North American Trends for Organic Tree Fruit Production

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Presented at the 45th Annual IDFTA Conference, February 16-20, 2002, Kelowna, British Columbia, Canada.

The emergence of the term "organic farming" to describe a distinct system of agriculture began in the first half of the 20th century. Prominent spokespersons such as J.I. Rodale, Sir Albert Howard, Lady Eve Balfour and Rudolf Steiner advocated farming methods that maintained their reliance on biological processes, with particular emphasis on a "healthy" soil. During the mid-1900s, organic farming was generally considered a fringe concept by a mainstream agriculture that was in the midst of dramatic technological change strongly influenced by chemical fertilizers, pesticides and growth regulators. Most agricultural officials considered organic farming to be impossible on a large scale, and former U.S. Secretary of Agriculture Earl Butz once asked which half of the world would starve if we switched to organic farming.

After the publication of Rachel Carson's *Silent Spring* in 1962, the consuming public became increasingly aware of some of the issues regarding modern farming practices. A small percentage of consumers began seeking food products grown under the organic philosophy. The environmental awareness of the 1970s led to increased demand for organic foods and, with the expansion of the market, a system of verification was needed to guarantee the product. This resulted in the development of organic certification programs, both public and private, that wrestled with codifying a philosophy of agriculture.

Most organic farming certification programs have relied on the general concept that natural materials are preferable to synthetic ones and have greatly restricted the use of synthetic fertilizers and pesticides in organic production. Soil building, while a central concept, was less easy to put into regulatory format. With the passage of the Organic Foods Production Act of 1990 by the U.S. Congress, the development of a uniform national rule was launched, culminating in the final National Organic Standards adopted by USDA last year, to be fully implemented in October 2002.

Organic production experienced dramatic expansion in all crops during the 1990s, including tree fruit. Growers had access to new biological pest control techniques, more choices of organically approved inputs and an expanding information base. While organic production is easier in some climates for certain crops, it is clear there is no fundamental biological obstacle to this farming system. In some cases, pest management and soil quality have been clearly enhanced by organic farming, and often organic foods bring a premium price that makes organic production a sound economic choice for growers.

Organic production of temperate tree fruits continues to expand in North America. Growers have become more interested in organic orcharding due to chronic low prices in conventional fruit markets and increased interest in alternative production systems that reduce regulatory risk. In contrast to Europe where Integrated Fruit Production was widely adopted by growers in the past two decades, organic certification is the well-known label in North America for foods grown with specific environmental standards. In the semi-arid fruit regions of western North America, certified organic production has proven very feasible.

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Several current trends bode well for organic fruit producers. Consumer research points to the growing interest in "wellness," which motivates interest in improved diet (more fruits and vegetables) and avoidance of toxins (e.g., pesticides). Organic fruit can deliver on both counts. The expanding availability of organic

FIGURE 1

Washington State trends in certified organic apple acreage and acreage in transition to organic.

