United States Department of Agriculture

VGS-313-01

April 2006

Electronic Outlook Report from the Economic Research Service

www.ers.usda.gov

Fruit and Vegetable Backgrounder

Gary Lucier, Susan Pollack, Mir Ali, and Agnes Perez

Table of Contents

Introduction 3
Domestic Supply and Demand 5
U.S. International Fruit and Vegetable Trade 15
Prices, Price Variability, and Marketing Margins 23
Characteristics of the Fruit, Tree Nut, and Vegetable Industry 26
Present Farm Policy Affecting the Fruit and Vegetable Industries . .32
Fruit and Vegetable Policy Issues in Coming Years 39
Conclusion 41
References 42
Useful Links 46
Appendices 49

Approved by USDA's World Agricultural Outlook Board

Abstract

The U.S. fruit and vegetable industry accounts for nearly a third of U.S. crop cash receipts and a fifth of U.S. agricultural exports. A variety of challenges face this complex and diverse industry in both domestic and international markets, ranging from immigration reform and its effect on labor availability to international competitiveness. The national debate on diet and health frequently focuses on the nutritional role of fruit and vegetables, and a continued emphasis on the benefits of eating produce may provide opportunities to the industry. In the domestic market, Americans are eating more fruit and vegetables than they did 20 years ago, but consumption remains below recommended levels. In terms of per capita consumption expressed on a fresh-weight basis, the top five vegetables are potatoes, tomatoes, lettuce, sweet corn, and onions while the top five fruit include oranges, grapes (including wine grapes), apples, bananas, and pineapples. The industry also faces a variety of trade-related issues, including competition with imports. During 2002-04, imports accounted for 21 percent of domestic consumption of all fresh and processed fruit and vegetables, up from 16 percent during 1992-94.

Keywords: United States, fruit, vegetables, tree nuts, potatoes, pulses, melons, demand, supply, trade, policy, financial characteristics, disappearance, ERS, USDA.

Acknowledgments

Appreciation is extended to Joy Harwood, Linwood Hoffman, D. Demcey Johnson, Daniel Pick, and Edwin Young, USDA, Economic Research Service, for their support, review comments, and suggestions. The authors also extend thanks and gratitude, for time and effort spent providing review comments, to Edmund Estes, North Carolina State University, Department of Agricultural and Resource Economics; Larry Salathe and Carol Goodloe, USDA, Office of the Chief Economist; Dennis Shields, USDA, Farm Service Agency; William Brantley, Kevin Kesecker, Donald Hinman, and Enrique

Ospina, USDA, Agricultural Marketing Service; John Love, USDA, World Agricultural Outlook Board; Debra Pumphrey, Shari Kosco, Robert Knapp, and Heather Velthuis, USDA, Foreign Agricultural Service; and Jim Smith, USDA, National Agricultural Statistics Service. Finally, special thanks are extended to John Weber for editorial assistance, Wynnice Pointer-Napper for layout and graphics assistance, and Wilma Davis for chart design assistance, USDA, Economic Research Service.

Introduction

Fruit and vegetables (including tree nuts, pulse crops, and melons) account for 29 percent of 2002-04 U.S. farm crop cash receipts (fig. 1), about 17 percent of consumer food expenditures, and 18 percent of agricultural export value. Although the fruit and vegetable share of crop receipts is relatively large, in 2002 these high-value crops were produced on only 13 million acres, or 3 percent of U.S. harvested cropland.

This diverse and important component of the farm economy has rarely entered the mainstream of farm policy debate. With the exception of programs targeted at producers of dry peas and lentils, Federal farm programs that provide income support to field crop producers do not apply to the fruit and vegetable industry. Nevertheless, various Federal programs play key roles in stabilizing and promoting fruit and vegetable sales, while also partly protecting growers from market uncertainty.

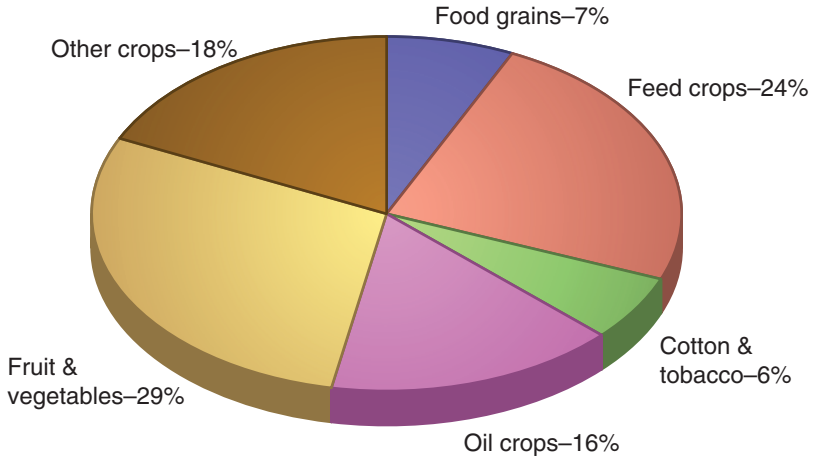
Key policy issues concerning the fruit and vegetable industry center on labor and domestic and international demand for U.S. products. These issues address access to an affordable labor pool, the possible elimination of the planting flexibility restrictions for fruit and vegetables on program crop base acreage, government purchases of fruit and vegetables for Federal feeding programs (e.g., School Lunch Program), and strategies to maintain export programs and help U.S. produce compete more effectively in international markets.

A planting flexibility provision in the 1990 farm bill allows growers to plant crops other than program crops on their base acreage (acreage used to calculate program support) without losing any base acreage or government payments.[1] At the request of the fruit and vegetable industry, the provision prohibits the planting of fruit and vegetable crops on these "flexed acres" to protect growers who do not participate in farm programs (and do not receive government payments) from having to compete against producers who do.

[1]Pollack and Lynch.

Figure 1

U.S. farm cash receipts for crops, average 2002-04



Source: USDA, Economic Research Service, Farm Income and Costs Briefing Room.

Without these restrictions, commodity program producers would be able to grow fruit and vegetables on their base acreage.

A recent ruling by the World Trade Organization (WTO) may push the planting flexibility provision to the front in future domestic farm policy discussions. A WTO panel concluded that, because of planting restrictions, U.S. direct payments were not consistent with "green-box" support (subsidies permitted by the WTO because the effects on trade are minimal). Still, there are no immediate compliance issues associated with the ruling.

Defining the Sector

The fruit and vegetable industry might best be described as "diversity within a common framework." The Census of Agriculture (the Census) reports area and production for over 100 separate fruit and vegetable commodities or groups of commodities. Some commodities are annuals (e.g., snap beans, tomatoes, and potatoes) while others are perennials (e.g., oranges, apples, and almonds). Some are grown for direct consumption, such as fresh-market apples and tomatoes, while some are grown for processing into such products as orange juice or tomato sauce.

Many fruit and vegetables require similar handling and share a common marketing system. Wholesale markets, for example, handle most types of fresh fruit and vegetables. Fresh produce is highly perishable and requires constant cooling during storage and transportation. Perishability of fresh produce also dictates special handling to minimize marketing losses. Although the majority of fruit and vegetables are consumed directly (either fresh or processed), a substantial share is used as raw material in the manufacture of such products as soups, frozen entrees, and flavoring agents.

According to the Census, more than 132,000 farms specialized in the production of fruit, tree nuts, berries, vegetables, and pulse crops in 2002. Between 1987 and 2002, the number of all farms harvesting vegetables and melons (excludes potatoes, sweet potatoes, and pulse crops) fell 11 percent to 54,391 and the number of orchards (fruit and tree nuts combined, excluding berries) dropped 6 percent to 113,649. Despite the drop in farm numbers, harvested area increased 17 percent for orchards and was largely unchanged for vegetables and melons. Over the same period, the number of farms producing berries rose 3 percent to 18,234, while harvested berry area increased 26 percent.

Domestic Supply and Demand

Domestic Supply

U.S. fruit and vegetable production has generally trended upward over the last 50 years. Spurred by improvements in production management and technology as well as growth in domestic consumption and export sales, production gains are projected to continue to exceed those of population growth over the next 5-10 years.

The United States produced about 100 million short tons of fruit, tree nuts, and vegetables annually during 2002-04 (table 1), up about one-tenth from 1992-94. Vegetable production rose 12 percent during that period, while fruit and tree nut output rose 7 percent. While total vegetable output has been rising over the past decade, harvested acreage has declined 1 percent. The introduction of more prolific hybrid varieties, many of which exhibit improved disease resistance as well as increased fruit set (the proportion of flowers that develop into fruit), and the trend toward precision farming, including the adoption of drip irrigation, plastic mulches, row covers, more

Table 1
Selected U.S. fruit and vegetable production

Item	2001	2002	2003	2004	2005
			1,000 short tons		
All vegetables	62,511	66,202	64,779	67,797	64,109
Fresh market[1]	23,010	23,149	23,433	24,227	23,635
Head lettuce	3,446	3,407	3,412	3,311	3,180
Onions, dry bulb	3,498	3,492	3,668	4,150	3,688
Tomatoes	1,885	1,979	1,779	1,917	1,973
Processing	15,110	17,162	15,688	17,807	15,843
Tomatoes	9,249	11,671	9,820	12,266	10,200
Potatoes, all uses	21,884	22,909	22,891	22,802	21,044
Dry beans, all	981	1,516	1,125	889	1,361
Sweet potatoes	726	640	795	806	787
Dry peas/lentils	370	404	425	840	1,011
Mushrooms, all	430	422	424	427	427
All fruit and nuts	34,260	34,764	33,491	34,720	29,986
Citrus	16,216	16,194	15,180	16,360	11,363
Fresh	4,167	4,128	4,222	4,079	3,683
Processed	12,049	12,066	10,958	12,281	7,680
Noncitrus	16,740	17,122	16,853	16,837	17,163
Fresh	6,488	6,549	6,676	7,179	--
Processed	10,252	10,573	10,177	9,658	--
Tree nuts	1,304	1,448	1,458	1,524	1,460
Total	96,771	100,966	98,270	102,517	94,095

-- = not available.

[1]Includes only the 24 vegetables and melons in the current USDA, National Agricultural Statistics Service estimates program.

Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, various issues of *Vegetables Summary, Citrus Fruit Summary,* and *Noncitrus Fruits and Nuts Summary*.

effective and targeted pesticide sprays, high-density planting, satellite-aided field operations, and other improved technology, all led to improved yields.

A shift from less productive to more productive areas also contributed to higher U.S. average yields for vegetables. For example, the center of both the U.S. potato and onion industry has slowly migrated from lower yielding Eastern States toward Western States, which are characterized by much higher yields and lower per unit production costs.

Similar migration in production has also been noted for certain fruit, such as apples and peaches, and most of the technological innovations that have helped boost productivity in vegetables have also boosted fruit and tree nut yields. Still, most of the gain in fruit and tree nut production is attributed to increased bearing acreage (has trees that yield commercially harvestable volume)—up 10 percent since 1992-94.

Fruit and vegetables are produced throughout the United States, with the largest acreage (excluding potatoes and dry beans) in California and Florida (app. A). The Upper Midwest (Michigan, Minnesota, and Wisconsin) and the Northwest (Washington and Oregon) report the largest vegetable acreage for processing, while California, Florida, and Texas harvest the largest share of fresh vegetable and melon acreage. The eastern seaboard States (from Georgia to New York) also report substantial vegetable acreage. With continuous strong output of cool-season crops, such as lettuce, broccoli, and celery, California remains the major producer of fresh vegetables during the winter months. Florida, however, is the top producer of warm-season crops (e.g., tomatoes, peppers, snap beans). Potato production is concentrated in the Northwest (Idaho, Washington, and Oregon), but Colorado, North Dakota, California, Wisconsin, and Maine are also key suppliers.

California, Florida, Washington, Texas, Michigan, New York, and Oregon lead in the amount of land in fruit orchards. California alone accounts for about half of U.S. fruit and tree nut acreage (including berries), Florida over one-tenth, and Washington close to one-tenth. California's mild climate gives it an advantage over other fruit-producing States. California is the Nation's largest producer of grapes, strawberries, peaches, nectarines, avocados, and kiwifruit. It also leads in fresh-market orange production and U.S. tree nut production, including virtually all almonds, pistachios, and walnuts. Florida is the primary U.S. citrus producer, while Washington is the largest apple producer for both fresh use and processing. Washington is also a leading producer of grapes (mostly for wine and juice), pears, and sweet cherries. Midwestern and Northeastern States are key producers of processed fruit products, such as canned tart cherries and apple sauce, while Florida leads in the production of oranges for juice, grapefruit, and tangerines.

Irrigated acreage accounts for more than half of all U.S fruit and vegetable production. According to the Census, irrigated acreage represented about 69 percent of total vegetable acreage in 2002, 82 percent of the land in orchards, and 77 percent of berry area. Irrigation is critical to agriculture in most Western and Southwestern States, including California. In 2002, California irrigated over 99 percent of its vegetable crops and all of its tree fruit, tree nuts, and berries.

Although still a relatively small share of the market, organic production represents one of the fastest growing segments of the U.S. fruit and vegetable sector. Still, in 2003, certified organic acreage accounted for less than 2 percent of all fruit, tree nut, vegetable, potato, pulse, and herb area. ERS estimates certified organic acreage has jumped 81 percent since 1997.

Processing vs. Fresh

Commodities within the fruit and vegetable industries may be classified according to two major end uses: fresh market or processing. Processing can be further subdivided into canning, freezing, juicing, and dried/dehydrating. Other than the production of certain commodities with varieties suitable for both uses (e.g., apples, grapes, broccoli, cauliflower, and asparagus), growing for processing is distinct from growing for the fresh market. Occasionally, some fruit and vegetables harvested for fresh use do not meet quality standards and are sold for processing. In general, however, substitution between the markets is uncommon, even in years when crop output is severely reduced due to bad weather or pests. Most vegetable varieties grown for processing are better adapted to mechanical harvesting and often lack characteristics desirable for fresh market sale (e.g., processing tomatoes are generally smaller and possess different internal attributes than most fresh varieties). Most fruit varieties grown for processing are still hand harvested; however, high processor demand and the proximity of growers to processing plants establishes the processing sector as the primary marketing outlet.

In contrast to produce grown for the fresh market, the majority of fruit and vegetables destined for processing are grown under contractual arrangements between growers and processors. Contracting shifts a portion of the decisionmaking related to production from the grower to market gatekeepers, such as juice processors, canning firms, and salad processors. Contracting is especially prevalent in the production of vegetables for processing, as processors require assurances of a crop's volume, specific characteristics (e.g., variety, size, color, Brix), and timing for delivery to the factory. USDA analyzed data on production of 11 different processing vegetables from 2000 to 2004. Area grown under contract ranged from close to 100 percent for green peas to about 85 percent for cucumbers.

More than half of total U.S. fruit and vegetable production goes into processing. Among fruit, approximately 60 percent of noncitrus production moves into processing channels, while over 70 percent of citrus production is processed. Among vegetables, processing accounted for about 50 percent of total output during 2002-04. Tomatoes (85 percent processed) and potatoes (68 percent of sales processed) are the top two vegetable crops processed, while oranges and grapes are the top two fruit crops processed. Citrus fruit, primarily oranges, are processed mostly into juice, while grapes are processed primarily into juice, wine, and raisins. The quantity of grapes used for wine production alone makes up over one-third of all fruit processed, and raisins make up well over half of all dried fruit production.

Most fresh-market produce is sold in the spot market; in recent years, however, sales via contractual arrangements have increased within the fresh market. This change been especially true within the rapidly expanding fresh-

processing sector (e.g., pre-packaged salads, baby carrots, and fresh-cut fruit), as buyers seek assurances of steady supplies at a consistent price to fill and maintain retail shelf space. Large regional and multinational produce shippers are also relying more on fresh-market contracts with grower-suppliers to better serve a more concentrated retail sector that demands year-round supplies of consistent bulk produce (e.g., head lettuce and apples).

