Chapter 7.
Alternative Crops

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Many alternative crops will grow in Illinois and many will grow quite well, but most have not been produced commercially. A few such crops have been produced on a limited scale and sold in limited quantities to local markets. Many alternative crops are associated with high market prices and high potential income per acre, and thus are eye-catching to farmers who might hear about them. Upon investigation, such crops often have requirements that cannot be met under Illinois conditions, have high labor requirements or other costs of production, or have no established or very limited markets. There is usually some reason why certain crops are not grown in an area, though such reasons may not be obvious.

Before undertaking production of an alternative crop, study market availability, demand, and growth potential. Crops with limited demand can easily become surplus in supply, driving down previously high prices. Unless alternative crops are desired by large populations, potential market expansion is limited. Delivery to a local market is most desirable; transporting crops long distances to market may greatly decrease profits. Market factors must be considered first with alternative crops.

Some alternative crops can be used on-farm, perhaps substituting for purchased livestock feed. If production cost is sufficiently low, it may be possible to increase overall farm profitability with such a crop. The feeding value of the alternative crop should be included in such a consideration: While some crops can substitute for protein supplements, they may not result in equal animal gain or performance.

Even though some alternative crops may grow quite well in Illinois, they may not enjoy a *comparative advantage* under our conditions. If a crop is less profitable than other crops that grow or that could grow, then it is not economically advantageous, even if it grows well. For example, various types of edible beans grow in Illinois, but they usually enjoy a comparative advantage elsewhere in the United States.

If specialized equipment and facilities, or a large supply of inexpensive labor, are needed to produce an alternative crop, the crop may not be very profitable. Unless equipment or special facilities are used across many acres of a crop, the cost will be prohibitive. Large labor supplies are usually not available in the Corn Belt; thus, crops that require, say, hand harvest will usually not be grown here.

Table 7.01 lists alternative crops that might be, or have been, produced on Illinois farms. Information is provided on the botany, use, environmental needs, and potential problems for each crop. Most of these crops do not have large or established markets in Illinois, but a few may have limited local markets, perhaps allowing producers to market the crop directly to the consumer. More information on the crops listed can be obtained from *Alternative Field Crops Manual* (available from the Center for Alternative Plant and Animal Products, 340 Alderman Hall, University of Minnesota, St. Paul, MN 55108).

Sunflower, canola, and buckwheat crops have been produced on Illinois farms in recent years. Brief overviews of these crops and their production requirements are provided in subsequent sections.

Sunflower

Sunflower is an alternative crop that some Illinois farmers have produced profitably. Two kinds of sunflowers can be produced in Illinois: the oil type and the confectionery type. Production practices for these types are similar, but end uses of the grain differ.

Oilseed sunflower produces a relatively small seed with an oil content of up to 50 percent. The hull on the grain is thin and dark colored and adheres tightly to the kernel. Oil from this type of sunflower is highly regarded for use as a salad and frying oil. Meal from the kernel is used as a protein supplement in livestock rations. Sunflower meal is deficient in lysine, and thus it must be supplemented for nonruminant animals.

Table 7.01. Alternative Crop Characteristics, Uses, and Considerations

Crop	Botany	Uses	Environmental needs	Potential problems
Adzuki bean	Legume; indeterminate growth habit; 110 to 120 days to maturity.	Food—confectionery items, fillings for bread. East Asian export market	Similar to soybeans and dry beans.	Limited varieties; disease; limited markets.
Amaranth	Relative of red root pigweed; 5 to 7 ft tall.	Grain, forage, and green leafy vegetable.	Widely adapted to Midwestern and western U.S. areas.	Uniform varieties not available; no herbicides labeled for crop; harvest losses; limited markets.
Broomcorn	Annual type of sorghum; 6 to 15 ft tall.	Long panicle branches used to make brooms.	Warm summer, soil moist and fertile—widely adapted.	Harvest and curing of fiber is very labor intensive; disease problems; limited markets.
Buckwheat	Indeterminate growth; will not die until killed by frost; harvest in 10 to 12 weeks.	Nutritious grain used for human food and livestock; smother crop or green manure.	Cool and moist climate; tolerates low fertility better than other grains.	Limited varieties available; seeds shatter easily; limited markets.
Canola	Edible type of rapeseed; spring and winter growth habits available.	Nutritious oil in grain; meal fed to livestock; forage use.	Well-drained, fertile soil; cool temperature range; cannot tolerate water-saturated soil.	May not survive winter in Illinois; disease; timely planting in a corn-soybean rotation; seeds shatter easily; limited processing in the Midwest.
Chickpea	Annual legume up to 40 in. tall; produces protein-rich seed; fairly drought resistant.	Soups and salads; can be fed to livestock.	Temperature of 70° to 80°F optimum; fertile soil with good drainage.	Excess water induces disease and lodging; limited markets.
Cowpea	Annual legume, known as blackeye pea; produces protein-rich seed.	Grain, fresh vegetable, or forage for livestock.	Adapted to humid tropics and temperate zones; tolerant of heat and drought, but not frost; needs well-drained soil.	Disease, nematodes, and virus problems can occur; specialized harvest equipment required for fresh harvesting; limited markets in the Midwest.
Crambe	Annual herb up to 40 in. tall; produces seed with inedible oil used by industry.	Manufacture of plastic, nylon, adhesives, and synthetic rubber.	Cool season; well-drained, fertile soil; cannot tolerate water-saturated soil.	No developed market; seed meal has little value; limited varieties available; no herbicide or insecticide labeled for crop.

