smaller grain crops resulting from the greater acreage now in alfalfa. Savings due to the elimination of chemical fertilizers and nearly all pesticides had been predictable, but there were even savings on tractor fuel because the soil improved in tilth and became easier to work. Moreover, despite the widely held belief that organic farming is relatively labor-intensive, the Billbergs have found their work to be simpler and easier than before.

Then, on top of everything, the Billbergs saw an improvement in the health and eating habits of their livestock. The animals got by on less feed, suffered less disease, and, on those occasions when some animals were given antibiotics, they responded much better than they had when such medication was being regularly included in their diet.

In light of their experience, the Billbergs urged Secretary Bergland to have the USDA look into and promote organic farming practices. Bergland says that receiving such advice from a prominent, politically conservative farmer and active Farm Bureau member in his home county made a real impression. Accordingly, on his return to Washington, the Secretary asked Anson R. Bertrand, the USDA's director of science and education, to have SEA undertake the study and prepare the report that is now about to be made public.

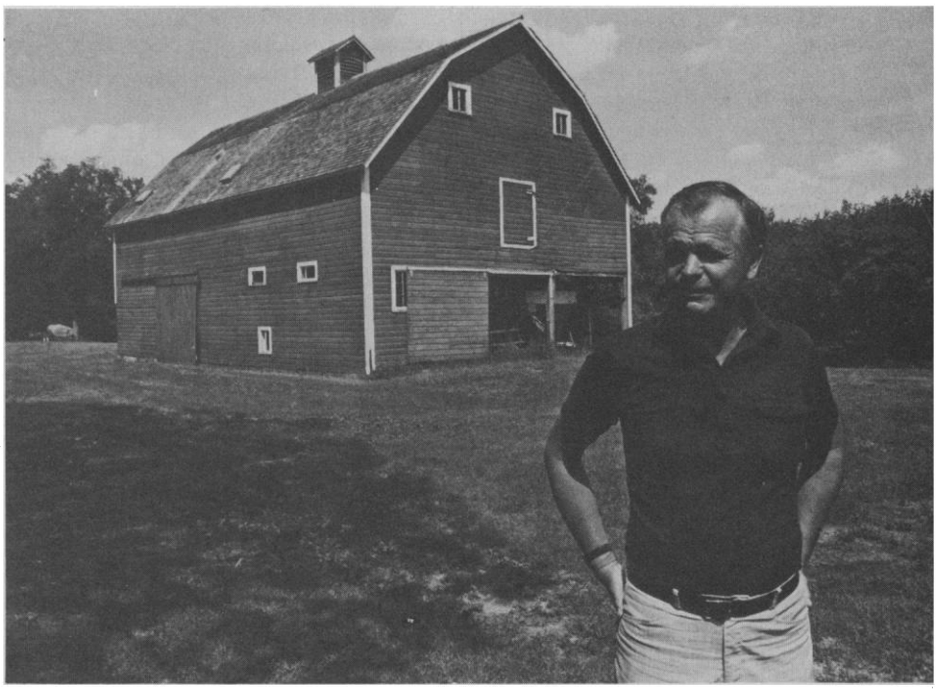
Just how little the USDA had previously concerned itself with organic farming was evident in the fact that the study team Bertrand appointed found itself in an undefined and still largely unexplored universe. What is an organic farmer? How many are there? Where are they? And how are they faring compared to conventional farmers? Some of these questions had been investigated by university-based researchers, such as those at the Center for the Biology of Natural Systems at Washington University, Saint Louis, but nothing resembling a systematic review of organic farming had been undertaken.

To get its bearings, the USDA study team, representing one of the world's largest research establishments, had to go for help to Rodale Press in Emmaus, Pennsylvania, the publisher of *Organic Gardening* and *New Farm* and one of the early pioneers in the promotion of alternative agricultural practices based on the use and recycling of organic materials.

A questionnaire prepared jointly by the study team and Rodale Press was mailed to 1000 subscribers of *New Farm*, who were selected at random from the magazine's total subscription list of 80,000. Some 700 responded; nearly 100 said they farmed strictly by organic methods and about 200 identified themselves as farmers who use a combination of organic and conventional practices. Previously it had been thought that organic farmers in this country numbered about 20,000, compared to some 1.7 million conventional farmers; but, from the Rodale Press survey, it appeared that among *New Farm* subscribers alone there are some 35,000 farmers who rely in whole or in part on organic practices.

Members of the study team visited 69 such farmers, in 22 states, during the summer of 1979. Papendick was one of the team members who visited the Billbergs' farm. "I was very impressed," he says. "The Billbergs are good managers. They emphasized timeliness in planting, tillage operations, and weed control."

But while the study team's visits to farms across the country confirmed that organic farming practices are being successfully applied, perhaps the most important thing gained from those visits and from the study overall was a sharpened awareness that organic agriculture is poorly understood and that few hard-and-fast judgments about its advantages and limitation are now warranted.



Secretary of Agriculture Bob Bergland on his farm near Roseau, Minnesota.

For example, although the Billbergs are convinced that continued applications of high levels of inorganic nitrogen fertilizer destroys microbiological processes in the soil and robs the soil of its tilth, there is as yet no scientific confirmation that this is true. In soils treated with a single heavy application of anhydrous ammonia microbial activity has been found to be suppressed for periods of up to 7 weeks but then to recover. While there might not be such a recovery after repeated and frequent applications over a long period, this has not been demonstrated. Similarly, the Billbergs' belief that the once poor health of their livestock was attributable to farm chemicals is at the moment only a worrisome speculation.