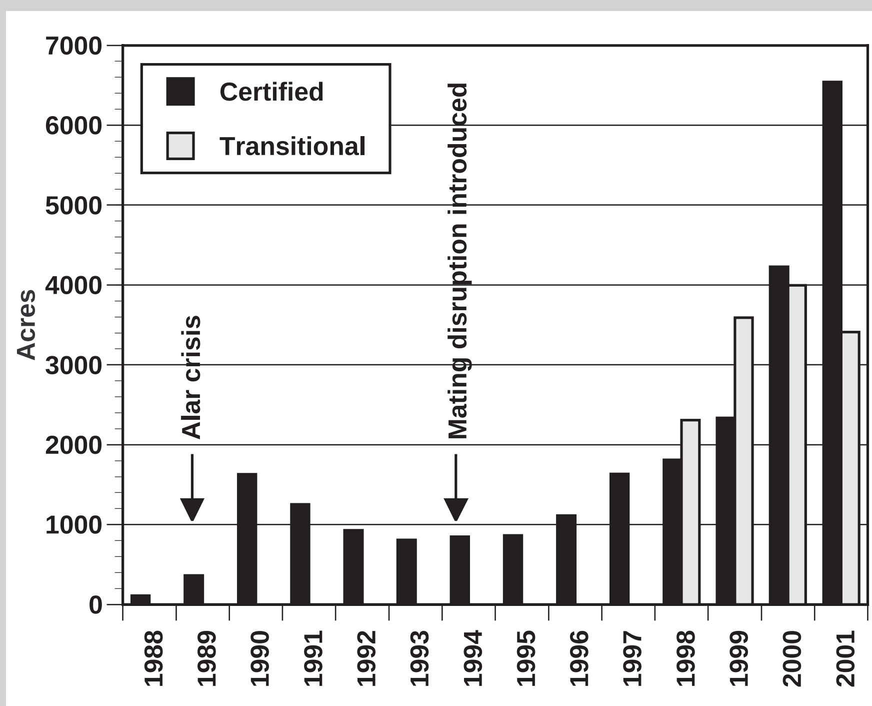


TABLE 1

Organic apple acreage for varieties in Washington State, 2001.

Variety	Certified (acre)	Transitional (acre)	Total (acre)	Total as %
Red Delicious	1872	864	2736	27
Granny Smith	1053	651	1704	17
Gala	1040	440	1481	15
Golden Delicious	860	131	991	10
Fuji	807	408	1215	12
Other	260	51	310	3
Braeburn	258	177	435	4
Cameo	151	146	297	3
Pink Lady	128	532	660	7
Golden types	111	11	122	1
Total	6540	3411	9951	

TABLE 2

Estimated U.S. certified organic tree fruit* acreage in 2001.

State	Apples	Pears	Cherries	Stone fruit	All fruit
Washington	6540	1308	303	285	8436
California	4529	842	179	3112	8662
Arizona	2800		30		2830
Colorado	1535	100	133	155	1023
Idaho	503			3	506
Oregon[1]	350	500	25		1180
Wisconsin	163	16	1		188
Michigan	163		50	2	215
Vermont	225				237
Pennsylvania[2]	150				150
New York	130	20	4		154
Nevada	55				55
Virginia	50				50
Ohio	30				34
Iowa[3]	30				50
Arkansas	18		2		20
Texas	1	12		32	45
Total U.S.	17,272	2,798	727	3,589	23,835

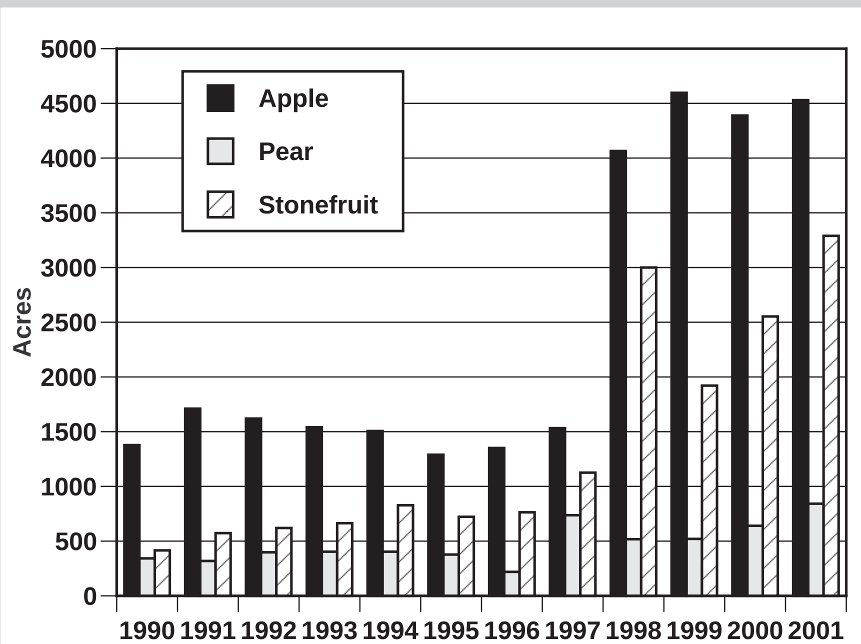
*includes only pome fruits and stone fruits.

[1, 2] figures are from 2000.

[3] estimated by M. Wills, IDALS.