Table 7.01. Alternative Crop Characteristics, Uses, and Considerations (cont.)

Crop	Botany	Uses	Environmental needs	Potential problems
Fababean	Annual legume; takes 80 to 120 days to mature; seedlings frost-tolerant; seed size varies greatly by variety.	Human food; livestock feed; forage or silage.	Cool, moist conditions; hot weather is injurious; well-drained soil; does not tolerate waterlogged soil conditions.	Negligible demand in the U.S., thus limited markets; no insecticide or herbicide labeled for the crop.
Ginseng	Perennial herb prized in East Asian cultures for its medicinal properties. Native in some Midwest forests.	In East Asia in soft drinks, toothpaste, tea, and candy; sold as extracts, crystals, and powder capsules.	Moist climate; 70 to 90% shade; soil high in organic matter, with pH near 5.5. Wild type in forest has higher value than cultivated type.	Disease and insect problems; shade structures, labor, and time make production expensive; harvest is at least 3 years after planting.
Kenaf	Annual fiber crop native to Africa; 8 to 14 ft tall.	Fiber for paper, cardboard, rope, twine, rugs, and bagging; forage.	Widely adapted, but long growing seasons with high temperatures and abundant rainfall yield best.	Limited varieties, with none developed for the Midwest; specialized equipment needed for harvest; markets lacking.
Lentil	Cool season legume grain crop; 12 to 20 in. tall; seed varied in color; stems tend to lodge.	Soups, stews, and salads.	Cool temperatures with 10 to 12 in. precipitation annually (seedlings frost-tolerant); soil with good drainage required.	Plants are weak competitors, thus weed control is essential; lodging of stems slows harvest; volatile price; limited market opportunities.
Lupine	Annual legume crop with good protein content; older types had bitter alkaloids.	Flour and pasta; feed for dairy cows, lambs, and poultry, but not swine.	Cool season; relatively tolerant of spring frost; well-drained soil with pH below 7.	Poor competitor with weeds; very few herbicides cleared for use; diseases likely with excess moisture; seed costs are high (3x soybean); limited markets.
Millet	Annual grass up to 4 ft tall; several types, with proso, foxtail, and some barnyard types grown in the Midwest.	Birdseed and livestock feed; hay and silage.	Warm temperatures (frost sensitive); well-drained, loamy soil; will not tolerate waterlogged soil or extreme drought.	Limited herbicides labeled; limited markets available through bird food suppliers.

Table 7.01. Alternative Crop Characteristics, Uses, and Considerations (cont.)

Crop	Botany	Uses	Environmental needs	Potential problems
Mung bean	Annual legume; 1 to 5 ft tall; upright or viney types; seed color varies with variety.	Bean sprouts or canned for human food; livestock feed.	Warm season like soybean; fertile, well-drained soil with good internal drainage and pH less than 7.2.	Many broadleaf herbicides damage the crop; pod maturity not uniform; seed costs higher than soybean; limited market opportunities.
Safflower	Annual oilseed; produces a high-quality edible oil low in saturated fatty acids.	Primarily oil, but also protein meal and birdseed.	Warm, sunny, less than 15 in. rain/year; dry weather during flower and seed fill; deep, fertile, well-drained soil.	Broadleaf weeds are difficult to control; wet weather can induce disease; no established market.
Spelt	Wheat relative with protein content similar to oats; growth habit like winter wheat.	Feed grain, pasta, and high-fiber cereals; can replace soft red winter wheat in baked goods.	Typical Midwest climates; is reported more winter-hardy than most soft red winter wheat; grows on sandy and poorly drained soils.	Feed value could be lower than oats, as test weight is sometimes lower; no established market.
Sunflower	Annual; produces high-quality edible oil; world's third-largest oilseed crop.	Vegetable oil, snack food, birdseed, protein meal, soaps, detergent, plastics, adhesives, and paints.	Semiarid regions; tolerates high and low temperatures; can survive drought but is inefficient water user; grows on wide range of soil types.	Bird, disease, and insect problems can limit yield; modified combine needed for efficient harvest; limited local markets in the Midwest.
Triticale	Created from the cross of wheat and rye; spring and winter types grow like wheat and rye.	Livestock feedgrain, forage, baked goods; inferior to wheat in food products.	Needs of winter types similar to fall-planted wheat and rye; spring types need conditions similar to spring oats, barley, and wheat.	Ergot disease may occur with spring plantings; other diseases may occur; markets limited.

