Diversifying With New or Alternative Crops

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At one point in time, every crop grown in almost every region of the world was a new crop to that region. Corn was new to Europeans, and wheat was new to the Americas. Soybeans, from China, were considered an unimportant alternative for decades in the U.S., until their acreage started to increase in the 1930s and 1940s. In more recent decades, sorghum and sunflowers have gained substantial acreage in the U.S., and they are now considered commodity crops in some parts of the country. Ironically, sunflowers are the only major grain or oilseed crop that is native to the U.S. yet were never accepted here as a crop until much plant breeding was done to improve them over a several decade period in Russia. Canola has been a significant crop known as rapeseed for centuries in Europe, yet it only became important in North America after the Canadians made a major government-supported effort to develop it. Clearly, farmers in many times and many regions have benefited by adopting new or alternative crops.

One thing that is different about agriculture as practiced in the U.S. today, as opposed to agriculture in most times and places, is the lack of crop diversity. So many U.S. farms grow only one or two crops, especially throughout the corn, wheat, and cotton belts. There are many factors that have contributed to this lack of diversity, including government policy, recent research priorities, market dynamics, and mechanization.

Successful introduction of new or alternative crops into a region depends on several factors, but it can be assisted by appropriate on-farm research. Some of the key things to test in on-farm trials are variety comparisons and planting and harvesting methods. Since many alternative crops differ in seed size from commodities and have different germination and maturation patterns than commodity crops, equipment adjustments or modification need to be evaluated. It is much better to have a planting failure or inefficient harvest when only an acre or so in a trial plot is affected, rather than in a 40- or an 80-acre field.

Evaluating alternative crops in on-farm trials also allows a producer to gain important familiarity with the growth habit and pests of the crop before committing to a larger acreage. For example, learning about timing needs on weed control can help balance labor demands when the new crop is fit into the existing rotation.

Alternative Crops to Choose From

There are a number of alternative crops that have potential to return a reasonable profit in appropriate regions of the country. Some of the oilseeds, legumes, and grains to consider are outlined below. A good source of further information is the Purdue new crop website (www.hort.purdue.edu/newcrop/), or my office, the Jefferson Institute (phone 573-449-3518). One source of funds to help with cost of testing an alternative crop in on-farm research is the SARE producer grant program (phone 202-720-5203, or visit the SARE website, www.sare.org, for more information).

Alternative Oilseeds

Of the alternative seed-harvested crops available, the type experiencing the most growth in acreage is the alternative oilseeds. The world oilseed market continues to expand, especially as plant-derived oils begin to replace petroleum-derived products. Canola and sunflowers are alternative oilseeds adapted to many areas of the U.S. that have seen expanding acreage. Although the primary marketplace for canola and sunflower is the edible oilseed market, for cooking oil or processed foods, these crops also are being used for a variety of non-food purposes as well. Canola with a high level of erucic acid in the seed is called industrial rapeseed and has a variety of uses, including as a slippage agent to keep plastics like bread wrappers from sticking together.

Flax and sesame are "old" oilseeds that are viable alternatives for many regions of the U.S. Flax is high in omega-3 fatty acids, which are believed to help reduce cholesterol. Sesame is a crop that is mostly imported, even though it can be grown very well domestically - Thomas Jefferson noted the potential of sesame in his own test plots 200 years ago. Most alternative oilseeds are high in oil content, typically 40% or more of the seed weight, compared to about 20% oil in soybean seeds. Plant-produced oils provide a more renewable source of

material than petroleum, and they are often friendlier products to the environment by being biodegradable or less polluting.

Other examples of alternative oilseeds include crambe, meadowfoam, and safflower. Crambe is a non-edible oilseed grown for its high content of erucic acid in the seed, a material that can be used for a variety of industrial products such as slippage agents in plastics or engine lubricants. Meadowfoam is being grown in Oregon as a high value oilseed used in cosmetics, with potential for other unique uses. Safflower is an edible oilseed grown in arid regions of the West for use as a cooking oil and for birdseed mixes.