Seasonality of Production

Most domestic fruit and vegetable production in the United States is seasonal, with the largest harvests occurring during the summer and fall. During the summer through early fall, every State has some commercial production of fruit and vegetables. As cooler temperatures prevail in most States, field-based production is restricted to Southern and Southwestern States, such as Florida, California, Arizona, and Texas. Florida, for example, grows the majority of the domestic fresh field-grown tomatoes in the winter and spring, while other States (led by California) produce the bulk of U.S. field-raised output during the summer and fall.

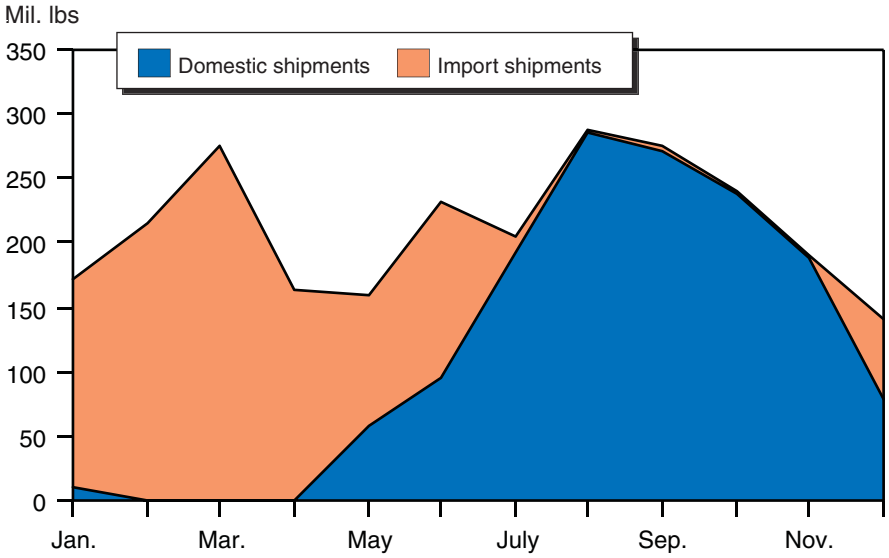
In the United States, citrus is harvested virtually year round, with peak output from November through May for navel oranges and other early citrus varieties and April to October for Valencia oranges and California grapefruit. The noncitrus fruit harvest begins in December with strawberries and progresses through the spring, summer, and fall of the succeeding year, ending with apples and pears. In recent years, market availability of peaches and nectarines has lasted into late summer and early fall with increased plantings of late-season varieties. Controlled atmosphere (CA) storage extends apple and pear marketing into the summer following the previous fall's harvest. Certain varieties of noncitrus fruit, such as plums and grapes, can be stored in a controlled (regulated temperature and atmosphere) environment for a few months, but most soft fruit are marketed soon after harvest. CA storage also extends the marketing season for such vegetables as sweet onions, cabbage, and carrots.

Retailers today offer most fruit and vegetables year round by augmenting domestic supplies with imports, especially imports of fresh products during the winter. Imports of grapes from the Southern Hemisphere, have significantly expanded the U.S. fresh grape market (fig. 2). Offshore volume of grapes to the United States moved from 4 percent of domestic use in 1972-74 to 53 percent in 2002-04. Southern Hemisphere countries also supply such products as peaches, plums, nectarines, and asparagus during the winter. Fresh tomato imports (primarily from Mexico and Canada) and domestic greenhouse production combine to boost total U.S. tomato supply during the first few months of the year. This combination both supplements (mostly in times of inclement weather) and competes with winter and early spring production from Florida. During 2002-04, imports (largely from Mexico) accounted for 57 percent of winter (January-March) fresh-market tomato shipments, compared with 42 percent in 1992-94 and 56 percent in 1982-84.

In addition to offering year-round supplies, retailers have also expanded their produce offerings. Produce departments in most major supermarket chains now routinely offer such specialty products as cherimoya, lychee,

Figure 2

Seasonal fresh-market grape shipments, average 2002-04



Source: Prepared by USDA, Economic Research Service using data from USDA, Agricultural Marketing Service, *Fresh Fruit and Vegetable Shipments*.

crenshaw melon, baby squash, Jerusalem artichoke, Asian pear, kohlrabi, fresh herbs, and a wide range of organically grown items. This change has provided consumers with an ever-widening selection of fresh produce over the past two decades, and has spurred an increase in U.S. consumption of several fruit and vegetables.

Market Channels

Fruit and vegetables move from the producer to the consumer through a number of different routes or market channels. Channels for fresh items emphasize quality retention by moving produce quickly from field to consumer. Fresh products often pass through terminal wholesale markets before being sold to foodservice operators or retail stores; however, some are also marketed by packinghouses directly to retailers. Processed fruit and vegetables largely pass through various third-party wholesalers and broadline foodservice distributors but also move directly from processors to retailers.

Several types of fresh-market fruit and vegetables (e.g., grapes, lettuce, and celery) are largely field packed, thus bypassing the packing shed and reducing costs. Many other produce types (e.g., onions, oranges, apples, and tomatoes) still move from the field to the packing shed, where products may be washed, sized, sorted, graded, packed, cooled, and loaded (mostly on over-the-road trailer trucks) for shipment to retailers, wholesalers/terminal markets, farm markets, or export markets. Brokers (agents who bring together buyers and sellers for a fee) may operate at the port of entry, at the shipping point, and/or at the terminal market.

In 2002, 212 cooperatives marketed $7.3 billion in U.S. net fruit and vegetable sales—down from 297 cooperatives with $8.2 billion in net sales in 1990. Marketing cooperatives usually own and operate all (or some

combination of) grading, packing, cold storage, and transportation facilities. Aside from providing marketing services to its members, some cooperatives also provide technical assistance, processing, and bargaining functions. In today's competitive environment, a cooperative can help members more efficiently gain market access, both domestically and internationally, through its large resource base and its ability to offer a range of high-quality products in volume. A cooperative operates collectively with its members in the purchase of input supplies and the marketing of the final product. This approach enables members to reduce input and handling costs, meet requirements of large volume buyers, and obtain higher prices.

Examples of grower-owned and grower-operated cooperatives include the following:

- *Sunkist* has a membership of about 6,500 citrus growers in California and Arizona.
- *Blue Diamond* is the world's largest tree nut processing and marketing cooperative and has a membership of about 3,200 California almond growers.
- *Sun-Maid Growers of California* has a membership of about 1,200 raisin growers, representing 30 percent of California's raisin producers.
- *The Raisin Bargaining Association* (RBA) is a grower-owned and grower-controlled cooperative whose main function is to negotiate with packers for an annual raisin field price for its members, which in turn becomes the pricing standard for the industry. RBA grower members supply about 40 percent of California's raisin volume.

More than half the volume of all fresh and processed fruit and vegetables reaches consumers via supermarkets and other retail establishments. The next major marketing segment for produce is the foodservice industry, which includes quick service (fast food) establishments, table-service restaurants, institutional food services, and various Federal programs (e.g., school lunch and military purchases). Some produce (an estimated 1 percent) is marketed directly from the farm to the consumer via farmers' markets, roadside stands, and pick-your-own operations. About 10 percent of U.S. fruit and vegetable supplies enter export markets.

Fruit and vegetables are transported from producing areas to population centers via truck, rail, ship (some imports), and air (some high-value imports, such as asparagus). Many major shipping areas for fruit and vegetables are located on the coastal rim of the United States in California, Florida, Texas, and the East Coast, with different regions active at different times of the year. Trucks account for the vast majority of the domestic movement of fresh and processed produce.

Transporting products to market can be difficult and costly, as evidenced by a longrun decline in rail shipments and rail availability over time, frequent truck shortages in various producing areas, and escalating costs for diesel fuel and labor. In fact, at times during some seasons, the transportation cost can actually exceed the f.o.b. value (the grower price plus various marketing services) of the product being shipped. For example, the shipping cost of a

truckload of iceberg (head) lettuce moving from Salinas, California, to New York City in October 2005 ranged from $5,700 to $6,200. During this time, the f.o.b. shipping-point price for head lettuce in the Salinas Valley averaged $5.05 per 50-pound carton, each containing 24 heads. Assuming an average 48-foot trailer load contains 22 pallets with 42 cartons each, the packed lettuce in the truck was valued at $4,666 (f.o.b.)—$1,034 below the low-range trucking cost.

Processed fruit and vegetable products (canned, frozen, dried/dehydrated, juice) may be moved in bulk containers to other processing firms, which add further value by repackaging the products into consumer packs, combining them with meats or other products to be sold as meals, or further refining them into final products. Final products are exported; transported to wholesaler/retailer warehouses after purchase by buyers, brokers, or buying groups; or stored for later sale by the processor.

Consolidation in grocery wholesaling and retailing over the past two decades has changed the nature of transactions and coordination between fruit and vegetable shippers and wholesale and retail buyers. The largest 20 food retailers increased their share of the Nation's grocery store sales from 40 percent in 1987 to 59 percent in 2001.[2] As a result, fruit and vegetable growers, shippers, and trade associations have expressed concerns about the implications of having fewer buyers for their products. Issues of concern include the possible effects of consolidation on prices, as well as the introduction of various marketing services and trade practices over the past decade in the wake of the rising incidence of mergers and acquisitions. For example, some retailers require special packaging or other in-store promotional services for the produce they receive, while others are charging grower-shippers slotting fees (to assure product placement on store shelves) and other fixed fees. In the interest of increased efficiency, some retailers also prefer to deal with produce shippers that can provide year-round supplies, putting small and/or seasonal shippers at a disadvantage.

[2]Kaufman.

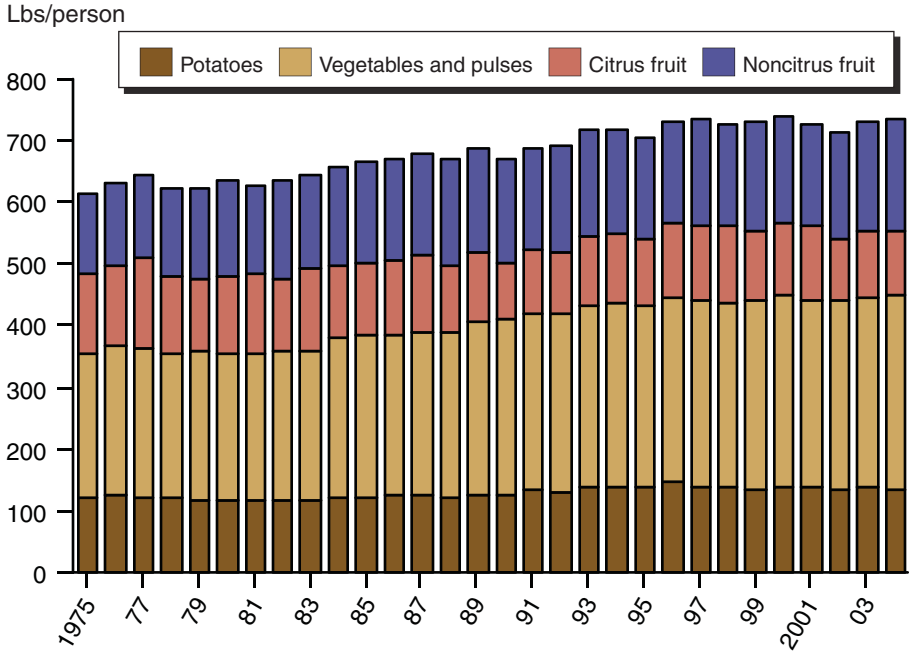
Domestic Demand

According to the U.S. Bureau of Labor Statistics (BLS), domestic consumption of fruit and vegetables accounted for about 17 percent of all at-home food expenditures in 2004. During the same period, Americans spent an average of $224 per person ($561 per average household) on fresh and processed fruit and vegetables consumed at home. All food away from home (including fruits and vegetables) accounted for 42 percent of food expenditures in 2004. However, BLS does not estimate the purchase value of fruits and vegetables in meals away from home.

According to ERS estimates of food disappearance, Americans are eating more fruit and vegetables than they did 20 years ago (fig. 3). Vegetable demand has shifted substantially over the past two decades as incomes have risen, immigration has increased, and consumer tastes and preferences have changed. Over the same period, per capita disappearance of fruit, tree nuts, and vegetables has increased, driven largely by gains in fresh-market use. Since most fresh fruit and vegetables can be classified as normal goods

Figure 3

U.S. per capita disappearance of fruit and vegetables[1]



[1] Data are on a farm-weight basis.

Source: USDA, Economic Research Service, *Fruit and Tree Nuts Yearbook* and *Vegetables and Melons Yearbook*.

(demand increases as income rises), the strong national economy that has largely prevailed during this period also helped boost consumption higher.[3]

Shifting national tastes and consumer preferences have perhaps had the greater effect on the increased consumption of fresh produce. Such shifts arise from changes in population characteristics, such as age, lifestyle, family size, and race/ethnicity. Over the past several decades, a population increasingly characterized by households with fewer children and more adults in the workforce has been supplemented by a surge in immigration from Latin America and Asia. Shifts in consumer eating habits resulting from population changes have influenced wholesale changes in the types of attributes consumers seek with regard to fruit and vegetables. When choosing fresh produce, today's discriminating consumer looks for such characteristics as novelty, convenience, taste, eye appeal, nutrition, and health benefits. As a result, the produce industry has had to become more adept at appealing to potential consumers.

Until the 1980s, fruit and vegetables with convenience attributes largely referred to canned, frozen, or dried products, or hand-held, readily consumable fruit, such as bananas and apples. Today, convenience has become a cornerstone product attribute driving innovation in the fresh produce industry. Convenience now factors largely in the surging sales of value-added and time-saving products, such as bagged salads; salad kits; pre-cut wrapped/packaged items, such as carrots, melons, and celery; sweet corn in microwave-ready tray-packs; bagged baby spinach; and broccoli florets. In the quest for convenience, consumers have influenced a shift in the point of purchase for many fruit and vegetables, as an affluent but time-challenged population now purchases a larger percentage of meals away from home than it did 20 years ago.

[3]Per capita *consumption* is approximated by per capita *disappearance*, which calculates the supply available for consumption. This includes non-consumption in the form of spoilage, waste, and feed use. In this report, the two terms are used interchangeably. For detailed data on per capita vegetable and melon disappearance, see: www.ers.usda.gov/publications/vgs/tables/percap.pdf

For fruit and tree nuts, see: www.ers.usda.gov/publications/fts/yearbook05/fts2005.pdf

Consumers also value taste as an attribute in produce, and the fruit and vegetable industry has responded by introducing more flavorful products, including sweeter cantaloups and carrots, better tasting sweet corn with a longer "shelf-life," and improved-flavor and consistency in tomatoes and strawberries. Consumers have also discovered heightened taste sensations in new varieties of chile peppers, apples, various tropical fruit, tender baby vegetables, and specialty mushrooms.

Visual attributes remain important in the marketing of fruit and vegetables, with consumers expecting blemish-free products of a certain size and, especially, color. Produce departments regularly feature bright yellow, red, and orange peppers; yellow, green, and red apples; white, yellow, and red onions; red leaf lettuce; large brown portobella mushrooms; yellow-flesh watermelon; and even purple carrots. Improved internal characteristics have also sparked consumer interest. The development of seedless varieties is partly responsible for increases in table grape and watermelon consumption over the past 20 years.

In terms of per capita disappearance expressed on a fresh-weight basis, the top five vegetables are potatoes, tomatoes, sweet corn, lettuce, and onions. The top five fruit are oranges, grapes (including wine grapes), apples, bananas, and pineapples (table 2). Per capita disappearance of all vegetables and melons (fresh and processed) increased 4 percent between 1992-94 and 2002-04, with consumption reaching 449 pounds (farm-weight basis) in 2004—the second highest total on record.