Due to the distance to sunflower oil processors (most are in the upper Great Plains), most of the oil-type sunflowers produced in Illinois are used for products other than oil. In recent years, some producers have been producing sunflower as a double-crop following wheat harvest. While it is possible to get good yields in this short season, sunflower quality, as measured by oil content, is usually lower than industry standards. This, coupled with the low density (weight per bushel, or per cubic foot) common in the Illinois crop, makes it prohibitive to ship out of state for oil production. Instead, most such sunflowers in Illinois are packaged and used for birdseed.

Confectionary sunflowers usually have larger seeds and a striped hull. They are processed for use as snack foods, and some are used in birdseed mixtures to provide color. Few if any commercial confectionary sunflowers are produced in Illinois; our weather is often too humid for this crop. Tall plants with very large heads that often are planted in gardens are usually the confectionary type. Birds like all types of sunflower, and they will often eat seeds from the head with great enthusiasm.

Sunflower planting coincides with corn planting in Illinois. Many hybrids offered for sale will reach physiological maturity in only 90 to 100 days; thus,

they can usually mature when planted following harvest of small grain crops. Use of sunflower as a double-crop may be a good choice if soybean cyst nematode is a pest, because sunflower is not attacked by cyst nematode.

Populations of 20,000 to 25,000 plants per acre are suitable for oilseed sunflower types produced on soils with good water-holding capacity. Stands of 16,000 to 20,000 per acre are appropriate for coarser textured soils with low water-holding capacity. The confectionery-type sunflower should be planted at lower populations to help ensure production of large seed. Planting of seed should be at 1½- to 2-inch depth, similar to placement for corn. Performance will tend to be best in rows spaced 20 to 30 inches apart.

A seed moisture of 18 to 20 percent is needed to permit sunflower harvest. Once physiologic maturity of seed occurs (at about 40 percent moisture), a desiccant can be used to speed drying of green plant parts. Maturity of kernels occurs when the backs of heads are yellow, but the fleshy head and other plant parts take considerable time to dry to a level that permits combine harvest. A conventional combine head can be used for harvest, with losses reduced considerably if special panlike attachments extending from the cutter bar are used. Long-term storage of sunflower is feasible, but levels of less than 10 percent moisture need to be maintained.

Locating a market for sunflower is important before producing the crop. Because the head containing seed is exposed at the top of the plant, insects, disease, and birds can be pest problems. The location of sunflower fields relative to wooded areas will have an impact on the extent of bird damage.

Canola (Oilseed Rape)

Rapeseed, a member of the mustard family, from which canola was selected, is a crop that has been used as an oilseed in many countries for centuries. Canola was genetically improved by Canadian scientists (hence, the "can" in "canola") resulting in low erucic acid content in the oil and low levels of glucosinolates in the meal produced from the seed. Only since 1985 has canola been approved for consumption in the United States.

Varieties of canola with spring and winter growth habits are available, but the winter type is more likely to succeed in Illinois because hot weather occurs during seed production when spring types are grown. Winterhardiness and disease resistance under Illinois conditions have proven to be problems for the winter types, which are planted in the fall shortly before wheat is typically seeded.

Site selection is critical to successful production of canola because waterlogged soil cannot be tolerated. Only fields with good drainage should be used; excess moisture (ponding) will kill the crop.

Planting 2 or 3 weeks in advance of normal wheat planting time is adequate for plant establishment, provided that cold temperatures do not arrive unusually early. The very small seeds need to be planted shallowly with a grain drill at a rate of only 5 to 6 pounds per acre. Canola needs adequate time to become established before fall temperatures decline, but it does not need to develop excessively. Plants with 8 to 10 leaves, with a lower stem about the diameter of a pencil, are considered adequate for winter survival. A tap root 5 to 6 inches deep generally develops with desired levels of topgrowth in the fall.

