Why aren't all the farms in Maine organic?

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February 16, 2007

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Summary

A farmer's choice to adopt organic methods is based on a mix of economic and personal values. While there are known problems from the use of synthetic inputs in conventional agriculture, the high yields and economic efficiency they provide are strong incentives for their use.

Organic crops, meat, and dairy usually require more labor and therefore costs more to produce than conventional counterparts (MOFGA 2007). Distribution and marketing costs may also be higher because of the need to segregate organic from conventional produce and the relatively smaller volumes for organic products (Ibid). For some commodities, organic price premiums are required to make organic systems as profitable as conventional systems (e.g. Dalton et al. 2005, USDA 2005a).

Organic agriculture became one of the fastest growing segments of U.S. agriculture during the 1990s. But this growth was not even across commodities. Fresh fruit and vegetables account for 80 percent of organic sales (Ibid). Despite recent growth, overall adoption level is still low. Only about 0.5 percent of all U.S. cropland and 0.5 percent of all U.S. pasture was certified organic in 2005 (USDA 2006b). In relation to its population size and total crop acreage, Maine ranks high in acres of organic production and number of organic farms (Ibid).

In addition to organic agriculture, there are other approaches to minimizing pesticide use and environmental disruption by agriculture, including integrated pest management and sustainable agriculture. Agriculture is a difficult and competitive business. There is market demand for the perceived advantages of both conventional (e.g. price and availability) and organic (e.g. environmental and health benefits) production systems.

Introduction

Why aren't all the farms in Maine organic? This question was recently posed at a legislative hearing to the Maine Board of Pesticides Control. Sometimes a simple answer is not adequate to fully answer what appears to be a simple question. The issues surrounding organic agriculture have been the topic of much writing, discussion, and at times, contentious disagreement. This document is an attempt to address the question concisely, but with enough detail and breadth to answer meaningfully.

This response is primarily based on national, not Maine-based, economic analyses. It seems reasonable to assume that Maine farmers respond to the same economic principles as U.S. farmers in general. This response also strives for neutrality. Rather than compare the arguments for or against different practices, this document is based on reports from two USDA programs as ostensibly neutral sources: the Economic Research Service (ERS), and the Cooperative State Research, Education, and Extension Service (CSREES).

To formulate an answer requires defining the terms and context of the question.

What is "organic agriculture"?

The meaning of "organic" when applied to farming has been the subject of debate. To provide consumers with assurances that products labeled as organic were produced in a certain manner, certifying organizations were founded, starting in the early 1970s. Differences in production practices allowed by the various certifying organizations in different parts of the U.S. and in other countries left consumers wondering exactly what they were buying. This led to federal legislation to define and control the use of the word "organic" in marketing products in the United States (USDA 2006a).

The statements in this document assume that "organic" means a production system that is managed in accordance with the Organic Foods Production Act of 1990, and its subsequent amendments. The intention of the Act is to define production systems that respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity (USDA 2002a). The specifics of organic certification were addressed with release of the USDA National Organic Standards in 2002.

The national standards took the form of lists of allowed and disallowed inputs. With some exceptions, an organic approach virtually prohibits synthetic fertilizers, synthetic pesticides, and other chemicals in crop production; and antibiotics or hormones in livestock production (USDA 2006b). The organic standards generally allow pesticides, fertilizers, and other inputs defined as being of natural origin. Organic livestock guidelines include requirements for organically grown feed and living conditions.

The national standards have been widely accepted, but are not without detractors. Some organic proponents see the USDA regulations as contradicting the site-specific and holistic nature of an organic approach. To critics of the standards, the attempt to achieve regulatory specificity promotes an overly simplistic input-substitution approach.

USDA recognizes that organic agriculture is not simply the avoidance of conventional chemical inputs, nor is it the substitution of natural inputs for synthetic ones. USDA reports describe organic agriculture as a site-specific process where ecosystem processes, nutrient cycling, soil organisms, species distribution and competition are incorporated as farm management tools (USDA 2005a, 2006a).