FIGURE 2

Trends in California organic tree fruit acreage. (Data source changed from CCOF to CDFA in 1998.)



foods in mainstream supermarkets is helping to increase consumption. Greater public dialogue about the role of agriculture and food policy in the U.S. is raising consumer awareness about how food is produced, particularly with regard to environmental impacts and pesticide use. As organic acreage expands and more mainstream growers participate, the agriculture research and development infrastructure, both public and private, is responding with new techniques and tools for growers. With the recent passage of the USDA National Organic Standard, there will be more regulatory certainty and consistent standards that should enhance trade. Also, organic foods are the best bet for those consumers who want to buy foods free of Genetically Modified Organisms.

At the same time, growers must be aware of potential pitfalls. With the organic market share still relatively small, a modest increase in production easily can overshoot demand. The "industrialization" of organic is changing the markets and relationships growers have enjoyed in the past. Vocal critics of organic methods have emerged who are trying to undermine public confidence in the product. Also, conventional production of many foods moves ever closer to organic, potentially blurring the distinction and eroding the market premium.

PRODUCTION TRENDS

The first major expansion in organic fruit production occurred in 1990 as a direct result of the Alar incident (Fig. 1). Organic apple acreage in Washington State nearly quadrupled as growers searched for profitability and wanted to minimize future risks. Also, the state certification program required only one year of transition at the time, with a planned phase-in of 3-year transition by 1992. Thus entry was relatively easier than what it was going to be in the future. However, many growers were unable to cope with the codling moth damage and other challenges of organic production, and nearly half the growers abandoned organic production by 1992.

During the mid-1990s, organic tree fruit acreage in Washington and California (Fig. 2), the leading states, was relatively stable. Market demand stayed slightly ahead of supply, and prices to growers remained high. By 1994, pheromone mating disruption for codling moth was commercially available and field tested. This new technology was a major breakthrough for organic apple and pear production. In most cases, it provided very satisfactory control of codling moth at lower cost and labor than other options. Continued high prices for organic fruit plus this new tool induced more growers to try organic fruit production, and acreage began to expand in Washington State in 1996.

Poor prices for conventional fruit in the late 1990s spurred more growers to try organic production. Often they were motivated by financial considerations and converted old Red Delicious apple blocks to organic, hoping to turn a profit. However, organic consumers do not appear to favor Red Delicious in the same proportion as the conventional market (J. Parker, pers. comm.), and an oversupply of organic Red Delicious developed that weakened prices (Gabriel, 2000). Red Delicious was and is the largest acreage of organic apples in Washington but has declined as a percent of the total from about 45% in 1998 to 27% in 2001 (Table 1).

The first study of trends in organic tree fruit production in the U.S. was completed in 1999 (Granatstein, 2000a). Washington, California and Arizona dominated the production, representing about 80% of the organic apples in the country (Table 2). Colorado's tree fruit industry has also shifted to more organic production to remain competitive and utilize the climatic advantage. Apple scab was and is the main impediment to successful organic production in more humid regions, as well as numerous insect pests. The 1999 study also documented for the first time the acreage in transition to organic in Washington State, allowing growers to better anticipate future production and its impact on prices. In 1998, Washington State had more apple acres in transition to organic (2672 acres) than certified (1809 acres). This rapid increase in production, which has also occurred in other countries (Table 3), appears to have led to excess supply, as evidenced by softening prices and reports from growers (Fig. 3). Increased international competition, especially counter-seasonal fruit from the southern hemisphere, and retail consolidation have altered the marketplace and made organic fruit production less profitable than in the past.

These statistics illustrate how quickly organic production has grown in some regions. For example, 5 years ago New Zealand had virtually no organic apple production and now organic accounts for over 10% of the acreage. While total apple production in Europe is generally double that of the United States, the latter has over twice as much organic apple acreage.

MARKET TRENDS

As the organic food sector has matured in terms of distribution, availability, choice and quality control, more mainstream agricultural interests with the ability to rapidly ramp up production have entered the scene. Organic food sales in the U.S. have grown about 20% per year for the past 8 years and thus have attracted new investment. Organic production appears to be going through a process of "industrialization, consolidation and commoditization" similar to that of the conventional system, bringing with it the same challenges for growers.