Table 2

Top fruit and vegetables by average per capita consumption, 2002-04[1]

Vegetables and melons	Per capita consumption	Fruit and tree nuts	Per capita consumption
	Pounds		*Pounds*
Potatoes, all	135.0	Oranges, all	81.3
Tomatoes, all	89.5	Apples, all	46.6
Sweet corn, all	26.6	Wine grapes	30.0
Lettuce, head	22.4	Bananas	26.2
Onions, all	21.5	Grapes, excl. wine	19.2
Watermelon	13.6	Pineapples, all	13.3
Carrots, all	11.9	Grapefruit, all	10.6
Cucumbers, all	11.1	Peaches, all	9.5
Lettuce, romaine/leaf	10.9	Lemons, all	7.4
Cantaloup	10.5	Strawberries, all	6.6
Cabbage, all	9.2	Pears, all	5.6
Broccoli, all	8.0	Tangerines and tangelos	3.8
Snap beans, all	7.4	Avocados	2.7
Bell peppers, all	6.9	Limes	2.6
Dry beans, all	6.3	Mangos	2.0
Celery, all	6.2	Cherries, all	1.6
Chile peppers, all	5.7	Olives	1.3
Squash, all	4.5	Plums and prunes, all	1.3
Sweet potatoes, all	4.4	Almonds	1.1
Mushrooms, all	4.1	Papayas	0.9
Others	29.4	Others	8.4
Total	445.1	Total	282.0

[1]Data are in fresh-weight equivalent. "All" refers to all uses, fresh and processed.

Source: USDA, Economic Research Service, *Fruit and Tree Nuts Yearbook* and *Vegetables and Melons Yearbook.*

Fresh vegetables and melons (excluding potatoes) accounted for 39 percent of vegetable consumption, potatoes (all uses) accounted for 30 percent, and processing vegetables (canned and frozen) accounted for 27 percent. Consumption of fresh-market tomatoes, sweet corn, and leaf and romaine lettuce hit record highs within the past few years.

Per capita use of all fruit and tree nuts increased 1 percent between 1992-94 and 2002-04, with consumption totaling 286 pounds (farm-weight basis) in 2004. The increase in total fresh fruit consumption during the period was driven largely by gains in consumption of noncitrus fruit (e.g., grapes, apples, and bananas), which more than offset a decline in consumption of citrus. Consumption of fresh noncitrus fruit increased 5 percent between 1992-94 and 2002-04, while fresh citrus consumption dropped 6 percent.

U.S. consumption of fruit juices increased less than 1 percent between 1992-94 and 2002-04, reflecting growth in apple and grape juice demand and a decline in grapefruit and pineapple juice consumption. As with consumption of canned vegetables, consumption of canned fruit has trended lower, dropping 20 percent over the period, as consumers continued to express a preference for fresh fruit. Per capita consumption of dried fruit (mostly raisins) decreased 17 percent over the same 10-year period, averaging about 10 pounds (farm-weight basis) in 2002-04.

Though per capita consumption of produce has increased since 1985, the average American still does not consume the recommended 5-10 servings of fruit and vegetables a day.[4] U.S diets are high in wheat flour products, dairy products, and meat, leaving consumers with less capacity to consume fruit and vegetables. Still, U.S. produce consumption is expected to trend higher over the next decade, given the increasing emphasis on balanced diets. ERS research shows that U.S. consumers would need to substantially increase their intake of fruit and vegetables to meet the recommendations in the *2005 Dietary Guidelines for Americans*. Dietary adjustments such as these are not universally embraced by Americans. The change of course that would be needed for U.S. consumers to meet the new guidelines suggests a significant dietary challenge, as fruit consumption would have to more than double, while vegetable consumption would have to rise by more than one-fourth.

[4]Centers for Disease Control and Prevention.

With increasing national concern about diet and obesity, public and private sector nutritionists have emphasized the need for Americans to increase fruit and vegetable consumption. According to the Centers for Disease Control and Prevention, diets rich in fruit and vegetables may reduce the risk of cancer and other chronic diseases, with fruit and vegetables providing essential vitamins, minerals, and fiber, while remaining low in calories. In 1992, the fruit and vegetable industry (through the Produce for Better Health Foundation, a nonprofit consumer education foundation representing the vegetable and fruit industry) in cooperation with the National Cancer Institute (an agency within the U.S. Department of Health and Human Services) embarked on a campaign (still working today) to increase fruit and vegetable consumption. Future gains in fruit and vegetable consumption are expected from the continued efforts of this campaign, together with individual industry promotional efforts, additional Federal dietary emphasis, an aging and health-conscious population, and positive news reports on the benefits of eating fruit and vegetables.

U.S. International Fruit and Vegetable Trade

The large volume and value of U.S. international trade in horticultural products indicates the extent of the fruit and vegetable industries' integration with world markets. Fruit, vegetables, and tree nuts now account for 17 percent of the value of U.S. agricultural exports. In calendar year 2005, the United States exported $10.7 billion in fruit, tree nut, and vegetable products and imported $14.1 billion (table 3). The United States has had a negative net fruit and vegetable trade balance since 1998.

While the U.S. market is generally the primary market for most domestically grown fruit and vegetables, some commodities are heavily reliant on export markets for sales. Most of the tree nut industry relies on export sales, particularly to Europe, but also to India and other Asian countries, to move products. For example, about three-fifth of almond supplies, over a third of walnut supplies, and between a quarter and a third of pistachio supplies are exported annually. Similarly, over 40 percent of fresh grapefruit supplies and 30 percent of fresh orange supplies are shipped to export markets each year. Since the mid-1980s, as domestic demand for fresh grapefruit began to decline, the industry has increasingly relied on export markets to maintain grower revenues. In the case of fresh oranges, as well as some other crops, such as fresh cherries, exported fruit, especially those shipped to Japan, tend to be the highest quality fruit available and receive higher returns than growers could receive in the domestic market. Among fresh-market vegeta-

Table 3
Calendar year value of U.S. fruit and vegetable trade[1]

	Vegetables and prep.[2]		Fruit and prep.[3]		Vegetables and fruit	
Year	Imports	Exports	Imports	Exports	Imports	Exports
			Million dollars			
1990	1,989.5	1,924.1	3,553.5	3,113.0	5,542.9	5,037.2
1991	1,879.3	2,065.4	3,509.0	3,325.5	5,388.4	5,390.8
1992	1,755.0	2,194.6	3,786.0	3,639.9	5,541.0	5,834.6
1993	2,056.8	2,434.7	3,535.5	3,707.2	5,592.2	6,141.9
1994	2,307.0	2,693.6	3,665.7	4,163.0	5,972.7	6,856.6
1995	2,636.3	2,819.1	3,834.6	4,388.4	6,470.9	7,207.5
1996	2,945.5	2,802.3	4,452.5	4,658.7	7,398.0	7,460.9
1997	3,095.8	3,067.4	4,538.7	4,594.1	7,634.5	7,661.5
1998	3,699.4	3,254.0	4,525.3	4,293.1	8,224.6	7,547.0
1999	3,805.6	3,171.9	5,333.0	4,188.1	9,138.5	7,360.0
2000	3,934.7	3,359.8	5,197.8	4,468.0	9,132.5	7,827.8
2001	4,370.6	3,323.1	5,061.1	4,507.8	9,431.8	7,830.9
2002	4,620.4	3,356.2	5,527.1	4,688.1	10,147.6	8,044.3
2003	5,259.5	3,403.5	6,170.2	5,183.2	11,429.7	8,586.7
2004	5,927.8	3,574.4	6,881.8	5,809.1	12,809.6	9,383.5
2005	6,260.4	3,868.0	7,839.3	6,833.3	14,099.7	10,701.3

[1]Excludes wine, essential oils, malt beverages, cut flowers, and nursery stock.
[2]Also includes melons, dry beans, dry peas, and lentils, but excludes olives.
[3]Includes olives and tree nuts, but excludes melons.

Source: Prepared by USDA, Economic Research Service using data from USDA, Foreign Agricultural Service, *FASOnline*.

bles, about 27 percent of cauliflower and 17 percent of broccoli supplies are exported annually.

Based on share of total shipments, the largest export markets for U.S. fruit, tree nut, vegetables, and preparations in 2005 included Canada (33 percent), Japan (12 percent), Mexico (9 percent), Germany (3 percent), and Spain (3 percent), with fresh fruit and nuts dominating the list of export items. Canada, Japan, and South Korea purchased the greatest amount of U.S. fresh citrus in 2005, accounting for 71 percent of the $630 million sold worldwide. The United States exported $2.1 billion in fresh noncitrus fruit in 2005, with Canada (40 percent), Mexico (11 percent), and Taiwan (7 percent) as the top three markets. Spain (14 percent), Germany (13 percent), and Japan (8 percent) were the top three foreign markets for U.S. almonds in 2005, with $1.8 billion shipped worldwide. Raisins, the fifth largest U.S. fruit export (excluding nuts and juice) at $209 million in 2005, went primarily to the United Kingdom, Japan, and Canada.

Canada is the largest importer of U.S. vegetables and vegetable products, especially fresh-market vegetables. In 2005, the United States exported $3.9 billion in vegetables and preparations, melons, and pulse crops of which Canada accounted for $1.8 billion (47 percent). Mexico, the second leading destination, accounted for 14 percent of U.S. vegetable exports, or $526 million, during the period, while Japan, Taiwan, and South Korea rounded out the top five U.S. vegetable export markets.

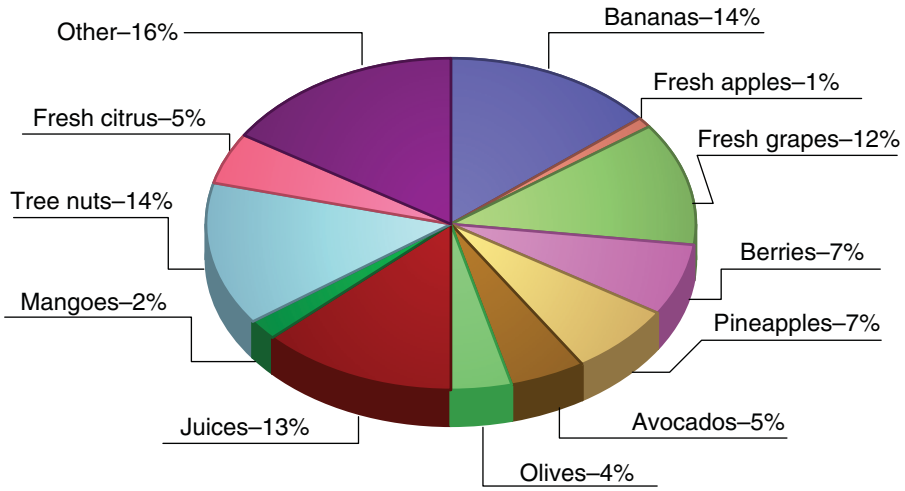
Fruit and Vegetable Imports Expand Over Past Three Decades

Mexico, Canada, Chile, China, and Costa Rice were the leading sources of U.S. fruit and vegetable imports in 2005, with vegetables and preparations, melons, and pulses accounting for 44 percent of the total. U.S. imports of these crops totaled $6.3 billion in 2005 (see table 3). The major vegetable imports were fresh tomatoes, melons, canned mushrooms, fresh onions, and fresh sweet peppers. Mexico remained the top foreign supplier of U.S. imports of vegetables, melons, and pulses in 2005, with 47 percent of the value. Canada (25 percent), China (5 percent), Peru (4 percent), and Guatemala (2 percent) rounded out the top five foreign suppliers. Mexico's vegetable exports to the United States consist mostly of fresh vegetables shipped during the winter and early spring (December-May). U.S. vegetable imports have risen steadily since 1970, with the pace increasing in the 1980s and late 1990s. The influx of immigrants accustomed to produce-heavy diets, a rising consumer awareness of the role of fruit and vegetables in good nutrition, and an increase in the demand for year-round fresh availability play key roles in the rise in U.S. imports of fresh vegetables.

U.S. imports of all fruit, fruit juices, and tree nuts totaled $7.8 billion in 2005. Mexico remained the top foreign supplier of these products to the United States, with 19 percent of total import value. Chile (15 percent), Costa Rice (6 percent), China (6 percent), and Brazil (5 percent) round out the top five foreign sources. With a value of $1 billion, bananas (fresh and dried) remained the top single U.S. fruit import (fig. 4). Based on share of total shipments, Guatemala (26 percent), Ecuador (23 percent), and Costa

Figure 4

Value of U.S. fruit imports, by share, 2005



Source: Prepared by USDA, Economic Research Service using data from USDA, Foreign Agricultural Service, *FASOnline*.

Rice (22 percent) were the top banana shippers to the United States in 2005. Fresh-market grapes ($945 million) were the second leading single U.S. fruit import in 2005, with Chile shipping 71 percent of volume, counterseasonally to U.S. production.

Tropical fruit have been growing in popularity in the United States since the late 1980s. Because climatic requirements limit domestic production of tropical fruit to parts of southern Florida, California, and Hawaii, imports have played a critical role in meeting domestic demand. Mexico is a major U.S. supplier, shipping more than half of the mangos and papayas and almost all of the limes consumed in the United States. Fresh pineapples are exported to the United States mostly from Costa Rice, with smaller quantities shipped from Ecuador, Honduras, and Mexico. For many years, Chile was the major U.S. source of imported avocados, with shipments arriving from November through March. However, Mexico recently surpassed Chile as the top supplier of avocados to the United States. Mexico greatly benefited from expanded market access granted in December 2004, allowing it to ship avocados year round to all U.S. States, except California, Florida, and Hawaii.

Aside from imports of tropical fruit, most U.S. imports of fruit are driven by the seasonality of domestic fresh fruit. During the winter months, U.S. imports of off-season fruit (such as stone fruit and grapes) from Southern Hemisphere countries, especially Chile, largely complement domestic production by providing a steady, year-round supply of fresh fruit. As a result, since the late 1980s, Chile has become the second largest source of U.S. fruit imports, after Mexico. Following the success of Chile, other Southern Hemisphere countries, such as Australia, South Africa, Argentina, and Brazil, are increasing shipments of fresh fruit to Northern Hemisphere countries.

Increasingly, fruit imports have been rising during the primary U.S. growing seasons. For example, with new varieties of grapes that mature later in the

season, Chilean and Mexican fresh grape exports are more often overlapping with California's early grape season in Coachella. Some berry exports to the United States overlap with fresh berries produced in the Pacific Northwest. Likewise, the U.S. avocado market is facing greater competition from imports, particularly from Mexico.

In recent years, U.S. imports of clementine tangerines from Spain have grown rapidly. Clementine imports arrive in the United States at the same time U.S. tangerines and oranges are in season. The popularity of this fruit has led to an increase in clementine acreage in California. The domestic crop is just now reaching commercial availability. The U.S. citrus industry is also affected by recent increases in Australian navel oranges shipped to U.S. markets. These products are in direct competition with California's Valencia oranges. Previously, Valencias were the only orange available in the domestic market during the summer, but the recent summertime availability of the more popular navel oranges has driven down grower prices for California Valencias.

The largest volume of fresh vegetable and melon imports, mostly from Mexico and Central American countries, enters the United States during the winter and early spring months when domestic supplies are limited. Tomatoes, peppers, cucumbers, squash, and other tender warm-season vegetables require warmer temperatures for growth than those that prevail in most parts of the United States during the winter. Southern Florida is virtually the only domestic outdoor growing area that can reliably produce these warm-season vegetables in commercial volume throughout the winter. But even in Florida, cold weather remains an annual threat to winter crops. As a result, winter imports of vegetables help insulate the domestic market against impacts from localized weather events, such as freezes, heavy rain, and hurricanes.

Hardier cool-season fresh vegetable crops, such as lettuce, broccoli, spinach, and celery, can withstand fluctuating winter temperatures that prevail in the desert southwest of California and Arizona and the Rio Grande Valley of Texas. Consequently, for cool-season crops, a smaller share of supply is imported during the winter and spring than for warm-season crops, such as tomatoes, peppers, and cucumbers.