Organic certification deals with other aspects of the production system beyond pest management, including soil and nutrient management, and crop genetics. Organic practitioners must also deal with issues beyond the specifics of what is, or is not, organic. Farming is complex, and regardless of affiliation with “conventional”, “organic”, “sustainable” or other approach, an agricultural enterprise needs to address challenges including pest management, manure management, equipment and technology, small farm viability, labor availability, and occupational safety. Agriculture is second only to mining in recorded injuries and fatalities (USDA 2006c).

In order to describe organic agriculture requires discussion of historical context and of other approaches with similar goals.

Organic agriculture in historical context

Technological progress in the 19th and 20th centuries was applied toward maximizing agricultural production with tremendous success. This process accelerated after World War II. This period saw the completion of the transition from animal to tractor power, the use of hybrid seeds, adoption of improved livestock breeding, and the use of more agricultural chemicals, both fertilizers and pesticides.

Between 1948 and 1994, total farm output rose 137%, while farm labor decreased by 71%. Agriculture continues to have one of the highest rates of productivity growth in the U.S. economy (Ahearn et al. 1998). The American standard of living improved as agricultural productivity gains were passed on to the consumer in the form of lower food and fiber prices. The portion of disposable income spent on food decreased from 22% in 1948 to 11% in 1994 (USDA 2005a).

Agricultural productivity also reduced inequality in living standards because lower food prices benefit low-income people more than high income people. This is because low-income people spend a larger share of their income on food than do high-income people (Ahearn et al. 1998). High levels of agricultural productivity freed up resources for use by other sectors of the economy, such as health care and education that would otherwise have been used to meet basic food needs.

Increased productivity lowered real agricultural output prices and improved the international competitive position of U.S. agriculture. The United States is the leading agricultural exporter (Ahearn et al. 1998). Given the persistent U.S. trade deficit overall, the trade surplus in agricultural products is critical to the health of the U.S. economy (Ibid).

But these gains were not achieved without costs. Increased food and fiber supply led to lower per unit returns to producers, and made large economy of scale efficiencies essential for profitability. Smaller producers were driven out. The focus on maximal production overlooked environmental, health, and social costs, and questions about long-term sustainability (USDA 2006c).

As the costs of industrialization and use of artificial inputs in manufacturing, agriculture, and elsewhere in society became more apparent, interest in sustainability arose. Sustainable development seeks to meet the needs of the present without compromising the ability of future generations to meet their own needs (USDA 2006d). Sustainable agriculture is a subset of this broader concept, with the goals of improving profitability, environmental stewardship, and quality of life for farm families and their communities (USDA 2006e). Agriculture has a unique role in sustainability, as it accounts for a majority of land and water use and is a major contributor to environmental impairment (USDA 2005a).

Sustainable agriculture places an emphasis on rural community vitality and encompasses many approaches, including organic and others (USDA 2006f). Organic agriculture is generally considered to be under the sustainable agriculture umbrella, but organic practices and restrictions may conflict with sustainability goals (Ibid). Opinions differ on the relative importance of organic agriculture to sustainable agriculture (Ibid).

To address issues around adoption of organic agriculture in detail requires narrowing the focus. This discussion will focus on pest management, which I would like to reemphasize is only one of several domains within organic agriculture.

It was not long after the increase in synthetic pesticide use after World War II that concerns rose about their undesirable impacts. Three landmarks in the awareness and addressing of negative pesticide impacts were the publication of the book “Silent Spring” by Rachel Carson in 1962, the founding of the U.S. Environmental Protection Agency in 1970, and the Federal Insecticide, Fungicide, and Rodenticide Act of 1972.

USDA has played a major role in devising and implementing new pest management practices. Scientists, producers and consumers have advocated for less pesticide use and greater use of biological and cultural pest management methods. Government programs to encourage development and use of biological and cultural methods include integrated pest management (IPM), the national organic standards, regulatory streamlining for biological pest control agents, and genetic engineering of crop plants (Osteen 2000).