The big question is about the potential stable size of the organic consumer base. Many studies suggest that this will be between 5 and 15% of the population. A 1996 consumer survey (Hartman Group, 1996) identified the core organic purchaser as about 7% of the total population, with significant and growing participation from other consumer sectors as well. Thus, much of the growth of organic food sales in recent years may represent the filling of latent demand, as organic food sales are about 3 to 4% of total food sales. Consumers are not necessarily uniform in their purchase decisions around organic food. For example, one study in Pennsylvania found that people were willing to pay a premium for "ecologically grown" apples but not oranges. Since most people eat the apple with the skin and the skin has the highest exposure to pesticides, the motivation to buy an organic product was higher than for an orange, which is peeled and thus the potential pesticide residues are removed. Consumer attitudes are not static either, and more people are considering wellness and environmental issues in their food purchases than did so five years ago. Price also will affect market demand. Previous studies found a common price ceiling of 10 to 15% over a conventional product as a major impediment to sales. Often, organic apples are priced 50 to 100% more than conventional apples in the retail stores.

As of 2001, organic apple acreage in Washington State represented about 3.9% of total apple acreage, while organic pear acreage was 5.2%. Based on the consumer estimates above, organic pears may be nearing short-term market saturation in the U.S. As production nears demand, it will be necessary to expand demand. One opportunity may be overseas exports (Zygmont, 2000). Lowering retail prices is another option. New products such as pre-sliced organic apples could expand consumption, especially in schools and food service.

Tracking organic fruit prices has been difficult due to a lack of consistent and reliable data collection. The Washington Growers Clearinghouse began collecting separate price data for organic apples and pears in 1996, with limited participation by fruit packers. The participation base has continued to expand but it is still unclear what percent of the organic crop is represented. However, when organic prices are plotted against conventional prices collected by the same group, the resulting pattern suggests that organic and conventional prices are affected by some similar factors from year to year (Fig. 4). For many varieties, the price premium for organic fruit appears to be shrinking over time.

FIGURE 3

Prices for organic apples for 10 varieties from 1995 to 2001 in Washington State ($/box FOB).

