



▲ FIGURE 10-41 MEDITERRANEAN AGRICULTURE Nearly all olives are produced in countries that border the Mediterranean Sea or have similar climates, including Sifnos, Greece.

considerable extent for international trade, and it is the world's leading export crop. The United States and Canada account for about half of the world's wheat exports; consequently, the North American prairies are accurately called the world's "breadbasket." The ability to provide food for many people elsewhere in the world is a major source of economic and political strength for these two countries.

MEDITERRANEAN AGRICULTURE

Mediterranean agriculture exists primarily on the lands that border the Mediterranean Sea in Southern Europe, North Africa, and western Asia (Figure 10-41). Farmers in California, central Chile, the southwestern part of South Africa, and southwestern Australia practice Mediterranean agriculture as well.

These Mediterranean areas share a similar physical environment (refer to Figures 10-18 and 10-40). Every Mediterranean area borders a sea, and most are on west coasts of continents (except for some lands surrounding the Mediterranean Sea). Prevailing sea winds provide moisture and moderate the winter temperatures. Summers are hot and dry, but sea breezes provide some relief. The land is very hilly, and mountains frequently plunge directly to the sea, leaving very narrow strips of flat land along the coast.

Farmers derive a smaller percentage of income from animal products in the Mediterranean region than in the mixed crop and livestock region. Livestock production is hindered during the summer by the lack of water and good grazing land. Some farmers living along the Mediterranean

Sea traditionally used transhumance to raise animals, although the practice is now less common. Under transhumance, animals—primarily sheep and goats—are kept on the coastal plains in the winter and transferred to the hills in the summer.

Most crops in Mediterranean lands are grown for human consumption rather than for animal feed. **Horticulture**—which is the growing of fruits, vegetables, and flowers—and tree crops form the commercial base of Mediterranean farming. A combination of local physical and cultural characteristics determines which crops are grown in each area. The hilly landscape encourages farmers to plant a variety of crops within one farming area.

In the lands bordering the Mediterranean Sea, the two most important cash crops are olives and grapes. Two-thirds of the world's wine is produced in countries that border the Mediterranean, especially Italy, France, and Spain. Mediterranean agricultural regions elsewhere in the world produce most of the remaining one-third (refer to Figure 4-22). The lands near the Mediterranean Sea are also responsible for a large percentage of the world's supply of olives, an important source of cooking oil. Despite the importance of olives and grapes to commercial farms bordering the Mediterranean Sea, approximately half of the land is devoted to growing cereals, especially wheat for pasta and bread. As in the U.S. winter wheat belt, the seeds are sown in the fall and harvested in early summer. After cultivation, cash crops are planted on some of the land, and the remainder of the land is left fallow for a year or two to conserve moisture in the soil.

Cereals occupy a much lower percentage of the cultivated land in California than in other Mediterranean climates. Instead, a large portion of California farmland is devoted to fruit and vegetable horticulture, which supplies a large portion of the citrus fruits, tree nuts, and deciduous fruits consumed in the United States. Horticulture is practiced in other Mediterranean climates, but not to the extent found in California. The rapid growth of urban areas in California, especially Los Angeles, has converted high-quality agricultural land into housing developments. Thus far, the loss of farmland has been offset by the expansion of agriculture into arid lands. However, farming in drylands requires massive irrigation to provide water. In the future, California agriculture may face stiffer competition for the Southwest's increasingly scarce water supply.

Pause and Reflect 10.3.8

At least 1 million metric tons of wine are produced in eight countries (Argentina, Australia, China, France, Italy, South Africa, Spain, and the United States). Referring to Figures 4-22 and 10-18, which one of the eight countries does not appear to have Mediterranean agriculture?

group 3 stop *
group 4
start

Sustainable Agriculture

Learning Outcome 10.4.7

Describe the role of sustainable agriculture in world food supply.

Some commercial farmers are converting their operations to sustainable agriculture, agricultural practices that preserve and enhance environmental quality. Farmers practicing sustainable agriculture typically generate lower revenues than do conventional farmers, but they also have lower costs.

An increasingly popular form of sustainable agriculture is organic farming. Worldwide, the UN classified 37 million hectares (75 million acres), or 0.6 percent of farmland, as organic in 2009. Australia was the leader, with 12 million of the hectares, or 32 percent of the worldwide total (Figure 10-66). Argentina accounted for 12 percent of the worldwide total, and the United States, China, and Brazil for 5 percent each. Three principal practices distinguish sustainable agriculture (and, at its best, organic farming) from conventional agriculture:

- Sensitive land management
- Limited use of chemicals
- Better integration of crops and livestock

SENSITIVE LAND MANAGEMENT

Sustainable agriculture protects soil in part through ridge tillage, which is a system of planting crops on ridge tops. Crops are planted on 10- to 20-centimeter (4- to 8-inch) ridges that are formed during cultivation or after harvest. A crop is planted on the same ridges, in the same rows, year after year. Ridge tillage is attractive for two main reasons: lower production costs and greater soil conservation.

Production costs are lower with ridge tillage in part because it requires less investment in tractors and

other machinery than conventional planting. An area that would be prepared for planting under conventional farming with three to five tractors can be prepared for ridge tillage with only one or two tractors. The primary tillage tool is a row-crop cultivator that can form ridges. There is no need for a plow, or a field cultivator, or a 300-horsepower four-wheel-drive tractor. With ridge tillage, the space between rows needs to match the distance between wheels of the machinery. If 75 centimeters (30 inches) are left between rows, tractor tires will typically be on 150-centimeter (60-inch) centers and combine wheels on 300-centimeter (120-inch) centers. Wheel spacers are available from most manufacturers to fit the required spacing.

Ridge tillage features a minimum of soil disturbance from harvest to the next planting. A compaction-free zone is created under each ridge and in some row middles. Keeping the trafficked area separate from the crop-growing area improves soil properties. Over several years, the soil will tend to have increased organic matter, greater water-holding capacity, and more earthworms. The channels left by earthworms and decaying roots enhance drainage.

Ridge tillage compares favorably with conventional farming for yields while lowering the cost of production. Although more labor intensive than other systems, it is profitable on a per-acre basis. In Iowa, for example, ridge tillage has gained favor for production of organic and herbicide-free soybeans, which sell for more than regular soybeans.

LIMITED USE OF CHEMICALS

In conventional agriculture, seeds are often genetically modified to survive when herbicides and insecticides are sprayed on fields to kill weeds and insects. These are known as "Roundup Ready" seeds because their creator, Monsanto, sells its weed killers under the brand name Roundup. Roundup Ready seeds were planted in 90 percent of all soybean fields and 70 percent of all cotton and maize (corn) fields in the United States in 2010. In addition to the adverse impacts of herbicides on soil and water quality, widespread use of Roundup Ready seeds is causing some weeds to become resistant to herbicides.

Sustainable agriculture, on the other hand, involves application of limited if any herbicides to control weeds. In principle, farmers can control weeds without chemicals, although doing so requires additional time and expense that few farmers can afford. Researchers have found that combining mechanical weed control with some chemicals yields higher returns per acre than relying solely on one of the two methods.

Ridge tillage also promotes decreased use of chemicals, which can be applied only to the ridges and not the entire field. Combining herbicide banding—which applies chemicals in narrow bands over crop rows—with cultivating may be the best option for many farmers.

▼ FIGURE 10-66 DISTRIBUTION OF ORGANIC FARMING Australia accounts for nearly one-third of the world's organic farming.