One definition of IPM (among many) is “A management approach that encourages natural control of pest populations by anticipating pest problems and preventing pests from reaching economically damaging levels. All appropriate techniques are used such as enhancing natural enemies, planting pest-resistant crops, adapting cultural management, and using pesticides judiciously.” (USDA 1993).

In practice, an IPM strategy draws from a variety of tactics including: field scouting, traps, and weather modeling to measure pest populations or disease risk; better knowledge of the consequences of various levels of pest and predator populations including economic action thresholds for pest species; more precise timing and application of pesticides; rotations between pesticide classes; cultural methods to influence pest and natural enemy populations; crop rotations; and more precise timing of planting (USDA 2005b).

A complete, practical, and accepted method to measure IPM adoption is not yet available. Comparison across crops and regions is complex because different pest classes (i.e. insect, diseases, weeds, nematodes) dominate in different crops and regions, calling for different pest management techniques to control them (Fernandez-Cornejo and Jans 1999). Even with these difficulties, studies have found that over half of U.S. farmers use at least a minimum level of IPM, with scouting for insect pests and basing insecticide applications on reaching economic thresholds as commonly used tactics (Vandeman et al. 1994)

Organic pest management can be seen as a more restricted version of IPM, in which only naturally-based pesticides are allowed, and where an attempt is made to compensate for the restriction against synthetic pesticides by increased attention to biological and cultural methods, and shifts in marketing to allow for higher tolerance of pest damage.

Adoption of organic agriculture

As public interests have further constrained farmers with increased demand for clean air and water, healthy soils, humane animal treatment, and minimal chemical applications, many consumers have taken a greater interest in where their food comes from and how it is grown. This has created demand for agricultural products that adhere to certifiable "healthy" production practices. Organic operations seek to meet this demand.

Apart from market demands, organic proponents seek to operate in accordance with personal values. Many reasons are cited by farmers for adopting organic practices, including:
(a) Economic - to lower input costs, to capture high value markets,
(b) Environmental - to conserve nonrenewable resources, to be an environmental steward, and
c) Health - to reduce exposure to agrochemicals (USDA 2006a).

In pursuit of these values and markets, organic producers seek to lower production inputs and costs, to apply environmentally sound practices (manures, cultural pest management, and minimal soil disturbance), and to maintain healthy agro-ecosystems (USDA 2006c). These farms tend to be smaller, closer to the consumer geographically and in the supply chain, and individually produce a variety of products (Ibid).

Organic agriculture became one of the fastest growing segments of U.S. agriculture during the 1990s. Between 1995 and 2005, organic acreage in the United States doubled, and consumption of organically produced products has increased 20 percent per year (USDA 2006a). But this growth was not even across commodities. Fresh fruit and vegetables account for 80 percent of organic sales (Ibid).

While the growth rate has been high in recent years, the overall adoption level is still low—only about 0.5 percent of all U.S. cropland and 0.5 percent of all U.S. pasture was certified organic in 2005 (USDA 2006b). These statistics are heavily influenced by the 'big acreage' commodity crops such as corn, soybeans and wheat for which the percent of certified organic production is well below 1 percent: i.e. corn and soybeans at 0.2 percent each, and wheat at 0.5 percent. On the other hand, organic accounts for a higher portion of other U.S. acreage for other crops such as carrots (6 percent), lettuce (4 percent), and apples (3 percent) (Ibid). Fresh produce is the top-selling organic category, followed by nondairy beverages, breads and grains, packaged foods (frozen and dried prepared foods, baby food, soups, and desserts), and dairy products (Dimitri and Greene 2002).