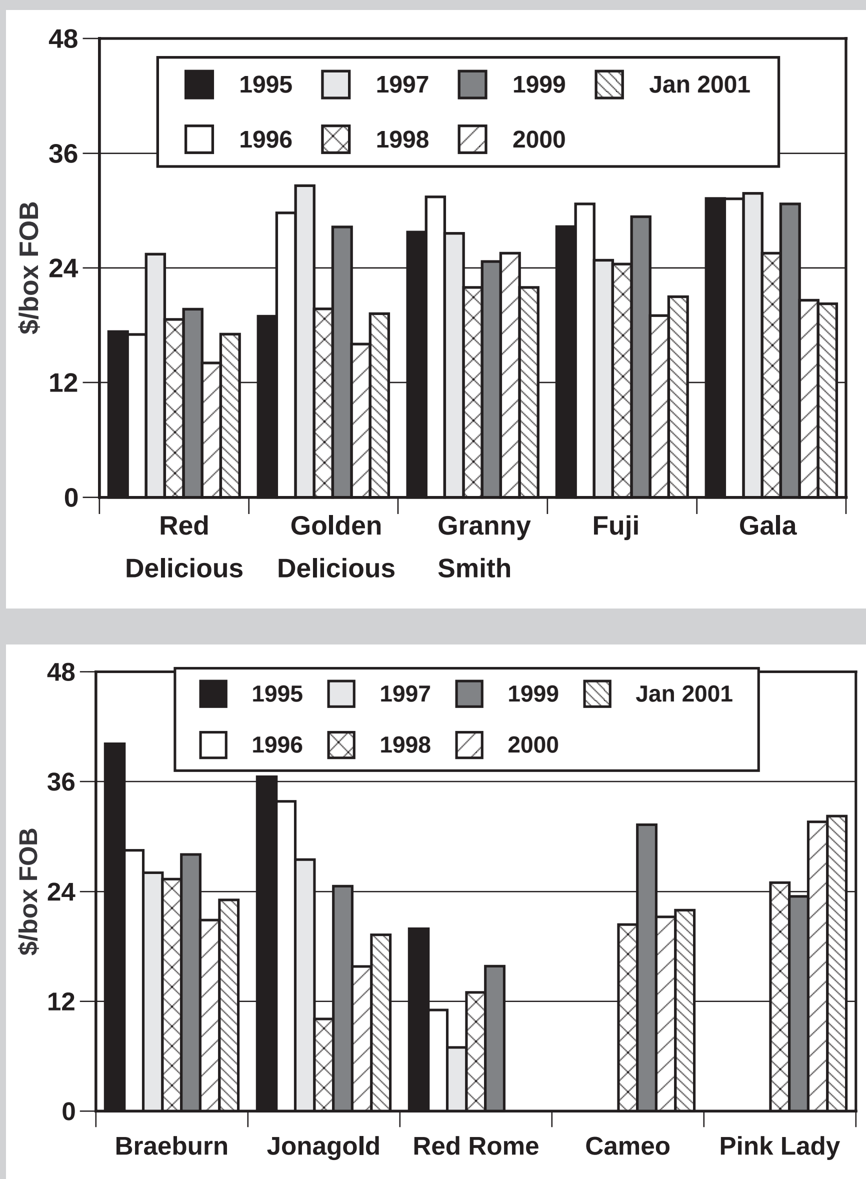


TABLE 3

Estimated worldwide production of certified organic apples and pears, 2001.

	Apple (acre)	Pear (acre)
U.S.	17,272	2,798
Canada	800	60
Europe*	8,675	3,665
South America	1,385	932
New Zealand	2,873	163
Total	31,005	7,618

*Europe acreage is a rough estimate from 2000.

Organic fruit production is now a significant component of the industry in Washington State and is leading to expanded interest and support from public and private entities in terms of research (Granatstein, 2001), education, new production tools and promotion. Even if the market incentives for organic production wane, organic tree fruit methods may prove valuable on their own and not result in more certified product on the market. For example, ongoing research and testing suggest that organic insect pest management in pears may be more effective and less expensive than a conventional system, not to mention the benefits in terms of regulatory compliance and worker safety (Alway, 2001).

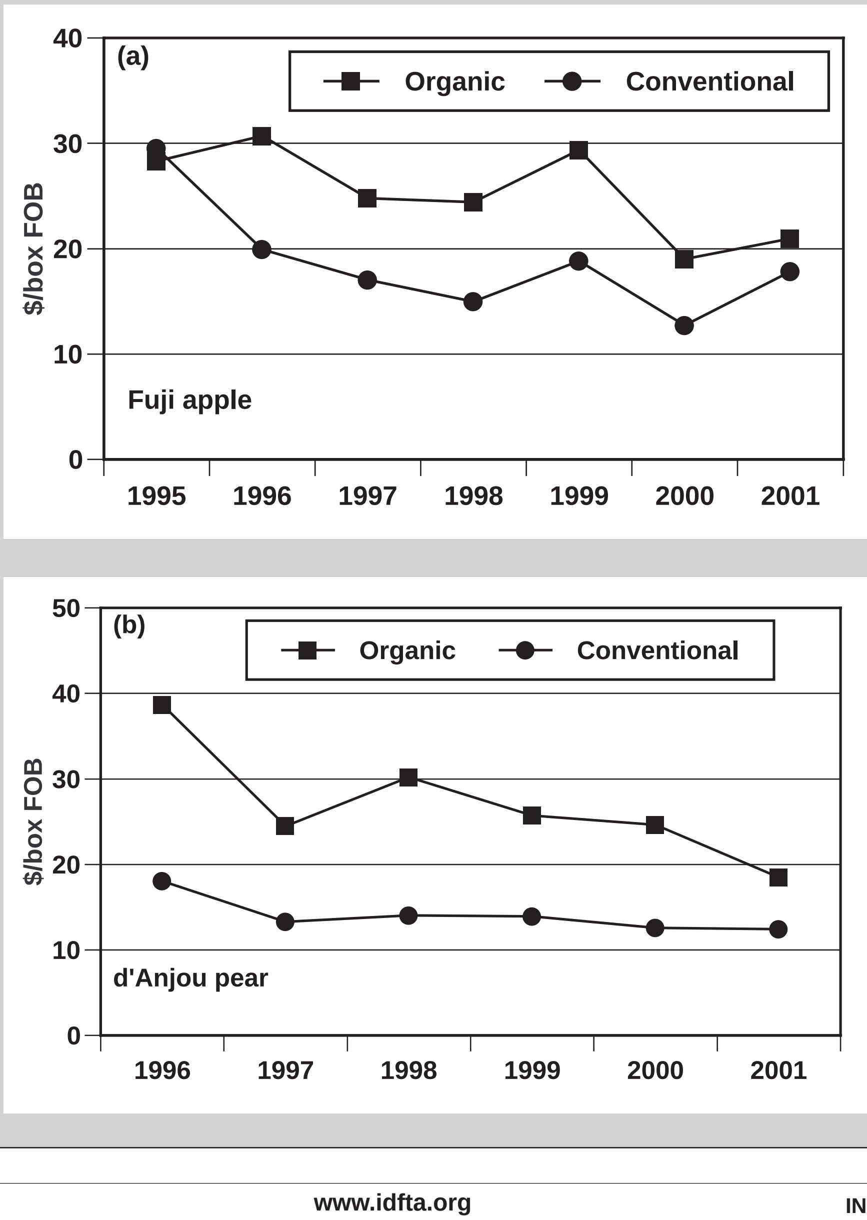
Researchers and growers in humid regions are working to develop commercially viable organic tree fruit systems. As the northeast U.S. is a large market for organic foods, organic production closer to those consumers could erode markets for western producers. Consumer acceptance of a scab-resistant apple variety would remove a major impediment to organic production in the East. Food consumers are increasingly interested in "taste, face and place," and thus local and regional production may increase in importance.