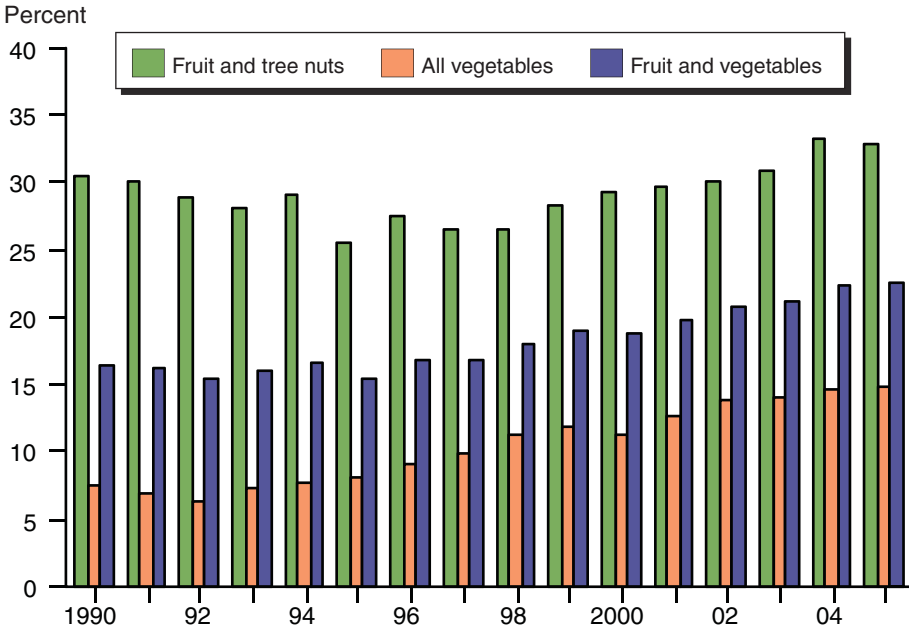
Trade Grows in Market Importance

Given the rise in demand for imported fruit and vegetables over the past decade, imports now account for a historically high share of domestic disappearance (an indicator of consumption) and output. U.S. fruit and vegetable imports as a proportion of total domestic disappearance have consistently trended higher over the past decade (fig. 5). During 2002-04, imports accounted for 21 percent of domestic disappearance of all fresh and processed fruit and vegetables, compared with 16 percent during 1992-94. Imports accounted for 23 percent of domestic consumption of fresh market fruits and vegetables in 2002-04, up from 18 percent a decade earlier.

Imports as a share of consumption of all fruit (fresh and processed) and tree nuts increased from 29 percent in 1992-94 to 31 percent in 2002-04. Paced by bananas (virtually all imported), fresh fruit imports jumped from 36

Figure 5

Import share of U.S. domestic fruit and vegetable disappearance[1]



[1]Fresh and processing. Vegetables includes melons and fruit includes bananas and olives.

Source: USDA, Economic Research Service.

percent of fresh fruit disappearance in 1992-94 to 44 percent during 2002-04. Excluding imports of bananas, imports as a share of fresh fruit consumption doubled, moving from 12 percent in 1992-94 to 24 percent during 2002-04. Summer fruit from the Southern Hemisphere, especially grapes, account for much of the increase, although the popularity of tropical fruit, such as mangoes and papayas, has helped expand the level of imports in the U.S. market.

Driven in part by a surge in imports of processed potatoes (mainly french fries from Canada and potato chips from Mexico), the import share of U.S. consumption of all vegetables, pulse crops, and melons (fresh and processed) doubled from 7 percent in 1992-94 to 14 percent in 2002-04. In 1995, imports accounted for less than 3 percent of the processed potato market, but changes in the frozen and chipping industries drove the import share to 15 percent in 2004. U.S. imports of fresh-market vegetables (including potatoes and melons), have risen as a result of increasing demand for vegetables, especially premium vegetables, such as greenhouse tomatoes, peppers, and asparagus. Imports as a share of consumption of fresh-market vegetables and melons increased from 10 percent in 1992-94 to 16 percent during 2002-04.

In recent years, the United States has negotiated bilateral trade agreements with several countries or regions (e.g., NAFTA with Canada and Mexico; CAFTA with Central America, and separate agreements with Chile and Australia). Largely because they reduced or eliminated tariffs, these agreements have enabled fruit and vegetable products shipped from partner countries to enter the United States at a lower cost to U.S. consumers. Lower cost imports have boosted the availability and volume of fresh and processed fruit and vegetables in the U.S. market. While U.S. imports of

produce have increased significantly, U.S. exports of produce still face obstacles that limit a similar increase. Many high-income nations, particularly in Europe and Asia, maintain high tariffs and/or nontariff barriers (e.g., phytosanitary requirements) that limit the demand for, or access of, U.S. fresh products in these markets.

Increased overseas promotion of U.S. fruit and vegetables has helped boost foreign sales despite the hindering effects of the strong dollar during much of the past 10 years. However, export markets for U.S. fruit and vegetables have expanded at a much more subdued pace than import markets. In 2002-04, the United States shipped 9.4 percent of its total fruit and vegetable supply to other countries, compared with 8.8 percent in 1992-94. Export share increased over the past decade for items such as melons, potatoes, canned fruits and vegetables, sweet potatoes, and tree nuts, while declining for fresh fruit and mushrooms. Little change was noted in the export share of U.S. fresh and frozen vegetables. Fruit and tree nut exports accounted for 11 percent of total supplies in 2002-04, down slightly from just under 12 percent in 1992-94. About 8 percent of total vegetable and melon supplies were exported in 2002-04, up from 7 percent in 1992-94.

China: A Market and a Competitor

U.S. fruit and vegetable growers have become increasingly concerned about the rapidly growing fruit and vegetable industry in China, both in terms of the increased competition in the U.S. domestic market as well as increased competition in major U.S. export markets. While U.S. fruit and vegetable exports to China have grown in recent years, China's shipments to major U.S. markets have also grown, creating a more competitive export market for many U.S. fruit and vegetables, which are shipped during the same seasons.

In accordance with its accession to the WTO, China had to make changes to its trade regime, lowering tariff rates and creating a more open environment for imports. As a result, between 2000 and 2005, U.S. vegetable and preparation exports to China increased by one-third to $39 million while U.S. fruit and preparation exports more than quadrupled to $158 million. U.S. fruit and tree nut exports to China increased across the board, with sizeable gains in tree nuts, processed fruit, and fresh deciduous fruit. Meanwhile, the processed sector accounted for much of the gain in vegetable exports, with more than three-fourths of this food category's exports to China consisting of frozen french fries and frozen sweet corn. Including shipments to Hong Kong, much of which are re-exported to mainland China, U.S. exports to China accounted for 21 percent of the value of U.S. frozen sweet corn exports and 8 percent of frozen french fried potato exports in 2005.

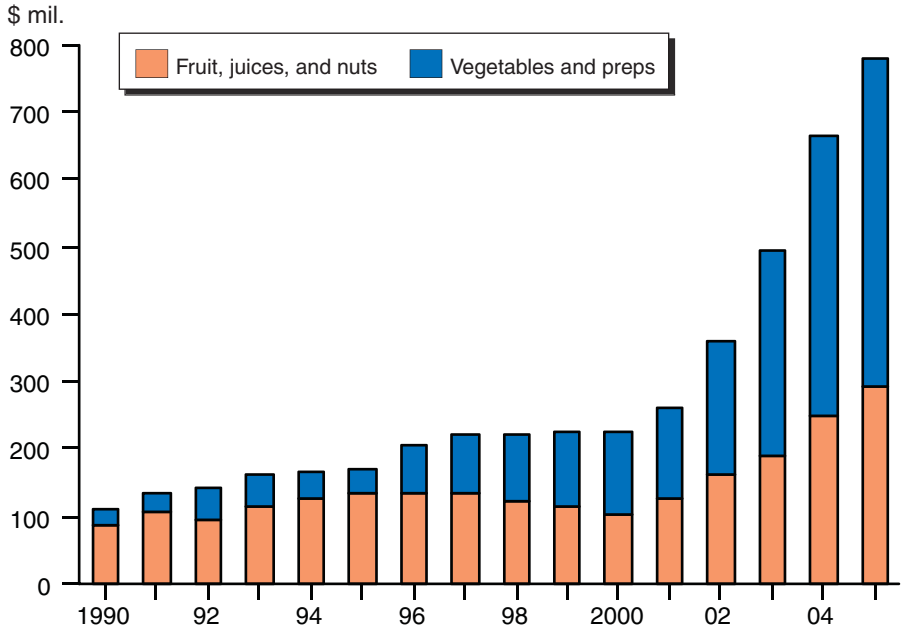
China (together with Hong Kong) is also a major market for U.S. fresh grape, orange, and lemon exports. Fresh grape exports to China (excluding Hong Kong) reached $47 million in 2005, more than four times the value in 2000, and accounted for 5 percent of U.S. fresh grape exports for the year. The combined China-Hong Kong market accounted for 10 percent of U.S. fresh grape exports. U.S. fresh lemon exports to the area increased from $5 million in 2000 to $7 million in 2005, accounting for 9 percent of all U.S. lemon exports.

In coming years, China may grow as a market for U.S. exports of processed fruit products, such as dried, canned, and frozen fruit. In 2005, China and Hong Kong accounted for 6 percent of U.S. dried fruit export volume, and 5 percent of canned and frozen fruit export value. In 2005, the value of raisin shipments to China was more than four times the value in 2000. The opening of China's market has been a boon to the viability of these U.S. industries, with domestic demand for processed fruit (other than juice) remaining flat in recent years.

While China has emerged as a key market for some U.S. fruit and vegetable industries, it has also developed into a competitor for U.S. fruit and vegetable producers in the domestic market. For example, while the value of U.S. fruit and tree nut imports grew 51 percent between 2000 and 2005, imports in this category from China (including Hong Kong) quadrupled. During the same period, the value of U.S. vegetable and preparation imports grew 59 percent, while U.S. imports of vegetables and preparations from China (including Hong Kong) expanded 184 percent (fig. 6). Most of the fruit imports from China consist of processed products. In many cases, while China's shipments contributed to an overall increase in a given commodity's U.S. imports, part of the increase in U.S. imports from China displaced volume imported from other countries. For example, while the growth in the value of U.S. apple juice imports from China increased 362 percent between 2000 and 2005, total U.S. apple juice imports increased just 20 percent. As apple juice imports increased from China, shipments declined from other major suppliers, such as Argentina and Germany.

Figure 6

U.S. fruit and vegetable imports from China[1]



[1] Includes Hong Kong. Fruit also includes olives, bananas, tree nuts, and preparations. Vegetables also include preparations, potatoes, melons, and pulse crops.

Source: Prepared by USDA, Economic Research Service using data from USDA, Foreign Agricultural Service, *FASOnline*.

In other cases, rapid growth in U.S. imports from China has resulted in loss of market share by domestic producers. For example, between 2000 and 2005, the volume of fresh garlic imports rose 143 percent, driven largely by imports from China, which jumped from less than 1 million pounds in 2000 to 112 million pounds in 2005. While garlic imports from China accounted for less than 1 percent of all U.S. fresh garlic imports in 2000, they accounted for 73 percent of the total in 2005, enabling China to dominate the fresh garlic import market.

On a smaller scale, the United States has seen rapid growth in fresh and frozen strawberry imports from China in recent years. In 1999, China accounted for less than 1 percent of total U.S. strawberry imports (at 1.5 million pounds). By 2005, its share increased to 12 percent, at 33 million pounds. Frozen strawberries still make up most of the category's imports from China, but fresh strawberries have also increased sharply in the last 2 years. It is expected that China will increasingly expand its presence in U.S. strawberry markets over the coming decade, likely increasing competition in the domestic market, especially for frozen products.

The growth of China's agricultural industry has also had an effect on major U.S. export markets, such as Japan, South Korea, Taiwan, and Hong Kong. With its proximity to Southeast Asia, China benefits from lower shipping costs, as well as lower production costs, than producers in the United States. As China has reformed its policies relating to land and agricultural production, producers from Southeast Asia have invested in China's horticultural sector, speeding up improvements required for producing export-quality products. As a result, more products and larger volumes of products are available for the export market and are being shipped to countries in this region.

China's agriculture is increasingly capitalizing on its proximity to Asian markets (e.g., Japan, Taiwan, and South Korea) that command high prices for high-quality produce. In recent years, China has increased the quality and production of such commodities as broccoli, garlic, apples, navel oranges, and some tree nuts that are shipped to these markets during the same season that they are shipped by the United States. As the quality of its produce increases, China's shipments become more competitive with U.S. products that previously held quality advantages. As China's shipments to Asian markets have expanded; so, too, has its shipments to Canada and Europe. As the quality of Chinese products continues to improve, China's producers may also eventually present competitive challenges for U.S. fruit and vegetable producers in Canadian and European markets.

Prices, Price Variability, and Marketing Margins

As with other commodities, various supply and demand factors come together to determine a market clearing price for a particular fruit or vegetable. The myriad commodities covered by the term "fruit and vegetable industries" do not operate in a homogenous market as they tend to face unique supply and demand characteristics. Thus, few fruit and vegetable price series are highly correlated (move together over time), which means market analysis can not be easily generalized across crops in the sector. For example, price movements for potatoes differ from those of apples, and price changes for fresh tomatoes vary widely from those of asparagus. However, some degree of price correlation can be found among select products, such as broccoli and cauliflower and potatoes and onions. This finding may reflect that these crop pairings share similar growing areas and conditions and are marketed in similar ways.

Agricultural commodity prices, especially fresh fruit and vegetable prices, are generally characterized by a greater degree of price variability than is typical for manufactured goods. Unlike manufactured goods, agricultural commodities are largely produced in an open environment over which the grower has limited control.

Extremes in weather and pests can cause havoc with the agricultural production process, resulting in unforeseen peaks and valleys in supply. In most fresh produce markets, prices rise when crops are damaged and supplies are insufficient, especially in markets where additional import volume is not immediately available. Thus, fruit and vegetable market shortfalls (or the opposite, gluts) are commonly accompanied by relatively large price changes. At the grower level, oversupply can sometimes lead to economic abandonment of a crop (plowing fields under or leaving crops unharvested due to low prices) and financial hardship when prices fail to cover production costs.

When domestic crop production is severely disrupted, as during the fall 2005 hurricane season, relatively large increases in retail prices typically are required to bring consumer purchases of the affected crop in line with available supply.[5] Conversely, during periods of oversupply, the reaction of retailers to downward prices is muted by the large share of the retail value accorded to marketing costs. With enough lead time, retailers can sometimes offer consumers special pricing to stimulate demand and help shippers work through market gluts.

In general, the farm value of all agricultural products accounts for about 20 percent of retail food prices, with the remainder going to marketing costs. For fresh fruit and vegetables, the farm value represented about 19 percent of the retail value in 2004, while the farm value of processed fruit and vegetables accounted for about 16 percent of the retail value. The price spread (marketing margin) between the farm value and the retail price includes the costs of inputs, such as labor, energy, transportation, and storage required to move products from the farm to the consumer. Labor

[5]In October 2005, the Florida vegetable industry suffered substantial hurricane damage to crops and infrastructure for the second consecutive year. Hurricane Wilma moved across southern Florida, resulting in severe damage to tomatoes and other vegetables set to be marketed from mid-December through March. Fresh tomato prices more than tripled in December 2005 before subsiding in early February when supplies recovered.

represents the largest food marketing cost and continues to grow as wage rates increase and the cost of employer-provided benefits moves higher.

Grower prices for fresh-market vegetables and melons (excluding potatoes) increased 22 percent between 1992-94 and 2002-04, reflecting strong demand and higher prices for such crops as romaine lettuce, spring onions, and broccoli (fig.7). Grower prices for fresh-market fruit were up 19 percent over the same period as producer prices rose 20 percent for citrus fruit and 14 percent for noncitrus fruit and berries. Despite improved demand, producer prices for tree nuts were up just 6 percent between 1992-94 and 2002-04, with stronger growth in almond prices offset by weaker growth in prices for pecans, walnuts, and pistachios.