The study team did, however, arrive at a number of significant, albeit often tentative, conclusions. For instance,

• *Nutrient budgets*. Enough nitrogen for moderate to high crop yields can be obtained through crop rotations and re-

turn of animal manures and harvest residues to the soil. But plant needs for phosphorus and potassium must also be met and any organic farming regimen that excludes additions of these minerals other than by recycling manures will often amount to "mining" the soil of these essential nutrients. Whether in an intensive organic system enough phosphorus and potassium for good plant growth will be released from natural rock phosphate and potash (sources of low solubility) is said to be an as yet unanswered question. The potential for making up nutrient deficits by drawing on off-farm sources of organic wastes is limited because most animal manure and crop residues are being returned to the soil already.

• *Energy needs*. Studies comparing the energy requirements of organic and conventional farmers for the growing of barley and three varieties of wheat found net energy savings of from 15 to 47 percent for the organic farmers; except in the case of winter wheat, the organic farmers used more fuel but this was more than offset by the fact that they used no inorganic fertilizers.

• *Crop yields*. The study team found that comparing yields of organic and conventional farmers is difficult and controversial because short-term studies may not reliably indicate long-term performance. Whether the organic farmers' yields are superior or inferior to the conventional farmers' appears to vary by crop and by region.

• *Economics*. Most organic farmers believe that their net farm income is no higher than that of conventional farmers and may be lower; but they believe their indebtedness to be less. The possibilities for a shift from conventional to organic farming is said to be limited in some areas by climate, lack of adequate supplies of organic wastes, or other factors, such as soils poor in phosphorus and potassium.

Modeling studies cited in the report show that, if a total shift to organic farming were somehow to occur, domestic food needs would be met but farm exports would fall short of their potential. Grain prices and farm income would be higher, and so would the prices paid by consumers.

"Based on our observations," the study team said, "the greatest opportunity for organic farming will probably be on small farms and on larger mixed crop/livestock farms with large numbers of animal units."

Making the transition from conventional to organic farming often demands of the farmer the patience and wherewithal to put up with several years of poor crops, the report points out. Investigation of soil management problems inherent in the transition is seen as another of organic farming's important research needs.

For some time now, Secretary Bergland has been tilting in favor of basic as opposed to applied research and has drawn criticism in agribusiness circles for saying the USDA has no business to support development of new fruit pickers or other farm machines. In his view, the organic farming report further points up the need to focus on basic scientific questions related to soil management and crop productivity.

In light of the report, Bertrand, director of SEA, says that given the tight budgetary situation the department cannot expect to receive new money for such research but that he foresees "some reorientation of existing resources." An organic farming coordinator for SEA already has been hired, with the job going to Garth Youngberg, a political scientist from Southeast Missouri State University who served on the study team.

What is an organic farmer? How many are there?

At a meeting on 5 May at the University of Massachusetts, Youngberg, Papendick, and others associated with the study presented the report's major findings before some 140 New Englanders from extension programs, experiment stations, the state universities, and state departments of agriculture. The message appears to have been well received. "I think all of us agreed that we ought to be looking into this subject," says Frederic Winthrop, commissioner of agriculture for Massachusetts.

Similar meetings may be held this fall in the Northwest, California, and the Midwest. Interest in the report is high, as indicated by the hundreds of inquiries about it already received. Farmers tend to be set in their ways, but when there is as much trouble down on the farm as there is today, they can be amenable to change. Many may soon be taking a look at organic farming practices that can perhaps ease some of their problems, such as loss of topsoil to erosion and loss of income to escalating fertilizer costs.

—LUTHER J. CARTER

Arguments Heard for Psychedelics Probe

A Harvard psychiatrist is conducting what appears to be a one-man crusade to stimulate renewed scientific interest in psychedelic drugs. Lester Grinspoon, author with James Bakalar of the recent book *Psychedelic Drugs Reconsidered*, believes that such research with humans "did not die a natural death because of loss of interest," but became taboo because of the bad reputation won through abuse of the drugs in the 1960's.

The history of clinical research with psychedelics goes back to the 1930's, when Heinrich Kluver, psychobiologist at the University of Chicago, tried psychedelics as a complement to therapy in various psychiatric disorders. Much clinical research went on in the 1950's and early 1960's, when the drugs were tried on drug and alcohol addicts, prisoners, and dying cancer patients. But research dwindled as the drugs became widely abused, and in 1970 the Food and Drug Administration added them to schedule I, the category of the most tightly controlled substances.

Now, although there is continued extensive abuse of psychedelics, Grinspoon believes the climate is right to take another look at the drugs. He contends that they could shed much light on such areas as brain lateralization, altered states of consciousness, and the search for receptor sites in the brain. And, he says, as therapy "they are really crying for more attention." Grinspoon acknowledges that "controlled studies are not that impressive," but believes there is enough anecdotal evidence to justify further explorations. Single doses of LSD, given to alcoholics or drug addicts, for example, have induced in some deep experiences, akin to religious conversions, that have afforded them a new vision of their lives and enabled them to shake their habits. Grinspoon also says "psycholytic" therapy—the administration of psychedelic drugs in conjunction with psychotherapy—needs further exploration. "If, as Freud said, dreams are the royal road to the unconscious, is it possible that psychedelic drugs are a superhighway to the unconscious?"

Among the few researchers now in-

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