. . . conventional production of many foods moves ever closer to organic, potentially blurring the distinction and eroding the market premium.

In addition, the breadth of organic standards may expand in the future, as leading organic groups such as IFOAM (International Federation of Organic Agriculture Movements) are examining new criteria such as labor and energy for possible inclusion into organic certification. Other food labels exist that address these and other criteria (e.g., SalmonSafe, Food Miles, The Food Alliance) and are compatible with organic certification (Granatstein, 2000b). Growers can explore the use of multiple labels to more fully address the concerns of targeted consumer groups. Creating a niche inside a niche is one strategy for surviving in the face of increased competition and consolidation.

FIGURE 4

Comparison of organic and conventional fruit prices for Fuji apple (a) and d'Anjou pear (b) in central Washington State.



RESEARCH NEEDS

Organic orchardists often have certain research needs that are different from conventional growers due to the constraints imposed by organic production rules. While pest management research over the past decade has focused more on IPM and soft pesticides, most new tools are not allowed in organic production. Research on biological control of pests and pest and beneficial behavior usually can be directly transferred to organic production.

Climatic conditions greatly influence the research needs for organic tree fruit production. In semi-arid regions where foliar diseases (especially scab) are not chronic problems, weed control, fruit thinning and fertility management emerge as key concerns. Replant disease is a significant problem in some regions, and insect pests require ongoing attention both for new pests and breakdown of controls for established pests. Growers in humid regions share the need for weed control alternatives, lower cost fruit thinning and effective fertility management. Apple scab dominates the research agenda in most humid regions.

For some of these needs, the benefits of research would extend beyond organic producers. For example, current research in Washington State on alternatives for controlling apple replant disease is focused on biological and cultural techniques that can replace chemical soil fumigation. With the phase-out of methyl bromide, a widely used fumigant, growers may have options that are more stable in light of future regulatory restrictions on all fumigants.

In contrast, the exclusion of herbicides from organic production has led to common use of repeated tillage to control weeds in the tree row. This practice is costly and can lead to soil deterioration over time, a direct conflict with the principles of organic farming. Thermal weeding is being examined, as is the use of various mulching systems. While mulching is more expensive than the use of herbicides, it can offer multiple benefits including water conservation, fertility inputs and improved soil quality that make it an attractive practice for all growers.