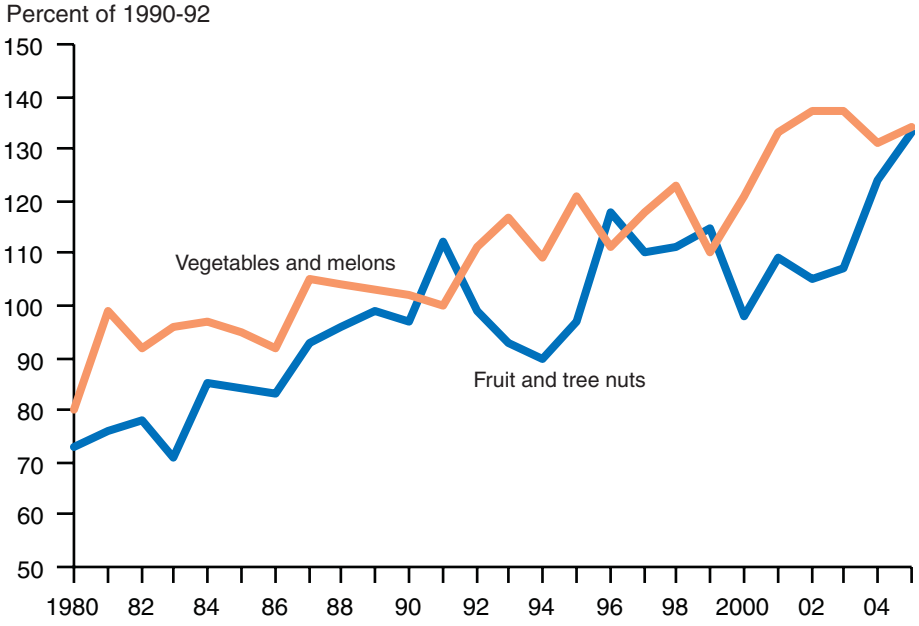
For processed fruit and vegetables, wholesale prices increased (unadjusted for inflation) between 1992-94 and 2002-04 as follows:

- *Canned vegetables and juices*, 16 percent
- *Canned fruit*, 9 percent
- *Frozen vegetables*, 11 percent (potatoes, 10 percent)
- *Frozen fruit, juices, and ades*, 4 percent (except frozen orange juice declined 2 percent)
- *Dried and dehydrated fruit and vegetables*, 7 percent
- *All processed foods*, 16 percent

While grower prices for fresh fruit and vegetables have generally kept pace with inflation over the past decade, retail prices for fresh fruit and vegeta-

Figure 7

Indexes of prices received by growers for fruit and vegetables



Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Agricultural Prices 2004 Summary*.

bles appear to have increased by about one-fifth in real terms. This reflects greater increases in marketing and transportation costs embodied in retail prices, compared with farm prices. Because growers have become more efficient in crop production, farm prices have generally risen more slowly than prices in the general economy in recent decades.

Shipping-point prices for many fruit and some vegetables tend to exhibit explicit seasonal trends during the year. Strong seasonal patterns have been noted for grapefruit, lemons, strawberries, pears, potatoes, and fresh-market sweet corn. Such crops as lettuce, fresh tomatoes, and celery have little discernible seasonal price patterns because supply and demand tend to be relatively consistent throughout the year.

Reflecting a combination of stronger demand and increasing transportation costs, consumer prices for fresh fruit and vegetables have risen at a much faster pace than prices for all food at home over the past decade. Meanwhile, sluggish or declining demand has restrained prices for processed fruit and vegetables, which have risen at about the same rate as prices for food at home. Consumer prices for processed fruit and vegetables, adjusted to account for inflation, have remained relatively steady over the past 10-15 years, with little change and some declines noted in raw product prices for several processing crops. For example, the price of tomatoes destined for processing averaged $58.50 per short ton (delivered price) during 2002-04, down 9 percent from 1992-94. Growers have been able to operate in this kind of competitive pricing environment by harvesting ever-larger tonnages from each acre. Processing tomato yields have been trending upward, hitting a record high in 2004.

Characteristics of the Fruit, Tree Nut, and Vegetable Industry

Farms that depend on fruit and vegetable sales for over half of their receipts, compared with other farms producing fruit and vegetables, tend to be much smaller in farm size (acres) and less diversified in the commodities produced. They have, on average, higher net farm incomes and substantially more financial assets. These farms are also less dependent on government payments. USDA's annual Agricultural Resource Management Survey (ARMS) is the primary source of information on the financial condition, production practices, resource use, and economic well-being of America's farm households. Data from the 2003 ARMS indicate that fruit and vegetable growers have performed as well financially (better in most cases) as most other commodity sectors in U.S. agriculture (app. B).

Specialized Fruit and Vegetable Farms

Farms that receive at least half of their gross value of production from the sale of fruit and vegetables are defined here as *specialized* fruit and vegetable farms. According to data derived from ARMS, these specialized farms represent the bulk of U.S. fruit and vegetable output, relying heavily on fruit and vegetable sales for a substantial share of their farm income. In 2003, specialized farms accounted for three-fourths of all the farms producing fruit and vegetables in the United States and contributed 95 percent of the total value of U.S. fruit and vegetable production. Regionally, these specialized farms tend to be concentrated in the West, with substantial numbers also found in the South. Although a significant volume of fruit and vegetables are also grown in the Midwest and Northeastern regions of the country, these areas tend to feature operations that rely less on fruit and vegetables for total farm revenue. Operators of specialized farms also tend to be older and more educated than their counterparts in nonspecialized farms.

The average size of specialized fruit and vegetable farms was significantly smaller than that of nonspecialized fruit and vegetable farms (farms where fruit and vegetables accounted for less than half of the total value of farm production). Fruit and vegetables accounted for half of the total acreage on specialized farms, compared with less than 10 percent on nonspecialized farms.

Geographical location largely governs which crops growers consider as replacements for production of fruit and vegetables. The principal competing crops on farms producing fruit and vegetables are small grains (especially wheat), corn, soybeans, cotton and hay. The commodity mix on nonspecialized fruit and vegetable farms tends to be more diversified than that of specialized fruit and vegetable farms. On average, the crop and livestock mix on specialized fruit and vegetable farms involved just 1.4 commodities, including fruit and vegetables as an aggregate. However, the average crop and livestock mix on nonspecialized fruit and vegetable farms involved nearly four commodities. In general, nonspecialized fruit and vegetable farms had more livestock (largely dairy and beef) than specialized farms.

As with all commodity-producing farms, fruit and vegetable farms vary widely in size and other characteristics, ranging from very small residential and retirement farms to establishments with annual sales well over $1 million. ERS combines farm characteristics, such as operator occupation and farm sales, to classify farms into one of three categories:

- *Commercial farms*—farms with annual sales of $250,000 or more
- *Intermediate farms*—farms with sales less than $250,000 and whose operators report farming as their primary occupation
- *Rural-residence farms*—farms with annual sales less than $250,000 and whose operators report their primary occupation as either retirement or off-farm employment

Only about 17 percent of all specialized fruit and vegetable farms were classified as commercial farms, with sales of more than $250,000. The majority of these farms were located in the West and the South. The share of commercial farms was larger for nonspecialized fruit and vegetable farms, at about one-fourth. More than half of specialized fruit and vegetable farms and 40 percent of nonspecialized fruit and vegetable farms were characterized as rural-residence farms. The remainder (about 26 to 36 percent) of both specialized and nonspecialized fruit and vegetable farms fell into the intermediate farm category.

Labor Is Largest Variable Expense

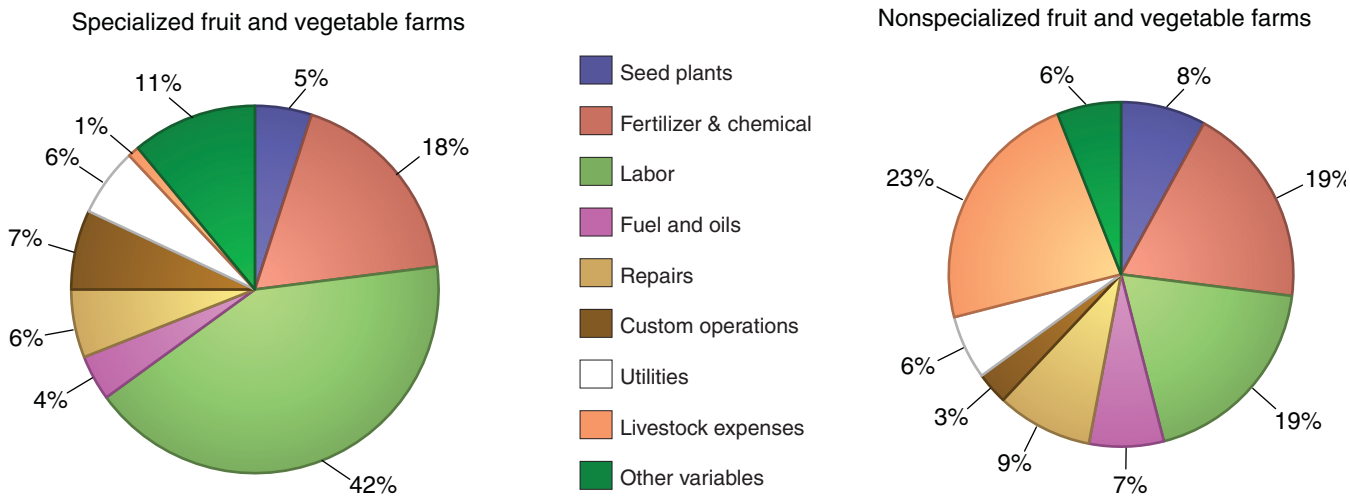
Variable expenses for fruit and vegetable production include such items as seed, fertilizer, chemicals, fuel, custom work, and hired labor. Annual variable expenses across all specialized U.S. fruit and vegetable farms averaged $153,426 per farm. The production of fruit and vegetables tends to be labor intensive because operations such as thinning, cultivating, irrigating, and harvesting must frequently be performed by skilled hand labor to avoid damage to tender plants, bushes, and trees and to help ensure the quality and appearance of fresh-market products. For this reason, labor expenses tend to be much greater for fresh-market crops than for processed-market crops, for which production tends to be more mechanized. At an average of nearly 42 percent of total variable expenses, labor was the single largest variable cost on specialized fruit and vegetable farms in 2003 (fig. 8).

As they strive to harvest high-in-demand, blemish-free produce, fruit and vegetable growers must constantly protect their crops from plant diseases, insect pests, and weeds. Chemicals (including fertilizers) were thus the second largest variable expense for specialized nonorganic fruit and vegetable farms in 2003—accounting for about 18 percent of total variable expenses. Seed and transplants can also be a significant annual expense, with many vegetable commodities (such as tomatoes, watermelon, and cantaloup) produced from transplants or costly hybrid seed. In Florida, for example, the transplants used to plant an acre of strawberries in 2004 cost nearly $2,000.

In addition to variable expenses, farms have fixed cash expenses, such as insurance premiums, real estate and property taxes, interest, rent, and lease

Figure 8

Variable expenses on fruit and vegetable farms, by share, 2003



Source: Prepared by USDA, Economic Research Service using USDA's 2003 Agricultural Resource Management Survey.

payments. When these fixed expenses are added to variable cash expenses, the average specialized fruit and vegetable farm paid $185,727 in total cash expenses in 2003. In comparison, nonspecialized fruit and vegetable farms had higher cash expenses, due primarily to the prevalence of livestock and other crop-related expenses.

Income and Financial Ratios

Although specialized fruit and vegetable growers only farmed about a fourth of the total acres operated by nonspecialized fruit and vegetable growers, the farm asset and equity positions of specialized farms were nearly 40 percent greater than those of nonspecialized farms. The net farm income of specialized fruit and vegetable farms was 10 percent higher than nonspecialized fruit and vegetable farms, averaging $63,187 per farm in 2003. Specialized fruit and vegetable farms also had 16 percent higher off-farm income than nonspecialized fruit and vegetable farms, which reflects the greater likelihood of operators of specialized fruit and vegetable farms reporting nonfarm employment or retirement as their primary occupation than operators of nonspecialized fruit and vegetable farms.

The debt-to-asset ratio is a measure of the relative debt burdens of farm businesses. Farms with an excessive debt level (indicated by a high debt-to-asset ratio) will likely have difficulty borrowing money for operating funds, or expansion, or could default on loan payments when farm income is low. In 2003, specialized fruit and vegetable farms had a debt-to-asset ratio of 9 percent ($9 of debt for every $100 of farm assets), compared with 12 percent for nonspecialized fruit and vegetable farms. Specialized farms compare favorably against the average across all U.S. farms, where the debt-asset ratio was reported to be 14.4 percent. In fact, specialized fruit and vegetable farms reported the lowest debt/asset ratio of all major farm types in 2003, including poultry farms (23 percent—the highest), cotton farms (14 percent), and wheat farms (11 percent).

Serving as a measure of profitability, the returns-on-assets is the income a farm business generates per dollar of farm assets. Specialized fruit and vegetable farms produced an average of $2.73 per $100 of assets, compared with $1.29 per $100 of assets for nonspecialized fruit and vegetable farms.

The operating profit margin, another measure of farm business profitability, is defined as the farm profit per dollar of production value. Based on this measure, specialized fruit and vegetable farms were more profitable than nonspecialized fruit and vegetable farms, averaging $15.53 of profit for each $100 of commodities produced in 2003. The profit margin for nonspecialized fruit and vegetable farms was significantly lower, averaging $4.99 for each $100 of commodity production.

USDA classifies the financial conditions of a farm business as favorable if it has a debt-to-asset ratio of 40 percent or less and a positive net cash farm income. A farm has positive net cash income when its total cash costs (fixed and variable) are less than income earned from the sale of products from the farm. About 61 percent of all U.S. farms fall into this category. In this regard, specialized fruit and vegetable farms compared positively, with 63 percent having a favorable financial position in 2003. Another 25 percent of specialized fruit and vegetable farms maintained debt-to-asset ratios of 40 percent or less in 2003 but were considered to have a weaker financial condition because of negative net cash income.

Each year, a share of U.S. fruit and vegetable growers realize negative net income due to unusually inclement weather, extremely low prices, or other temporary conditions. In 2003, temporary economic shocks left about 5 percent of specialized fruit and vegetable farms financially unstable, meaning they had negative income and a debt-to-asset ratio exceeding 40 percent—about the same share of unstable operations as the average across all commodities. In general, specialized and nonspecialized fruit and vegetable farms had very similar financial positions.

Economic Sustainability of Specialized Fruit and Vegetable Farms

The longrun economic viability of specialized fruit and vegetable farms can be viewed in several ways. To capture the short- and long-run dimensions of farm financial viability, an analysis should consider three measures of production expenses for the whole farm. Variable expenses comprise the costs for purchased inputs that are consumed in one production period (e.g., seed, fertilizer, chemicals, fuel, repairs, and hired labor). Total cash expenses include variable expenses plus expenses for overhead items (e.g., rent, taxes, insurance, and interest payments). Economic expenses include total cash expenses plus an allowance for depreciation, along with imputed returns to management, land, and unpaid labor of the operator and family.

A farm can often survive for a year if revenue covers no more than variable expenses and perhaps for several years if revenue covers total cash expenses, particularly if the operator is able to draw on cash reserves or borrow against assets, or use income from off-farm sources. However, such measures are usually temporary. For longrun profitability, revenue must

cover economic costs. For example, in the short run, the allowance for depreciation may be deferred and aging equipment may be repaired. But in the long run, as machinery wears out, a shortage of funds for replacing machinery may impact the ability of the farm business to generate revenue.