During the 1990s, organic dairy was the most rapidly growing segment, with sales up over 500 percent between 1994 and 1999 (Dimitri and Greene 2002). Organic livestock sales were beginning to catch up with produce in 2005, with 1 percent of U.S. dairy cows and 0.6 percent of the layer hens managed under certified organic systems (USDA 2006b).

Ranked by size, Maine is the 39th of the 50 states, and a large portion of that area is undeveloped forest land. Ranked by population, Maine is 40th, with just over 0.4% of the total U.S. population. But in relation to its size, Maine has notably high rankings for the number of acres of certified organic production for several commodities (Table 1).

Table 1. Organic commodities for which Maine had high state ranking in 2005 (USDA 2002b, 2006b).

Commodity	Organically certified acres or animals in Maine	Percent U.S. organic acreage/ animals	State ranking for U.S. organic (1-50)	Approx. percent of Maine total
Trees for maple syrup	4,521 trees	37%	2	0.3%
Apple	136	1%	7	4%
Other non-tree fruits (presumed to be primarily lowbush blueberry for Maine, U.S. total includes other crops)	770	2%	6	~3%
Acreage of small mixed vegetable farms (less than 5 acres per farm)	190	4%	7	~3%
Potatoes	165	1.4%	15	0.3%
Cut flowers	19	10%	2	na
Cultivated herbs	41	0.8%	13	na
Sheep and lambs	371	7%	5	4%
Milk cows	3,743	4%	10	11%
Other cows	3,350	6%	7	4%
Haylage and Silage	1,451	13%	4	6%
Other hay and pasture	9,810	5%	8	6%
Number of farms				
Number of organic crop and livestock operations	288 operations	3% of U.S. operations	10	4%

So…Why aren't all the farms in Maine organic?

Farmers make decisions about what their product is, how they will produce it, and who they will sell it to. A full discussion of the factors that drive those choices is beyond the reach of this report. Studies by the USDA Economic Research Service (ERS) are online at http://www.ers.usda.gov/. ERS examines factors that influence the decisions of farmers to use environmentally preferred pest, nutrient, and soil management practices (such as conservation tillage, IPM, precision farming, nutrient testing, organic farming, and biotechnology), the environmental and economic effects of these decisions, how can government policies influence those decisions and consequences, how individual management practices and technologies fit within production systems, and how they contribute to sustainability (USDA 2001).

But rather than throw up my hands and say “I don’t know, it’s a complicated question, ask ERS!”, I will hazard some guesses. While the text and statistics cited are from credible sources, the reasoning described below reflects personal opinion, the limits of my knowledge, and response time.

Society wants food and fiber products that are low-cost, safe to consume, and aesthetically pleasing, and wants production systems that preserve or enhance the environment. These are often competing goals and manifest themselves in how the inputs are selected, combined, and managed at the farm level (USDA 2001). Organic crops, meat, and dairy usually require more labor and therefore costs more to produce than conventional counterparts (MOFGA 2007). Distribution and marketing costs may also be higher because of the need to segregate organic from conventional produce and the relatively smaller volumes for organic products (Ibid).

Obstacles to organic adoption by farmers include:
- high managerial costs and risks of shifting to a new way of farming;
- limited awareness of organic farming systems;
- lack of marketing and infrastructure;
- inability to capture marketing economies (USDA 2006b); and
- increased need for site-specific information (USDA 2006c).

Results from a recent study (Glass 1992) on impediments to greater adoption of IPM also seem applicable to organic agriculture:
- lack of funding and personnel to conduct site-specific research and demonstrations;
- producer perception that IPM is riskier than conventional methods, more expensive, and not a short run solution; and
- educational degree programs that are structured toward narrow expertise rather than broad knowledge of cropping systems.

In short, adopting organic agriculture requires knowing how to produce goods organically, being able to sell them at a price that exceeds production costs, i.e. at a profit; and to be able to produce and sell those goods in high enough volume to generate sufficient income. Organic production methods are the subject of ongoing research.