As an example of the increased interest and activity in organic fruit production, the First National Organic Tree Fruit Symposium was held in May 2001 in Grand Junction, Colorado, and attracted over 50 researchers from across the country. Organic orchard research is underway in Iowa, Michigan, New York, Washington, Colorado and California. In the Pacific Northwest, examples of research on organic fruit production include a long-term orchard systems comparison experiment, development of biorational pest control tools (kaolin, soaps, oils, repellents), mulching systems for weed control, compost use, natural fruit thinners and organic tree fruit production statistics. Proposed topics for future research are effect of production system on fruit quality, agroecosystem design to maximize biocontrol of pests, rodent control and use of compost tea.

LOOKING AHEAD

Organic tree fruit acreage is expected to continue to increase, both in western North

America where a favorable climate exists as well as in more humid regions where local markets may be tapped. With prices for most organic tree fruits declining, the economic promise of organic production is less alluring. However, growers are finding many horticultural benefits of organic production, some that are very cost effective as well. New tools and techniques will become available to help solve organic production problems and lower costs. Further research on organic systems may uncover unique attributes in terms of food quality or environmental protection that could bolster support for organic farming through consumer demand and/or public policy (e.g., "green" payments). While organic farming today may represent a cutting edge for ecological or sustainable agriculture, it is not necessarily the endpoint. Organic farming cannot remain static; it must continually improve. And no doubt, with the infusion of research and grower attention, it will.

Data sources: Washington State Dept. Agriculture, Washington Growers Clearinghouse, organic certifiers (public and private) across the U.S., HortResearch New Zealand, CF Fresh, Linda Edwards, Franco Weibel. Several major U.S. certifiers were not able to provide data, therefore the information presented can be considered only estimates.

Thanks to Elizabeth Kirby for collecting and compiling the 2001 data.

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CONVERSION FACTORS ENGLISH VS. METRIC

To convert Column 1 into Column 2, multiply by:	Column 1	Column 2	To convert Column 2 into Column 1 multiply by:
	Length		
.621	kilometer, km	mile	1.609
1.094	meter, m	yard	.914
3.281	meter, m	foot, ft	.3048
39.4	meter, m	inch	.0254
.03281	centimeter, cm	foot, ft	30.47
.394	centimeter, cm	inch	2.54
.0394	millimeters, mm	inches	25.40

metric: 1 km = 1000 m; 1 meter = 100 cm; 1 meter = 1000 mm
English: 1 mile = 5280 ft; 1 mile = 1760 yards; 1 yard = 3 ft; 1 ft = 12 inches

	Area		
247.1	kilometers^2, km^2	acre	.004047
2.471	hectare, ha	acre	.4047
.4047	trees/hectare	trees/acre	2.471

metric: 1 ha = 10,000 m^2 = .01 km^2
English: 1 acre = 43,560 ft^2

	Volume		
1.057	liter	quart (US)	.946

English: 1 US gallon = 4 quarts

	Mass—Weight		
1.102	ton (metric), MT	ton (English)	.9072
2.205	kilogram (kg)	pound, lb	.454
52.5	ton (metric) of apples	apple packed box, *carton	.01905

metric: 1 metric ton = 1000 kg
English: 1 ton = 2000 lb; 1 packed box or carton* of apples = 42 lb

	Yield or Rate		
0.446	ton (metric)/hectare, MT/ha	ton (English)/acre	2.242
.892	kilogram/hectare, kg/ha	pound/acre	1.121
.991	ton (metric) of apples/hectare, MT/ha	bins* of apples/acre	1.009
.4047	trees/hectare	trees/acre	2.471
0.107	liter/hectare	gallon (US)/acre	9.354

metric: 1 metric ton = 1000 kg; 1 hectare = 10,000 m^2
English: 1 ton = 2000 lb; apple bin* = 900 lb; 1 acre = 43,560 ft^2

	Temperature		
1.8 C + 32	Celsius, C	Fahrenheit, F	.555 (F-32)

**Commercial cartons (packed boxes) of fruit and field/storage bins of fruit do not have universal weights. The weight of fruit in a packed box or carton varies around the world and with the type of fruit, but is here taken for apples as 42 lbs (19.05 kg); the weight of fruit in a bin also varies but is here taken for apples as 900 lbs (408.2 kg).*