

Low-Input Sustainable Agriculture

Is it possible to farm profitably while conserving natural resources and protecting the environment? There are farmers across the country who think so, or at least want to try. The approach they are using, or looking into, is now called “low-input sustainable agriculture” (LISA). This type of farming is giving new meaning to the role of farm management.

What Is LISA?

LISA is a way of thinking about farming. It incorporates some ideas found in what people have labelled ecological, organic, regenerative, biological, or simply alternative agriculture.

Among the goals that now drive the interest in low-input sustainable agriculture, two stand out: profitable and productive farming, and protection of resources and environmental quality. Companion objectives include ensuring safe and nutritious food supplies and reducing health risks to farmworkers.

LISA involves farmers substituting management, scientific information, and on-farm resources for some of the purchased inputs they currently depend on

for their farming enterprises. LISA techniques include rotations, crop and livestock diversification, soil and water conserving practices, mechanical cultivation, and biological pest controls.

Low-input sustainable agriculture offers no magical formula for profitable farming. You will not find a recipe for it in any how-to book. “Sustainable” means the capability to continue producing food and fiber indefinitely and profitably without damaging the natural resources and environmental quality on which all of us depend.

“Low-input” is a catchword for what many feel is a primary requirement for economic and environmental sustainability in farming—the need to cut back on purchased off-farm inputs. These especially include synthetic chemical fertilizers and pesticides, but also livestock growth stimulants.

How can farmers reduce their use of purchased chemicals? Haven’t these purchased inputs made it possible for farmers to specialize and to produce abundantly more than they could without chemicals? Potentially profitable alternatives to the chemical-intensive,

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capital-intensive conventional agriculture can take different forms.

Rotations, soil building practices, and crop-livestock diversification are some of the tools at the farmer's disposal. Legume rotations and use of green manure (crops planted specifically to be plowed under to enrich the soil) can supply plant nutrients, often without making it necessary for the crop farmer to also have livestock as a source of manure. Of course, livestock can serve the additional role of harvesting hay and forage produced as part of the farm's rotation. Soil and water conserving practices, including or in combination with rotations, enhance soil quality and productivity. Rotations also help control weeds, insects, and plant diseases.

With LISA, pests can be prevented or controlled without using chemicals. Mechanical cultivation can substitute for chemical weed killers. And farmers may simply call on their plants to control weeds. For example, rotations and crop diversification may include a crop like rye specifically because it is toxic to weeds. Integrated pest management can play an important role, also. Scouting of fields to monitor insect infestations is one way to limit the use of insecticides to a when-needed basis. Biological techniques, such as use of beneficial insect predators, can often eliminate the need for insecticides entirely. (See Part V, Chapter 5 on integrated pest management.)

The right set of low-input sustainable practices has to be discovered, rediscovered, and honed for each farm. What works on one farm may fail on another. This fact emphasizes the role of farm management. Low-input farmers, in effect, are working to substitute brainpower for chemicals. True, the farm management process for achieving satisfactory low-input farming in-

volves the familiar steps of planning, compiling information, making decisions, buying inputs that the farm cannot produce, selling products, and identifying and solving problems along the way. Depending on the farm for inputs as well as outputs presents greater management challenges. Low-input farming involves experimenting, figuring out how to cooperate with nature and how to benefit from the partnership—rather than concentrating on ways to overcome natural forces.

Why the Interest?

Farmers and nonfarmers alike are becoming more and more interested in this new type of agriculture.

Environmental Quality and Resource Conservation Reasons. Conventional agriculture's reliance on synthetic chemical fertilizers and pesticides has caused or aggravated many problems. Once seen as a basic and beneficial link to our natural environment, agriculture is now widely cited as a cause of pollution. Ground water contamination due to the leaching of agrichemicals is perhaps the environmental problem of greatest concern today. Vulnerability of ground water to contamination is widespread. And unlike surface water, ground water can be very difficult—and sometimes impossible—to clean up once it is contaminated.

However, purchased chemicals are not always the culprits. Excessive leaching of nutrients from livestock manure, a problem in areas such as the Chesapeake Bay region, can be a major source of pollution. Farmers are just as concerned about the ground water problem as anyone. Water in farm wells is often the first to become contaminated.