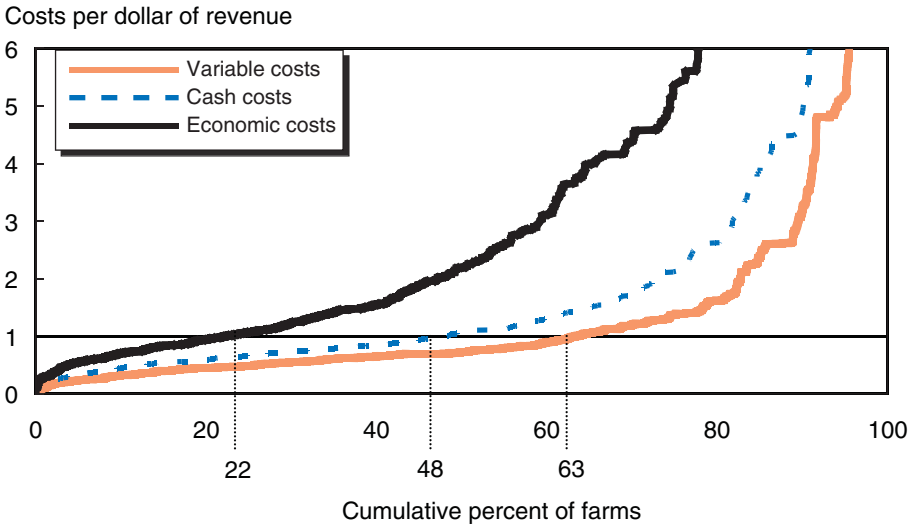
The share of specialized fruit and vegetable farms that cover expenses varies substantially depending on how costs are measured. Nearly two-thirds of specialized farms had revenues sufficient to cover variable cash expenses incurred during 2003. About half of these farms had revenues sufficient to cover variable cash expenses and other overhead cash expenses. Although varying from year to year, 22 percent of specialized farms were able to cover all economic costs in 2003, compared with 26 percent of all U.S. farms (fig. 9).

Specialized Farms Received Fewer Government Payments

In general, government payments do not materially contribute to the long-term financial sustainability of U.S. fruit and vegetable farms. The bulk of government payments received by fruit and vegetable farms come from commodity-related program payments, with a smaller share coming from conservation program payments for grower actions to protect the environment. Although growers of strictly fruits and vegetables (except dry peas and lentils) are not eligible for direct payments (other than ad hoc disaster relief), some fruit and vegetable growers also produce such crops as small grains, soybeans, or cotton—crops that make growers eligible for participation in various government programs—and some participate in Federal conservation programs. Nearly half of nonspecialized fruit and vegetable farms participated in government programs in 2003. In comparison, less than 15 percent of specialized fruit and vegetable farms participated in

Figure 9

Distribution of specialized fruit and vegetable farms at different cost levels, 2003



Source: Prepared by USDA, Economic Research Service using USDA's 2003 Agricultural Resource Management Survey.

government programs, receiving much less in government payments than nonspecialized fruit and vegetable farms. On average, specialized fruit and vegetable farms received $3,253 per farm in government payments in 2003, compared with $13,850 for nonspecialized fruit and vegetable farms.

Present Farm Policy Affecting the Fruit and Vegetable Industries

Presently, the U.S. fruit and vegetable industry benefits from a number of Federal programs that serve to stabilize and enhance income, such as ad hoc disaster payments (Noninsured Crop Disaster Assistance—NAP), crop insurance, marketing and promotion assistance, food aid purchases, export promotion (including the Market Access Program), tree replacement assistance, cost-share assistance and other assistance for implementing conservation measures, and Trade Adjustment Assistance. However, while the industry has set its goals on the expansion and enhancement of domestic and international demand for U.S. fruit and vegetables, it still seeks legislative assistance with several other issues. The industry is concerned about ensuring access to an affordable farm labor supply, further opening export markets and promoting products overseas, realizing full (and even expanded) funding of the various titles within the Specialty Crops Competitiveness Act of 2004, and ensuring the domestic promotion of fruit, vegetables, and tree nuts. In the past, these issues have generally not been included in farm bill legislation but as separate legislation. Dry peas and lentils are the only fruit and vegetable commodity for which growers are eligible for Federal program payments (see box, "Dry Peas and Lentils").

Disaster Assistance

Growers of fruit, vegetable, and tree nut crops who did not purchase crop insurance or do not have established Federal crop insurance programs for their crops are eligible for Federal financial assistance under NAP, administered by USDA's Farm Service Agency (FSA). The program provides payments to qualified growers who lose at least 50 percent of their crop or are unable to plant more than 35 percent of their acreage due to a natural disaster. Payments are made on the loss exceeding 50 percent of expected production, based on producers' yield and production records.

The amount disbursed to fruit and vegetable growers under NAP varies depending on natural disasters (if any) affecting crops in a given year. Because many commodities in the fruit and vegetable industry are not part of the Federal crop insurance program, growers of such commodities are reliant on NAP or ad hoc disaster aid for financial assistance during years of extensive crop loss.

In response to the extensive damage to Florida's horticultural industry in 2004 following three devastating hurricanes, Congress enacted the Florida Hurricane Assistance Programs (FHAP), administered by USDA's FSA. FHAP comprises three programs directly established for horticultural crops: the Florida Citrus Disaster Program; the Florida Nursery Crop Disaster Program; and the Florida Vegetable, Fruit and Tropical Fruit Disaster Program. Payments vary by program and are limited to $80,000 per producer. In addition to FHAP, the Secretary of Agriculture in the past committed financial assistance to Florida's citrus industry to battle citrus canker disease.

Dry Peas and Lentils

Until the late 1990s, the U.S. dry pea and lentil industry historically had been geared toward the production of high-quality food grade product, largely produced within a 90-mile radius of Pullman, Washington, in an area known as the Palouse (which also encompasses portions of nearby Idaho and Oregon). However, with the introduction of a Marketing Loan Assistance program for producers of dry peas, lentils, and "small" chickpeas (those that pass through a 20/64 inch screen) in the 2002 Farm Security and Rural Investment Act, acreage has expanded sharply outside of the Palouse, especially in North Dakota and Montana. Between 2002 and 2005, U.S. dry pea planted area (including Austrian winter peas) has surged 156 percent, while lentil area has risen 99 percent. Further gains in pea and lentil acreage are expected over the next several years because of the combined effects of the marketing loan program, the relatively low input costs for these crops, overseas marketing efforts by the industry, and the long-term agronomic benefits of having pulses in crop rotations.

The marketing loan program provides loan deficiency payments (LDP) or marketing loan gains to dry pea and lentil farmers when market prices are lower than commodity loan rates.[1] It also reduces revenue risk associated with price variability. When an LDP is paid on a portion of the crop, that portion cannot subsequently be used as collateral for a marketing loan or another LDP.

In 2004/05, loan deficiency payments for dry peas totaled $31.5 million on 13.2 million hundredweight. The quantity for which LDPs were received exceeded the USDA, National Agricultural Statistics Service (NASS) production estimates for dry peas, wrinkled seed peas, and Austrian peas because LDPs were available for other miscellaneous dry peas and because NASS production estimates only cover major producing States, excluding an estimated 30,000-40,000 acres scattered across a number of other States. For lentils, only $113,000 of LDPs were made in 2004/05 (none were made in 2003) because the market price remained well above the loan rate until late in the marketing year. LDPs were made for small chickpeas but totaled only $132,366 in 2004/05 due to limited production.

A large portion of the pea and lentil crop has traditionally been purchased each year by the Federal Government for foreign food aid distribution under such programs as Food for Peace (PL-480), with the remainder sold domestically or exported privately into a very competitive world market, where Canada is the leading supplier. Foreign markets are very important to this industry, with about 44 percent of available dry pea and lentil supply (production plus imports and stocks) exported during 2002-04. The livestock feed market (largely for dry peas) remains undeveloped in the United States, although it appears to have gained a small foothold in Canada. The goal of the U.S. industry is to develop this domestic feed market, while also exploring alternative food uses, which will facilitate the continued expansion of output.

[1]Producers eligible to obtain a nonrecourse loan, but who agree to forgo the loan, may obtain a loan deficiency payment (LDP). The LDP rate equals the amount by which the applicable loan rate where the crop is stored exceeds the loan repayment rate. The LDP equals the LDP rate times the quantity of crop for which the LDP is requested and is otherwise eligible to be placed under loan.

Producers realize a marketing loan gain if they repay their loans when the loan repayment rate is less than the loan rate. The marketing loan gain rate equals the amount by which the loan rate exceeds the marketing loan repayment rate. For more information, see the following: www.fsa.usda.gov/pas/publications/facts/html/pulse03.htm

Producers eligible for disaster assistance programs are also eligible to apply for the Disaster Debt Set-Aside Program, whereby they may be allowed to set aside a portion of their Federal debt in order to maintain their farming operation. Growers are also eligible for emergency loans and the Emergency Conservation Program.

Producers of fruit and tree nuts are also eligible for Federal assistance when there is a crop loss due to a natural disaster under the Tree Assistance Program (TAP). Under TAP, eligible producers can receive assistance to replant trees,

vines, or bushes damaged by bad weather. Growers, however, do not receive compensation that reflects the productivity of lost trees, vines, or bushes. Therefore, payment under TAP would be the same for a newly productive tree as it would be for a mature tree that produced a much larger crop.

Federal Crop Insurance

USDA's Risk Management Agency (RMA) administers crop insurance policies for over 100 crops. Many fruit, vegetable, and tree nut policies have been created since the late 1990s. Policies, which can vary by State, may cover a single commodity regardless of its end use or provide separate coverage for fresh and processing markets. Separate policies also cover fruit and nut trees in addition to the commodities harvested from them. The RMA has established pilot programs that test new policies for specific crops in specific States or regions of the country. Many of these pilot programs are for fruit, vegetable, and tree nut crops.

Separate crop insurance policies now cover more than 40 fruit, tree nut, and vegetable crops (the number is greater when considering policies by variety or State). According to the 2002 Census, 49 percent of the combined harvested area on specialized fruit, tree nut, vegetable, and melon farms was covered by some type of crop insurance program. Federal crop insurance is purchased prior to the growing season and provides an indemnity payment if the farmer's actual yield falls below a predetermined guarantee. The policies are sold and serviced by private insurance companies. Although crop insurance is not free to growers, the government subsidizes a significant portion of the insurance premium.

Market Access Program

The Market Access Program (MAP), administered by USDA's Foreign Agricultural Service, provides matching grants to commodity marketing boards and cooperatives to help expand markets overseas for U.S. agricultural products. Regional trade promotion organizations may also be grant recipients. The fruit and vegetable industry has a sizeable presence in the MAP, receiving about one-third of the total $200 million allocated in fiscal year 2005. The top horticultural recipients for fiscal year 2005 were the Wine Institute, Florida Department of Citrus, California Walnut Commission, National Potato Promotion Board, California Table Grape Commission, and Washington Apple Commission.

Commodity Procurement for Domestic Feeding Programs

USDA's Agricultural Marketing Service (AMS) purchases food products from handlers and processors. AMS makes some purchases to remove surplus commodities if the products can be used by recipient agencies. By purchasing some of a commodity output, AMS lessens the supply in the marketplace, helping improve prices received within the industry. All food purchased by AMS must be produced in the United States. In recent years, surplus removal has accounted for about two-thirds of the annual value of

fruit, vegetable, and tree nut purchasing by AMS. The other one-third of AMS purchases, consisting of nonsurplus commodities, was directed to various domestic feeding programs at the request of recipient agencies. The food purchased by AMS is provided to schoolchildren through the National School Lunch Program, to Native Americans, and to the needy and the homeless through various Federal food assistance programs. AMS-purchased food is also provided as emergency relief to individuals recovering from the effects of a natural disaster.

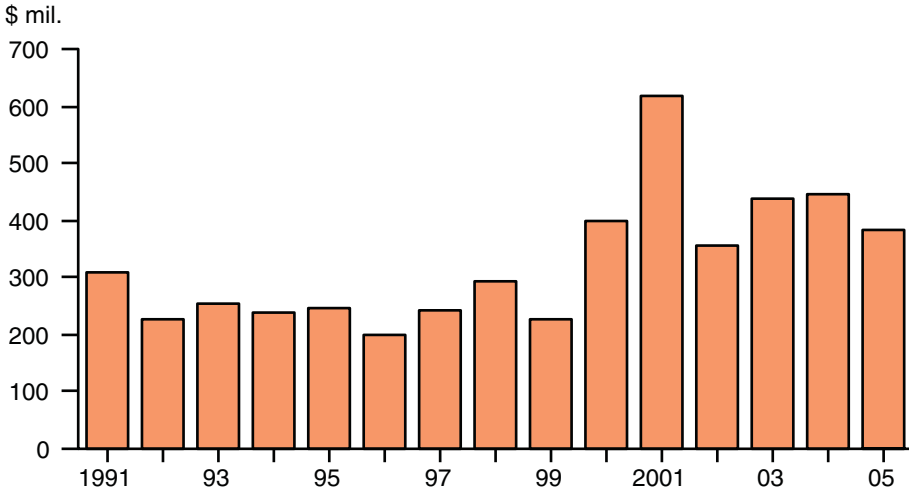
Purchases of fruit and vegetables are an important component of USDA's domestic feeding programs. Before declining in fiscal year 2005, AMS purchases of fruit and vegetables increased for 3 consecutive years (fig. 10). In 2002, AMS purchased 1.24 billion pounds (fresh-weight equivalent) of fruit and vegetables, fresh or processed, valued at $355 million. In 2004, purchases increased to 2 billion fresh-weight equivalent pounds, valued at $447 million. In comparison, other AMS purchases in 2004 included 213 million pounds of beef products ($135 million), 149 million pounds of chicken products ($92 million), and 14 million pounds of eggs ($12 million), as well as other products (dairy and grains are purchased by FSA under a separate program).

Food Assistance Programs

USDA's Food and Nutrition Service (FNS) administers various feeding programs, including those for which food is acquired through AMS food purchase programs. FNS programs include the Food Stamp Program; Special Supplemental Nutrition Program for Women, Infant, and Children (WIC); and school meals (such as the National School Lunch Program, School Breakfast Program, Child and Adult Care Food Program, Summer Food Service Program, Special Milk Program, and Team Nutrition

Figure 10

USDA, AMS domestic fruit and vegetable program purchases, fiscal year



Source: Prepared by USDA, Economic Research Service using data from USDA, Agricultural Marketing Service, Commodity Procurement Branch, FVP.

Program); along with other programs to provide nutritional meals to seniors, natural disaster victims, and others.

The Food Stamp Program generally allows participants to make their own food choices. Participants are allowed to purchase all food items, including fresh and processed fruit, vegetables, and nuts. Participants may also use Food Stamps at farmers' markets to purchase fresh produce. WIC, however, limits the products that eligible participants can purchase with WIC vouchers at participating retail outlets.[6] For the purchase of fruit and vegetable products, WIC participants can use vouchers only for juice, dry beans, and dry peas. Pregnant women can also use vouchers for carrots. Nutritionists and the fruit and vegetable industry have been lobbying Congress and USDA to include more fruit and vegetables in the program, as a way of expanding domestic consumption of their products and improving nutrition among WIC participants. As a result, USDA is considering expanding the amount of fruit and vegetables that can be purchased with WIC vouchers.

[6]WIC eligible participants include low-income, pregnant, breastfeeding, or post-partum women, infants, and children age 5 years or younger who are at nutritional risk.

Marketing Orders

There are currently 34 Federal marketing orders covering fruit, tree nuts, and vegetables in the United States.[7] Marketing orders, administered by committees of industry handler and grower representatives with oversight by AMS, are designed by the industries themselves in accordance with Federal requirements to establish and maintain orderly marketing conditions within fruit and vegetable markets. Various mechanisms are used in each marketing order to meet this goal, including enforcing product quality standards, regulating the flow of product to the market, standardizing packages and containers, creating reserve pools for storable commodities, and authorizing production and marketing research and advertising. Industries vote to establish marketing orders, which are subject to Federal oversight of certain aspects of their operations.

[7]As of January 2006, 32 of these Federal marketing orders were active, as 1 has been suspended since 1999 (California/Oregon potatoes) and 1 was being terminated (Hawaii papayas). A third was under consideration for termination (Texas melons).

Once established, a marketing order binds all individuals or businesses serving as "handlers" in a geographic area covered by the order. Marketing orders may also affect imports. Under the Agricultural Marketing Agreement Act of 1937, Section 8e, imports of commodities for which domestic marketing orders are in effect can be required to be in compliance with the same or comparable regulations on grade, size, quality, or maturity issued in the marketing order. The fruit, tree nut, and vegetable commodities covered by marketing orders annually generate cash receipts exceeding $11 billion.