A study of Maine and Vermont dairy farms in 2004 found that the average rate of return on farm assets for organic operations was negative 2.9 percent. By contrast, small non-organic dairy farms in the Northeast region generated a 4.1 percent positive rate of return. An average milk price premium of 19 percent would have been required to equal the return enjoyed by non-organic farms (Dalton et al. 2005). An update of this study found that in 2005 producing organic milk cost more for feed and labor, but also received a price premium that more than compensated for the increased costs (Richard Kersbergen, personal communication). The net result was that return on equity for organic dairies in Maine and Vermont was -.033 percent, higher than the -0.92 percent average for small New England non-organic dairies.

Studies on other agricultural commodities have found cases where organic price premiums are required to make organic as profitable as conventional systems, and also cases where similar or enhanced yields combined with sharply lower input costs result in organic systems being more profitable even without price premiums (USDA 2005a).

Beyond the production issues, there are the marketing factors. If organically produced goods are to receive a price premium to compensate for lower usable yield or higher production costs, this requires establishing a presence for a parallel product line (i.e. organic vs. conventional vegetables). That is no small task. The majority of U.S. food sales occur in grocery stores where shelf space is valuable territory. While this transition is difficult, it is not impossible. More organic food was purchased in conventional supermarkets than in any other venue for the first time in 2000 (Dimitri and Greene 2002).

The options available in deciding whether to “go organic” vary between commodities. Depending on the commodity, it may be possible to work within the boundaries of organic certification, produce high enough yield and quality, and receive a sales price that generates adequate income. Maine dairy farmers have developed viable organic production systems and found sufficient market demand that has led to a relatively high rate of conversion to organic.

Conversely, high consumer sensitivity for cosmetic imperfections to fresh market apples; combined with lower yields; less effective, more expensive (and in some cases ecologically questionable) pest, nutrient, and crop management options; has limited the acreage of organically certified apple orchards.

Each farm business is, after all, a business. Business viability requires that costs be less than returns. The risks, resource requirements, and profit potential from adopting organic methods exist in comparison to those of conventional methods. Even with its faults, conventional agriculture has much to argue for it. The U.S. farm sector has provided an abundance of output while using inputs efficiently (Ahearn et al. 1998).

It may be inaccurate, and at best an oversimplification, to reduce the comparison of organic to conventional production as a trade-off between using less pesticide at the cost of increased use of fuel and labor. But it is certainly true that the relative prices for pesticides, fuel, and labor are relevant to a farmer's decision whether to work within the boundaries imposed by organic certification.

Trends in pesticide prices relative to other input and crop prices can be a disincentive for organic adoption. Between 1965 and 1980, a period of rapid growth in pesticide use, pesticide prices increased (64 percent) (USDA 2005b). This was much less than increases in wages (233 percent), fuel prices (123 percent), and crop prices (135 percent) (Ibid). Weeds are by far the most pervasive pests in U.S. agriculture, and herbicides are the most commonly used type of pesticide, accounting for 60% of total pounds of pesticide active ingredient in 2001, followed by insecticides at 12%, and fungicides and other pesticides at 28% (USDA 2005b). From 1990 to 2003, the herbicide price index rose by 12%, the index for insecticide prices rose 46%, and the index for fungicides and other pesticides rose 17%. Weighted by pounds of use then, the average pesticide price index increase from 1990 to 2003 was roughly 18%. During that same period, the index for fuel costs increased 40% and wage rates 57% (Osteen 2000, Osteen and Livingston 2006).

Risk aversion is another key factor in farmer decisions. To reduce risk of large financial losses, some producers may find it rational to apply pesticides or other inputs in excess of profit maximizing levels (Osteen 2000). One explanation for increased pesticide use from 1945 through 1980 is that pesticides often cost less and contributed to higher and less variable yields than previously used nonchemical methods (Ibid). Most pesticide productivity studies have showed pesticides to be cost efficient inputs from the farmer's perspective (Ibid). These trends encourage the substitution of pesticides for labor, fuel, and machinery used in pest control.