Water quality is not the only environmental concern. Intensive cropping with heavy use of agrichemicals has often led to adverse on- and off-farm effects such as soil erosion, depletion of irrigation water supplies, and loss of fish and wildlife habitats. Despite efforts to curb erosion spanning 5 decades, loss of topsoil persists in lessening the productivity of farmland and causing sedimentation and other runoff problems estimated to cost billions of dollars a year to correct.

Economic Reasons. Farmers, though concerned about adverse environmental impacts of conventional farming practices, must make a decent living. In fact, it took the farm financial stress of the 1980's to raise substantial farmer interest in reducing chemical inputs in order to survive financially. Many farmers began to see low-input sustainable agriculture as one way to cut their production costs and debts, and therefore stay in business. Growing farmer interest in the economics of low-input agriculture has helped to broaden the idea to accommodate reduced-chemical as well as no-chemical practices.

The economic rationale for low-input sustainable farming has other roots. Farmers remain concerned about the rising costs and uncertain availability of pesticides. Over time, weeds and insects develop a resistance to previously effective pesticides. So farmers have to use more of those chemicals or alternative chemicals more often just to stay even with new pest resistances. The use of many of the pesticides they have come to depend on could be banned or restricted quickly if they are found to cause unacceptable health risks. The costs to chemical companies of developing, testing, and registering pesticides is going up, which means higher and higher future pesticide costs to farmers.



As barley is harvested at right, soybeans are planted in barley stubble. By using conservation tillage in a double cropping system, the farmer protects the soil from erosion, while saving time and fuel. (USDA Photo, MD-30616)

Thus, many farmers are thinking seriously about low- or even no-chemical alternatives.

Food Safety and Quality Reasons. If the combination of environmental and economic concerns has not been enough to boost interest in low-input sustainable farming, public concern about the safety and quality of the food we eat adds another reason. Issues such as pesticide residues on food and the use of growth stimulants in livestock move into and out of the headlines with increasing regularity. Whether real or imagined problems, they increase interest in profitable farming approaches that will prevent rather than just contain undue health and safety risks.

Does LISA Really Work?

There are really two questions concerning LISA: Can LISA lead to an agriculture that is environmentally beneficial and assures us of safe and wholesome food? And will LISA be profitable for farmers?

Skeptics say you can answer "yes" to only one of these questions. Believers in low-input sustainable agriculture cite case studies showing that many farmers using low-input practices are doing as well as, if not better than, their conventional counterparts. The following chapter in this book describes some of those farms.

Still, there are formidable barriers that would have to be surmounted if low-input sustainable agriculture is to become mainstream agriculture. One barrier is the lack of adequate information that farmers need to make wise decisions about practices that will work best for them. USDA and land-grant universities are just beginning to develop and disseminate information on low-input sustainable farming.

A new but small Low-Input Sustainable Agriculture Research and Education Program, administered by USDA, is giving the need for low-input farming facts and information important visibility and support.

Current farm and other public policies may also be potential obstacles to adoption of low-input sustainable agriculture. Price and income supports for major crops like corn, wheat, cotton, and rice continue to raise artificially the economic returns to farmers for producing those crops on as many acres as possible. The base acreage provisions in commodity programs that are used to determine the payments each participating farmer can receive have had the unforeseen effect of discouraging a shift to other enterprises that might be produced with a lower level of inputs. Shifting to these enterprises may mean using, and therefore losing, some of that crop "base" in order to grow rotation and other crops.

The Challenge Ahead

To some people, low-input sustainable agriculture will always seem like a step backward, a return to the way we farmed before chemical fertilizers and pesticides became widely used. They point to the impressive gains in yields attained since World War II when we began to use synthetically compounded fertilizers and to apply what had been learned about chemicals in controlling agricultural pests. They note the great reduction in the drudgery of the labor-intensive methods that accompanied farming in earlier decades.

But from all indications, low-input sustainable farming need not sacrifice those gains. In fact, it seems to involve a sophisticated combination of the best of past methods along with low-input practices, creating a system that may require only a modest increase in labor requirements over those of conventional farming.

The challenge ahead is to help farmers improve their management abilities, to give them the information they need to make informed decisions, and to remove barriers to the adoption of profitable and environmentally benign agriculture. For in the end, the extent to which farmers are willing and able to develop and profitably apply low-input sustainable management skills will have a big impact on the future of American agriculture and on the quality of our environment.