National Research and Promotion Programs

Federally sanctioned research and promotion programs are self-help programs, requested and funded by the industry groups that they serve. The goal of these programs is to expand, maintain, and develop markets for individual agricultural commodities in the United States and abroad. The Secretary of Agriculture appoints national program boards comprising producers, handlers, importers, and processors (depending on which industry members pay assessments to fund the programs), as well as public members. The

boards conduct promotion, market research, production research, and new product development under the supervision of AMS.

In 2005, six national research and promotion programs covered fruit and vegetables, including cultivated blueberries, Hass avocados, mangos, mushrooms, potatoes, and watermelon. A May 2005 Supreme Court ruling that the beef industry's marketing promotion program (*Johanns* v. *Livestock Marketing Association*), did not violate the First Amendment (free speech) rights of producers who disagree with how the promotion funds are spent ended 4 years of uncertainty for these programs, following a lower court ruling that the mushroom promotion program violated the First Amendment.

Nutrition and the Fruit and Vegetable Pilot Program

To encourage increased consumption of fresh fruit and vegetables by children, the 2002 Farm Security and Rural Investment Act (Farm Act) authorized the Fruit and Vegetable Pilot Program.[8] This program initially offered fresh fruit and vegetables free of charge to children in 100 schools in four States (Iowa, Indiana, Michigan, and Ohio), and 7 schools on an Indian reservation in New Mexico. Schools distributed fruit and vegetables using kiosks, vending machines, and various in-class methods. The program was funded for the 2002-03 school year at $6 million and eventually garnered support throughout the country. Given this support, the program was extended through the 2003-04 school year.

[8]For background and results, see *"Child Nutrition Programs: USDA Fruit and Vegetable Pilot Program."* ERS website briefing room, www.ers.usda.gov/briefing/childnutrition/fruitandvegetablepilot.htm

Country of Origin Labeling

In 2002, Congress incorporated Country of Origin Labeling (COOL) into the Farm Act. Mandatory labeling rules were slated to go into effect by September 30, 2004, but Congress and the President agreed to delay the implementation of mandatory COOL through September 30, 2006 (except for wild and farm-raised fish and shellfish), to revisit some of the legislative requirements and consider making COOL voluntary. Unless the law is changed, retailers will be required to identify fresh and frozen fruit and vegetables (among many other commodities) by their country of origin (domestic or foreign) effective October 1, 2006. Program implementation will come under the responsibility of USDA, AMS.

Specialty Crops Competitiveness Act

The Specialty Crop Competitiveness Act of 2004 became law in December 2004, but Congress did not appropriate funds to operate the program. The four title act authorizes a total of $54 million annually over 5 years to enhance production and use of specialty crops and improve the world competitiveness of U.S. producers of fruit (including dried fruit), vegetable, tree nut, and nursery crops (including floriculture). About 80 percent of the funding (subject to annual appropriation of funds) is earmarked for block grants through the various State departments of agriculture for planning and providing programs, subject to approval of the U.S. Secretary of Agriculture, that are of importance to local producers and consumers of specialty crops.

The act also authorizes an additional appropriation of $2 million annually to support Section 3205 of the 2002 Farm Act, which provides assistance to remove, resolve, or mitigate sanitary and phytosanitary and related barriers to trade. The Technical Assistance for Specialty Crops (TASC) Program is designed to open, retain, and expand markets for U.S. specialty crops. It helps U.S. exporters address phytosanitary or other technical barriers that prohibit or threaten exports of U.S. specialty crops. Eligible crops include all cultivated plants and their products produced in the United States, except wheat, feed grains, oilseeds, cotton, rice, peanuts, sugar, and tobacco. Since 2002, TASC has been funded at $2 million per year. A research title in the act authorizes the annual appropriation of $5 million for research on methyl bromide alternatives. In mid-2005, Congress allotted an initial $7 million for the act.

Fruit and Vegetable Policy Issues in Coming Years

Food Safety

Over the past 10-15 years, food safety has become a more visible issue within the food industry, particularly as it relates to the health risks posed by foodborne bacterial contamination and pesticide residues. Although infrequent, outbreaks of foodborne illness since the mid-1990s have been associated with fresh produce (e.g., raspberries from Guatemala, cantaloup and green onions from Mexico, lettuce and fresh herbs from California). The fruit and vegetable industry has cooperated with the U.S. Food and Drug Administration and USDA to adopt methods, strategies, and technologies to trace and prevent such incidents. Many growers, shippers, and processors have adopted the HACCP (Hazard Analysis and Critical Control Point) system to help safeguard fruit and vegetable supplies. Also, fruit and vegetable growers and shippers have introduced traceability systems to help prevent the distribution of unsafe or poor-quality products and aid in the analysis and isolation of safety or quality control issues when they do arise. Although many grower/shippers test their own products, many also employ outside (third-party) testing firms for verification of in-house results.

Farm Labor

Fruit and vegetable producers have periodically reported difficulty in acquiring sufficient labor to plant, nurture, and harvest their crops.[9,10] In 2005, several growers complained of strong competition for workers from the same labor pool with the rapidly growing construction and service industries. According to the U.S. Department of Labor's latest (2001/02) National Agricultural Workers Survey, fruit, tree nut, and vegetable farms accounted for two-thirds of all hired crop workers in the United States. Vegetable growers directly hired 78 percent of workers and sourced the remaining 22 percent via labor contractors. Fruit and tree nut growers directly hired 62 percent of their laborers, while sourcing the remaining 38 percent from contract labor firms.

[9]Warnert.

[10]Hirsch.

Farm labor is a critical input for most agricultural operations; but for fruit and vegetable farms (fresh and processing), hired labor (excluding custom work) accounts for 42 percent of variable cash expenses (38 percent for vegetables, 46 percent for fruit). Thus, maintaining access to an affordable labor pool is a top concern for the fruit and vegetable industry, especially for most growers selling fresh-market produce, which depends largely on hand labor for harvest and other field and packing activities. The timing of sufficient labor availability is also a concern for fruit and vegetable growers, who must harvest most crops within a specific time window to ensure optimal product quality.

Planting Flexibility

Future farm policy discussions are likely to include the issue of planting flexibility.[11] If this provision is changed to allow farmers to plant fruit and

[11]For background, see page 7 in Westcott et al.

vegetables on program crop base acres, it may affect the revenue of established fruit and vegetable growers.

In principle, elimination of the planting restrictions could expand the supply of fruit or vegetables, reducing grower prices.[12] However, the market effects are likely to be limited and confined to specific regions and commodities. Supply shifts would be more likely in regions where the land and climate are suitable for vegetable production and nonbase acres are in limited supply. Such regions would not necessarily experience large shifts in acreage because current restrictions are not always binding for producers. For example, some producers may be able to expand vegetable production by leasing nonbase land or planting vegetables on acreage traditionally planted to nonprogram crops. In areas in which there is a history of double-cropping of fruits and vegetables and wild rice with program crops, unlimited double-cropping is permitted. In other cases, producers may be dissuaded from growing vegetables (or other restricted crops) by other factors, such as the need for specialized equipment and expertise, increased labor for harvesting, the additional per acre cost of producing vegetables compared with traditional row crops, or limited outlets for produce.

[12]Planting of fruit trees and vines may be less likely than vegetables due to the delay in receiving a commercial fruit crop—trees and vines typically require several years to reach maturity.

Conclusion

The U.S. fruit and vegetable sector is at a crossroads. As an increasingly important component of U.S. agriculture, with nearly a third of U.S. crop cash receipts and a fifth of U.S. agricultural exports, the industry is becoming recognized by policymakers as pivotal to the health and well-being of consumers and to the economy of rural America. The various challenges facing the sector come from both domestic and international trade arenas. Key issues include labor cost and availability (including immigration reform and access to an affordable labor pool), strategies to enhance domestic demand, increased access and competition in foreign markets, and environmental issues. Confronting these challenges is vital for the U.S. fruit and vegetable industry to continue into the future as a healthy and vibrant sector of the U.S. economy.

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Useful Links

Web Sites:

Vegetables and Melons Yearbook: Includes historical data covering domestic and foreign production, trade, use, and prices by major commodity. *http://usda.mannlib.cornell.edu/data-sets/specialty/89011/*

Fruit and Tree Nut Yearbook: Includes historical data covering domestic citrus and noncitrus fruit and tree nuts, trade, use, and prices by major commodity. *http://usda.mannlib.cornell.edu/data-sets/specialty/89022/*

Vegetables and Melons Briefing Room: ERS Briefing Room contains special articles, data, and links. *www.ers.usda.gov/briefing/vegetables/*

Fruit and Tree Nuts Briefing Room: ERS Briefing Room contains special articles, data, and links. *www.ers.usda.gov/briefing/fruitandtreenuts/*

Potato Briefing Room: ERS Briefing Room contains special articles, data, and links. *www.ers.usda.gov/briefing/potatoes/*

Tomato Briefing Room: ERS Briefing Room contains special articles, data, and links. *www.ers.usda.gov/briefing/tomatoes/*

Dry Bean Briefing Room: ERS Briefing Room contains special articles, data, and links covering dry beans by class and dry peas and lentils. *www.ers.usda.gov/briefing/drybeans/*

USDA Market News: USDA, Agricultural Marketing Service website containing fresh shipments, f.o.b. and terminal market prices, weekly truck rates, annual reports, and more. *www.ams.usda.gov/fv/mncs/index.htm*

Vegetable Summary: USDA, National Agricultural Statistics Service annual statistical report covering acreage, yield, production, and value. *http://usda.mannlib.cornell.edu/reports/nassr/fruit/pvg-bban/*

Noncitrus Fruits and Nuts Summary: USDA, National Agricultural Statistics Service annual report covering acreage, yield, production, use, and value. *http://usda.mannlib.cornell.edu/reports/nassr/fruit/pnf-bb/*

Citrus Fruit Summary: USDA, National Agricultural Statistics Service annual statistical report covering acreage, yield, production, use, and value. *http://usda.mannlib.cornell.edu/reports/nassr/fruit/zcf-bb/*

FAS, HTP Web Site: USDA, Foreign Agricultural Service Horticultural and Tropical Products website with links including trade data and attaché reports. *www.fas.usda.gov/htp/default.htm*

Organic Farming and Marketing Briefing Room: ERS Briefing Room contains articles, data, graphics, and links. *www.ers.usda.gov/briefing/organic/*

Agricultural Atlas of the United States: Provides maps showing county-level data from the 2002 Censusof Agriculture and some maps showing increases and decreases from 1997 Census data.
www.nass.usda.gov/research/atlas02/

Farm Policy Background, Program Provisions, and History: Provides access to previous Farm Acts and policy backgrounders prepared by ERS for those Acts. *www.ers.usda.gov/briefing/farmpolicy/historyoffarm.htm*

U.S. and State Farm Income Data: Provides access to the latest farm income forecasts, national and State cash receipts, government payments, production expenses, and more.
www.ers.usda.gov/data/farmincome/finfidmu.htm

U.S. WTO Domestic Support and Support Reduction Commitments: ERS Briefing Room that summarizes the U.S. domestic support notifications to the WTO. www.ers.usda.gov/briefing/farmpolicy/usnotify.htm

Latest ERS Vegetable and Melon Data:

The following links provide the most recent data compiled by ERS on vegetables and melons. You may choose links for Adobe Acrobat (.pdf) table compilations or the original Excel workbook (spreadsheet) tables:

Per capita use (consumption):
PDF file: *www.ers.usda.gov/publications/vgs/tables/percap.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/percap.xls*

Vegetable prices:
PDF file: *www.ers.usda.gov/publications/vgs/tables/price.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/price.xls*

Fresh vegetables and melons:
PDF file: *www.ers.usda.gov/publications/vgs/tables/fresh.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/fresh.xls*

Processing vegetables:
PDF file: *www.ers.usda.gov/publications/vgs/tables/proc.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/proc.xls*

Potatoes:
PDF file: *www.ers.usda.gov/publications/vgs/tables/potat.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/potat.xls*

Sweet potatoes:
PDF file: *www.ers.usda.gov/publications/vgs/tables/swpot.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/swpot.xls*

Dry edible beans:
PDF file: *www.ers.usda.gov/publications/vgs/tables/drybn.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/drybn.xls*

Mushrooms:
PDF file: *www.ers.usda.gov/publications/vgs/tables/mush.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/mush.xls*

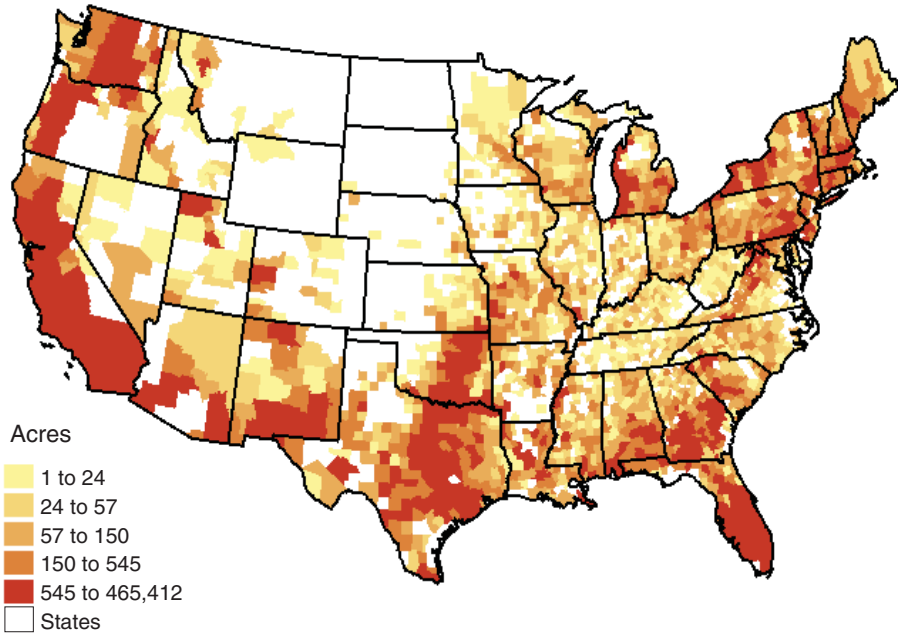
Vegetable and melon trade:
PDF file: *www.ers.usda.gov/publications/vgs/tables/trade.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/trade.xls*

Dry peas and lentils:
PDF file: *www.ers.usda.gov/publications/vgs/tables/drypea.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/drypea.xls*

World vegetable production and harvested area:
PDF file: *www.ers.usda.gov/publications/vgs/tables/world.pdf*
Excel file: *www.ers.usda.gov/publications/vgs/tables/world.xls*

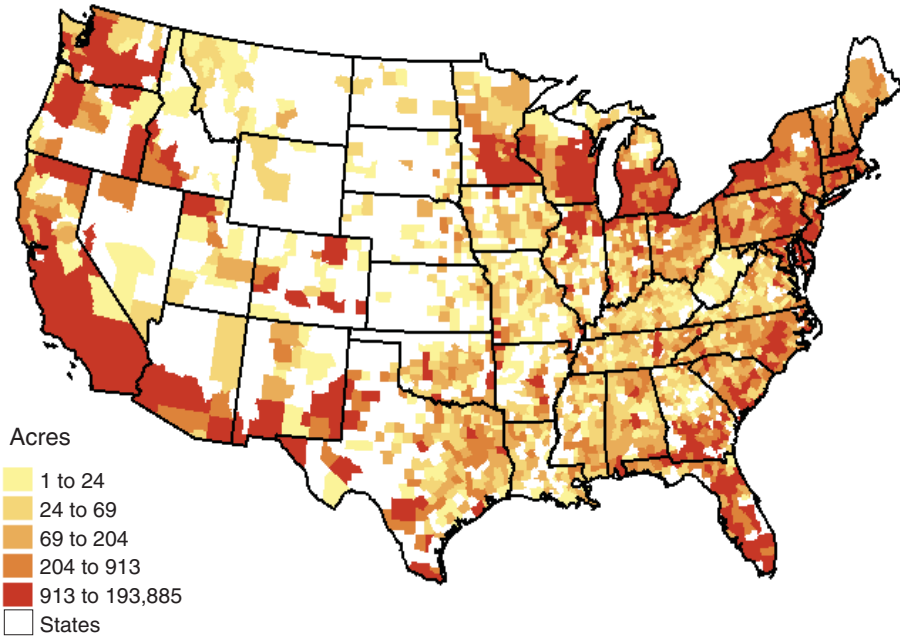
Appendix A—U.S. Area Maps, 2002

U.S. land in orchards, 2002



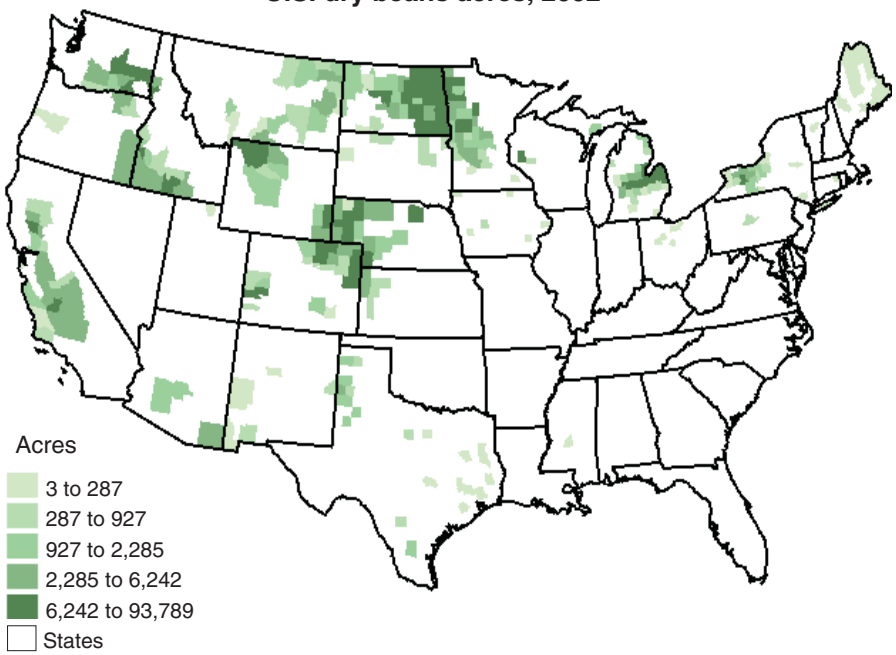
Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *2002 Census of Agriculture*.