The rationale for adopting organic pest management methods is typically made in comparison to conventional methods. But the environmental and health risk costs associated with pesticide use are not static. More stringent regulations, such as the Food Quality Protection Act

(FQPA) of 1996, and expedited registration of low-risk materials, have the goals of reducing the environmental costs and health risks associated with pesticides. The FQPA required reassessment of all pesticide residue tolerances against new safety standards, and an ongoing 15-year cycle of pesticide registration reviews against updated safety criteria.

The secondary impacts of conventional soil and nutrient management practices are also a moving target for comparison. Nationwide, soil erosion has declined by an estimated 40 percent since 1938, while cropland use has remained remarkably stable (USDA 2005a). Most of the erosion decline has occurred since 1982.

Surface-water quality in the U.S. has generally improved. In a 1974 survey, the EPA found that only about 40 percent of the largest rivers in the United States were safe enough for fishing and swimming. In 1994, 60 percent of the Nation's survey rivers, lakes, and estuaries were safe enough for fishing and swimming (Ibid). Still, agriculture has been identified by the EPA as an important contributor to surface-water impairment. Less is known about U.S. groundwater quality. Recent chemical use trends suggest that long-term improvements in groundwater quality may occur (Ibid).

The contiguous 48 States have lost about half of all wetlands since 1780. In 1954-1974 and 1974-1983, the net rate of wetland losses in the 48 states was 458,000 and 290,000 acres per year, respectively. From 1982 to 1992, the rate slowed to about 80,000 acres per year; almost 11,000 acres per year moved out of agricultural production and into wetlands (Ibid).

“Green technologies” (such as conservation tillage, IPM, enhanced nutrient management, organic farming, and precision agriculture) are those that can improve the environmental performance of agriculture without serious detriment to production and profits. However, simply making a technology available does not guarantee its adoption. Until markets are developed for the environmental attributes associated with green technologies (such as less erosion, improved water quality, and better wildlife habitat), private markets will underutilize these technologies (Ibid). The market prices of many environmental services and natural resources are less than their true value to society. This decreases economic incentive to develop or adopt technologies that conserve those resources (Ibid). The economic and environmental implications of green technologies, and barriers to adoption, vary by crop and region. No one technology will be sustainable for every farmer in every part of the country. And organic agriculture is not the only means towards a more environmentally benign agriculture.

The USDA, other government agencies, land-grant universities, consumer groups, and environmental organizations have actively encouraged use of IPM. As described above, integrated and organic pest management are complementary, not competing approaches. In many cases, adoption of IPM leads to a reduction in pesticide use, an improvement in yields, or both. Most studies also show that farmers increase their net returns by using IPM. Estimates of the impact of IPM on pesticide use, yields, and farm income are summarized in the Agricultural Resources and Environmental Indicators published by the USDA Economic Research Service (USDA 2005a).

Another alternative approach towards a less physically disruptive agriculture is bioengineered crops, an approach which is strictly prohibited from organic certification. U.S. farmers have rapidly adopted genetically engineered varieties for field crops since their introduction in 1996, notwithstanding conflicting claims about consumer acceptance, economics, and environmental impacts. Herbicide-tolerant crops, for example, provide farmers with a broader variety of options for effective weed control. In 2002, plantings of herbicide-tolerant varieties reached 75 percent of soybean acreage and 58 of cotton acreage (USDA 2005a).

Whether conventional or organic, large scale or small, agriculture is a difficult and competitive business. Maine's conventional and organic producers are exploring markets that allow them to retain more product value beyond the farm gate. Local relationships between food producers and consumers can provide better fresher food, lower transportation costs, and a more secure food-supply chain. There is market demand for the low price, availability, and wide selection of conventional farm products and also for the perceived environmental, health, and social advantages of organic products. With demand for both, there is need for both conventional and organic production environments. In some cases, individual producers are incorporating both into their agricultural enterprises.

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