Soil fertility needs of canola are similar to winter wheat, with a small amount of nitrogen applied in the fall to stimulate establishment and a larger topdress nitrogen application in the early spring to promote growth. Too much nitrogen available in the fall can delay the onset of dormancy of canola, putting it at greater risk for winter injury. Excess fertility can accentuate lodging tendencies.

Growth of canola resumes early in the spring, with harvest maturity being reached about the same time as winter wheat. Harvest needs to be done in a timely manner, for seeds tend to shatter easily from pods. Only the top portion of the plant containing the seed pods is harvested. Combining works well when seeds reach 10 percent moisture, but further drying of seeds (to 9 percent moisture or less) and occasional aeration are needed for storage. As seeds are very small, wagons, trucks, and bins used for transportation and storage need to be tight, with all cracks sealed.

Locating a nearby delivery site for canola is presently a problem. Problems with disese (especially *Sclerotinia*) and winter survival have also been persistent, and acreage of canola in Illinois is currently very low.

Buckwheat

Nutritionally, buckwheat is a very good grain, with an amino acid composition superior to all cereals, including oats. Producing the crop as a livestock feed is possible, but markets for human consumption tend to be small. An export market exists in Japan, where noodles are made from the grain. This market requires large, well-filled seeds.

Buckwheat has an indeterminate growth habit; consequently, it grows until frost. Growth is favored by cool, moist conditions. In a short period (75 to 90 days), it can produce grain ready for harvest. High temperatures and dry weather during flowering can seriously

limit grain formation. Little breeding work has been done to enhance yield potential; it is naturally cross-pollinated and cannot be inbred because of self-incompatibility. A limited number of varieties are available.

Because it produces grain in a short time, buckwheat can be planted as late as July 10 to 15 in northern Illinois and during late July in southern parts of the state. Rapid vegetative growth of the plant provides good competition to weeds. Fertility demands are not high, so buckwheat may produce a better crop than other grains on infertile, poorly drained soils.

With the exception of those that can use the crop for livestock feed, producers should determine market opportunities before planting buckwheat. A few grain companies in the Midwest handle the crop for export to Japan, but buckwheat produced from late planting may often have small seeds and thus limited potential for the export market.

Specialty Corn and Soybean Production

Corn and soybeans with unique chemical or physical properties can perhaps be viewed as alternative crops. Typically such corn and soybean varieties are utilized in the manufacture of foods, although some specialty corn offers feeding advantages for livestock. A considerable portion of specialty soybeans are exported to Asian countries where they are used in foods.

Some of the fastest growing specialty markets are for organic corn and soybean. Companies are manufacturing increasing numbers of consumer food products based on organic grains, and demand for organic meat, milk, and other products is increasing rapidly. The USDA has recently promulgated a set of rather complex rules that govern the production of organic crops and the labeling of foods that contain such crops. These rules are much too extensive to list here, but persons interested in organic production should check with state or national organic grower associations to learn what the rules are, and what steps need to be taken in order to become certified as an organic producer.

It takes three years without the use of prohibited inputs for a field to be certified as organic. Prohibited inputs include manufactured forms of fertilizer, all synthetic pesticides, and genetically modified seed, among other things. Certain rotational sequences and intervals between crops must also be maintained. While it is neither simple nor easy to gain certification, organic crops often command prices that are several times those of nonorganic crops, so profit potential may be large, even if production costs per unit are high. In a general sense, organic production that involves livestock tends to be easier than that which produces only grain crops. This is because forages in rotations can be grown for ruminants, and manure from livestock can be used to provide nutrients.

Markets for specialty corn and soybeans domestically are often smaller than those for commodity corn and soybeans, but for some producers, growing specialty grains may be a means to enhance income. Specialty grain is usually produced under contract with a grain buyer, and the requirements for grain delivered may differ considerably from the requirements for that delivered to a local elevator.

A publication titled *The Specialty Corn and Soybean Fact Sheet Booklet* (AE-4735) can be obtained from the University of Illinois's Department of Agricultural and Consumer Economics (call 1-217-244-4796). This information can also be found on the World Wide Web at http://web.aces.uiuc.edu/value. Specific marketing opportunities for different types of corn and soybean are identified on the Web site as well.

A New Resource

A recent research project at the University of Illinois resulted in a Web site, http://www.sws.uiuc.edu/data/altcrops/, that provides some estimates of suitability of crops, including many that are not grown in Illinois. Some of the data provided are not complete, but the site provides information on a very large number of crops, and it does give some idea about production potential.