U.S. vegetable acres, 2002



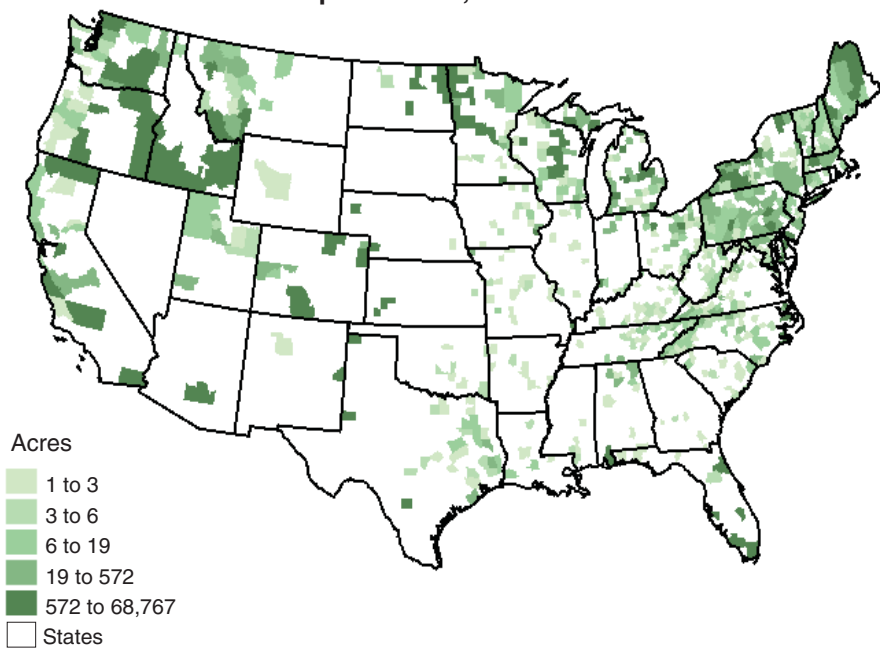
Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *2002 Census of Agriculture*.

U.S. dry beans acres, 2002



Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *2002 Census of Agriculture*.

U.S. potato area, 2002



Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *2002 Census of Agriculture*.

Appendix B—Tables

Appendix table B-1

Characteristics of farms producing fruit and vegetables, 2003

Item	Fruit and vegetable farms		
	Specialized	Nonspecialized	Total
Total farms (*number*)	90,006	27,511	117,517
ARMS share (*percent*)			
Farms	77	23	100
Fruit and vegetable acres	83	17	100
Fruit and vegetable value of production	95	5	100
Farm size (*acres*)			
Operated	158	605	263
Harvested acres	108	377	171
Crops harvested (*acres*)			
Fruit	46	8	37
Vegetables	36	46	38
Corn	*	90	24
Wheat	5	49	15
Soybeans	*	59	15
Barley/oats	*	12	5
Hay	6	45	15
Cotton	*	27	9
Potatoes	8	*	7
Beans/peas/lentils	*	11	4
Average number of commodities produced	1.4	3.8	2.0
Number of commodities produced (*percent of farms*)			
One commodity	75	0	57
Two commodities	14	27	17
Three commodities	6	24	10
Four or more commodities	5	49	15
Production specialty[1] (*percent of farms*)			
Cash grain and soybeans	0	15	3
Other field crops	0	31	7
High-value crops	100	19	81
Beef	0	17	4
Dairy	0	9	2
Other livestock	0	9	2

Totals may not add due to rounding. * = Less than 5 acres.

[1]Production specialty is the farm's production classification that represents the largest proportion of gross commodity receipts from the farm operation.

Source: Prepared by USDA, Economic Research Service using data from USDA's 2003 Agricultural Resource Management Survey.

Appendix table B-2

Operator characteristics of fruit and vegetable farms, 2003

Item	Fruit and vegetable farms		
	Specialized	Nonspecialized	Total
Operator age (*years*)	57	53	56
Age class (*percent of farms*)			
Less than 50 years	26	36	29
50 years or more	74	64	71
Education *(percent of farms*)			
Less than high school	8	21	11
Completed high school	30	29	30
Completed college	62	50	59
Primary occupation (*percent farms*)			
Farming	43	64	48
Retirement	20	10	18
Nonfarm job	37	26	34
Farm typology[1] (*percent of farms*)			
Rural-residence farms	57	40	53
Intermediate farms	26	36	28
Commercial farms	17	24	19
Farm tenure (*percent of farms*)			
Full owner	76	44	68
Part owner	20	48	26
Full tenant	5	8	6
Census region (*percent of farms*)			
Northeast	12	15	13
Midwest	12	36	17
South	22	32	24
West	54	17	46

Totals may not add due to rounding.

[1]Rural-residence farms had operators whose occupation was retirement or a nonfarm job. Intermediate and commercial farms had operators whose primary occupation was farming. Intermediate farms had sales less than $250,000, whereas commercial farms had sales of $250,000 or more.

Source: Prepared by USDA, Economic Research Service using data from USDA's 2003 Agricultural Resource Management Survey.

Appendix table B-3

Financial characteristics of fruit and vegetable farms, 2003

Item	Fruit and vegetable farms		
	Specialized	Nonspecialized	Total
Gross value of production (*$ per farm*)	269,607	250,886	265,224
Fruit and vegetable value of production	255,735	44,230	206,221
Farms receiving government payments (percent)	14	46	21
Farm income statement (*$ per farm*)			
Gross cash income	245,911	265,060	250,394
Livestock sales	767	66,031	16,045
Crop sales	198,719	138,627	184,651
Government payments	3,253	13,849	5,734
Commodity-related payments	3,143	12,823	5,409
Cash expenses	185,727	206,214	190,523
Variable expenses	153,426	166,810	156,559
Net cash farm income	60,184	58,847	59,871
Depreciation	15,204	19,921	16,308
Net farm income[1]	63,187	56,570	61,638
Farm balance sheet (*$ per farm*)			
Farm assets	1,503,938	1,096,801	1,408,625
Farm liabilities	138,964	129,710	136,798
Farm equity	1,364,974	967,091	1,271,828
Financial ratios (*percent*)			
Debt/asset ratio	9.24	11.83	9.71
Return on assets	2.73	1.29	2.47
Return on equity	2.23	0.52	1.92
Operating profit margin	15.53	4.99	12.93
Solvency position[2] (*percent of farms*)			
Favorable	63.1	61.6	62.7
Marginal income	25.7	29.0	26.5
Marginal solvency	5.8	7.2	6.1
Vulnerable	5.4	2.3	4.7
Source of household income (*$ per household*)			
Total household income	104,867	94,339	102,337
Farm related income[3]	36,149	35,592	36,015
Off-farm income	68,718	58,746	66,321
Earned sources	49,018	46,332	48,372
Unearned sources	19,700	12,414	17,949

[1] Net farm income is net cash farm income less costs for depreciation and noncash benefits for hired workers, plus the value of the inventory change in 2003 and any nonmoney income. Nonmoney income includes the value of farm products consumed on the farm and an imputed rental value for the farm operator dwelling.

[2] Favorable operations have debt/assets < 0.40 and positive net farm incomes, marginal income implies debt/assets < 0.40 and negative net farm income, marginal solvency implies debt/assets > 0.40 and positive net farm income, and vulnerable implies debt/assets > 0.40 and negative net farm income.

[3] Farm-related income is that portion of farm income that is accrued by the farm household. Farm-related income is then adjusted to reflect any other households that share in the farm business.

Source: Prepared by USDA, Economic Research Service using data from USDA's 2003 Agricultural Resource Management Survey.

Appendix table B-4

U.S. per capita disappearance of selected crops, average 2002-04

Item	Fresh market	Canning	Freezing	Dried and dehydrated	Juicing and other[1]
	Pounds per person, fresh-weight basis				
Fruit:					
Apples	17.2	4.3	0.9	0.7	23.6
Avocados	2.6	--	--	--	--
Bananas	26.2	--	--	--	--
Cherries, all	0.9	0.2	0.7	--	--
Grapefruit	4.3	--	--	--	6.3
Grapes	7.9	0.2	--	6.7	34.3
Lemons	3.2	--	--	--	4.1
Oranges	11.5	--	--	--	69.8
Peaches	5.2	3.6	0.6	0.1	--
Pears	3.1	2.6	--	--	--
Pineapples	4.2	4.5	--	--	4.6
Strawberries	5.1	--	1.5	--	--
Vegetables:					
Asparagus	1.0	0.2	0.1	--	--
Snap beans	2.0	3.6	1.9	--	--
Dry beans[2]	--	--	--	6.5	--
Broccoli	5.6	--	2.5	--	--
Cabbage	8.1	1.1	--	--	--
Cantaloup	10.5	--	--	--	--
Carrots	8.7	1.4	1.6	--	--
Cauliflower	1.6	--	0.4	--	--
Celery[3]	6.2	--	--	--	--
Sweet corn	9.4	8.1	9.1	--	--
Cucumbers	6.3	4.8	--	--	--
Head lettuce	22.4	--	--	--	--
Leaf and romaine	10.9	--	--	--	--
Onions, dry bulb[3]	20.2	--	--	1.4	--
Potatoes	45.6	1.3	56.6	14.7	16.8
Peppers, bell[3]	6.9	--	--	--	--
Squash, all[3]	4.5	--	--	--	--
Sweet potatoes[4]	2.9	1.1	0.3	0.1	--
Tomatoes[5]	19.7	69.8	--	--	--
Watermelon	13.5	--	--	--	--
Tree nuts:					
Almonds	--	--	--	1.1	--
Walnuts	--	--	--	0.5	--
Pecans	--	--	--	0.4	--

-- = not available or applicable.

[1]Other is chipping for potatoes.

[2]Includes many bean classes, such as pinto, navy, black, and baby lima.

[3]Fresh includes product used for canning and freezing.

[4]Estimated based largely on historical use.

[5]Canning includes other processing, such as dried.

Source: USDA, Economic Research Service, *Fruit and Tree Nuts Yearbook* and *Vegetables and Melons Yearbook*.

Appendix table B-5

Harvested fruit and vegetable acreage by State, 2002

State	Fruit and tree nuts		Vegetables		Total
	Orchards	Berries	Vegetables and melons[1]	Potatoes and pulses[2]	
			Acres		
Alabama	28,009	589	20,332	5,791	54,721
Alaska	16	19	364	851	1,250
Arizona	63,180	6	134,394	12,516	210,096
Arkansas	14,487	1,163	13,443	1,206	30,299
California	2,871,626	36,248	1,197,481	161,863	4,267,218
Colorado	6,008	27	39,526	161,683	207,244
Connecticut	3,478	619	10,691	71	14,859
Delaware	672	134	39,208	3,897	43,911
Florida	894,955	8,389	219,412	45,239	1,167,995
Georgia	145,602	4,822	149,556	1,585	301,565
Hawaii	34,908	11	6,554	300	41,773
Idaho	7,172	72	26,010	540,358	573,612
Illinois	8,168	657	70,430	6,865	86,120
Indiana	5,354	1,226	37,682	2,496	46,758
Iowa	3,141	228	9,435	1,013	13,817
Kansas	7,042	160	2,854	21,287	31,343
Kentucky	4,380	393	7,349	367	12,489
Louisiana	15,778	707	5,154	17,113	38,752
Maine	4,037	23,979	6,925	64,855	99,796
Maryland	4,931	461	31,701	3,374	40,467
Massachusetts	5,426	15,976	14,757	3,229	39,388
Michigan	118,166	19,289	137,887	304,896	580,238
Minnesota	4,148	900	225,640	217,500	448,188
Mississippi	15,230	1,408	11,705	13,921	42,264
Missouri	21,755	774	27,404	8,616	58,549
Montana	1,740	36	699	81,394	83,869
Nebraska	1,080	39	4,270	186,989	192,378
Nevada	420	3/	4,752	7,607	12,779
New Hampshire	2,658	543	3,433	78	6,712
New Jersey	12,155	12,565	59,024	4,176	87,920
New Mexico	43,182	77	33,297	14,638	91,194
New York	99,148	2,916	143,967	54,638	300,669
North Carolina	13,406	6,213	66,521	60,025	146,165
North Dakota	16	3/	655	927,204	927,875
Ohio	13,144	1,555	45,542	8,867	69,108
Oklahoma	88,088	237	18,565	5,699	112,589
Oregon	96,243	20,928	121,338	61,000	299,509
Pennsylvania	50,287	2,395	48,698	12,089	113,469
Rhode Island	464	254	1,961	525	3,204
South Carolina	24,389	701	30,362	1,539	56,991

See footnotes at end of table.

continued—

Appendix table B-5

Harvested fruit and vegetable acreage by State, 2002—Continued

State	Fruit and tree nuts		Vegetables		
	Orchards	Berries	Vegetables and melons[1]	Potatoes and pulses[2]	Total
			Acres		
South Dakota	213	24	2,502	14,536	17,275
Tennessee	3,288	603	39,502	721	44,114
Texas	224,271	1,372	126,044	55,690	407,377
Utah	8,254	154	4,792	1,026	14,226
Vermont	3,552	471	2,893	269	7,185
Virginia	26,354	728	24,377	6,704	58,163
Washington	311,194	17,089	215,135	373,784	917,202
West Virginia	9,495	134	1,707	206	11,542
Wisconsin	9,683	18,697	252,693	87,734	368,807
Wyoming	48	3/	128	30,862	31,038
United States *	5,330,439	206,034	3,698,744	3,605,063	12,840,280

* Totals may not sum due to rounding and undisclosed State data

[1]Excludes potatoes, sweet potatoes, dry beans, dry peas, lentils, dried herbs, and mushrooms.

[2]Includes potatoes, sweet potatoes, dry beans, dry peas, lentils, dried herbs, and mushrooms.

[3]Data not disclosed.

Source: Prepared by USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *2002 Census of Agriculture*.