Alternative Legumes

As part of a crop rotation, legumes can reduce or sometimes eliminate the need for nitrogen fertilizer (organic or conventional) applications. There are a number of domesticated or native legumes that have gained acceptance as forage crops or ground covers, but soybeans represent the only widely grown legume grain-type crop. After soybeans, cowpeas and dry edible beans have been the most economically important large-seeded legumes (pulses) in the U.S.

Legumes in general can be broken into two groups - cool season legumes, needing to be planted in early spring or as a winter annual, and warm season legumes, which can be planted later and are more suited to Southern regions. It is very important to find varieties adapted to the area of production with legumes, in part because they are somewhat more likely than other crop groups to experience disease pressure or other production risks when grown in a new area.

Besides soil fertility benefits, the chief advantages of pulse legumes is the large seed, making them easy to handle, and the typically high prices per pound relative to cereal grains. The main market for most pulse crops is as human food, although some are fed to livestock as a high protein source. All legumes, including pulses, are higher in seed protein than other types of crops.

Dry edible beans, which include several market classes such as pinto, navy, red, kidney, and black beans, are grown in several regions of the U.S. These beans are shorter in both stature and growing season than soybeans and bring a much higher price per pound. However, compared to soybeans, dry beans are harder to harvest, are more susceptible to pests, are lower yielding, and require more effort in post-harvest handling and marketing.

Cowpeas, or black-eyed peas, are Southern legumes that also have a variety of market classes. Some types of cowpeas are viney, and some are short and bushy. Cowpeas are also shorter season than soybeans but more difficult to harvest. Some buyers require cowpeas to be delivered at relatively high moisture within a day of harvest, while others accept dry cowpeas.

Alternative legumes grown in the Pacific Northwest include chickpeas (garbanzo beans) and lentils. These legumes go into the edible marketplace, and they work well in rotation with small grains in that region. Sweet white lupine is a cool season legume grown in some northern states that has unusually high protein levels of 38 to 40%. The primary market for the crop to date has been as a high-protein animal feed, particularly for dairy cows.

Mung beans are a significant alternative crop in Oklahoma and are suited to other parts of the South and Midwest, especially where moisture stress occurs. Mung beans are used for soup mixes and bean sprouts and are sometimes sold fresh or canned. Adzuki beans are related to mung beans and have export potential to Japan, where they are used for a variety of confectionery food products. Guar is another southern legume, grown some in Texas but largely imported for use as an ingredient in processed foods.

Alternative Cereal Grains

All of the most promising alternative cereal grains are crops that were domesticated for food use in some part of the world, usually thousands of years ago. Despite their value for human food use, many grains are grown primarily for animal feed, including corn and sorghum. Many of the alternative grains that have been tested or grown in the U.S. have started out being considered as livestock feed, and a few also hold potential for marketing as birdseed. The birdseed market consumes tens of thousands of acres of cereal grains such as sorghum and proso millet; notably, other alternative cereal grains, such as foxtail millet and pearl millet, have good potential for commercial birdseed market.

There is also a group of alternative crops called pseudocereals that are like cereal grains in that they are ground into flour for food use but are different in that they are not grasses. Amaranth, quinoa, and buckwheat are all pseudocereals that are actually broadleaf plants that do not fit into the oilseed or legume categories. Of these three, buckwheat is found on the largest acreage in the U.S., with a strong export market to Japan for use in noodles and other products.

Amaranth and quinoa are crops that were grown by the Aztecs and Incans, respectively, and have gained

renewed interest due to their relatively nutritious grain characteristics. Quinoa is more adapted to cool mountain climates, such as intermountain valleys of the West. Amaranth is adapted to most parts of the U.S. and has been grown commercially for the health food market, for products such as breakfast cereals, crackers, or baking flour.

Summary

A number of alternative grains, oilseeds, and legumes have potential for being grown on U.S. farms. Some of these crops can replace imports, while others can be grown for export. Most have a variety of potential uses in the U.S., and all of these crops can help diversify existing crop rotations, allowing for reduced pest pressures and potentially increased profits. Successful adoption of alternative crops often starts with on-farm research that can identify the appropriate variety for a growing region and determine the best equipment settings or modifications for existing farm equipment. Many barriers exist to diversification, including government policies, but the potential benefits of new crops are well worth the investment necessary to bring about increased diversity.