High-technology farm methods are simply waiting to be used

by Cynthia Parsons

Since World War I, the spread of mechanization, followed by widespread use of fertilizers, pesticides, and herbicides, generated an enormous leap in the productivity of American agriculture. Coupled with the use of hybrid seeds, these developments facilitated a 30 percent increase over a 30-year period.

If such progress is not continuing today, the reason is not a lack of new technological innovation, nor a lack of desire for even better production methods on the part of the American farmer. The reasons are purely political. Jimmy Carter's agriculture Secretary, Robert Bergland, was wholly unfit for that office, as he certified by reversing a century of U.S. government support for American farm expansion. He stated his belief that the American farmer produced "too much"—although U.S. agriculture has not yet come close to its full potential. He stated his belief that there is too much mechanization, too much use of fertilizer, pesticides and herbicides, and too much irrigation. He supported "environmentalists" who sought to deprive America of its food supply by returning farming to the "natural" 20-acres-and-a-mule state.

Then came Jimmy Carter's Federal Reserve Chairman, Paul Volcker. Volcker, continuing his policies of usury into the hapless Reagan administration, deprived farmers and farm-equipment suppliers of the credit necessary not only to modernize, but even to survive. Volcker, since assuming office in 1979, will have eliminated one million farmers by the end of this year.

Reverse the depression conditions Volcker has induced—before too many more farmers disappear—and eliminate the continuations of "Berglandism" in the government's parity and other policies, and the technological innovations recently made and soon to come on line in the field of agriculture will produce an increase in American farm productivity paling that of even the recent 30-year period.

The time factor

Among the many innovations we shall cite, the essential fact is that merely by reducing the time-factor involved in agricultural production, agricultural efficiencies could be increased 20-fold. In fact, a simple increase in the application of fertilizers and pesticides would bring an enormous increase in present output, without a single innovation otherwise.

Innovations in hydroponics

Innovations in mechanical technologies, including robots, computers, and improved tractors, plus innovations in the application of water, pesticides, and herbicides, are increasing output, reducing labor needs, and cheapening production costs in whatever part of the world they have been introduced. For example:

Soilless agriculture, though not widespread, is being developed in many countries, proving a boon to production of vegetables and horticulture.

The Israelis are developing aeroponics, a highly energy-intensive method of food production similar to hydroponics. Hydroponics is a soilless method of crop production with stones or similar substance replacing soil as the medium holding the plant. Essentially the plant is supported in water by the stones through which the roots grow and receive nutrients. The new aeroponics technique developed in Israel is similar. Extremely high yields can be obtained by this method, at very economical costs in terms of manpower, water and energy.

The new approach supports plants on modular growth-benches. Root systems are enclosed in "feeding chambers," where they are periodically sprayed with a fine mist of nutrient solution. The network of nutrient pipes is equipped with special foggers, which project a fog of air and solution into the chambers. A drainage system returns any unused solution to the nutrient tank, for greater economy. The important factor in this method is that it is a very controlled system, and water, nutrient and oxygen are supplied directly to the roots. Harmful microorganisms and insects are completely excluded. Computerized controls measure the amounts of nutrient solution to be atomized in each root chamber.

Sheep-shearing robots

Among the leaders in farm innovation today is Japan, not surprisingly. (They do things the way America used to.) The Japanese are developing robots for the farm and have developed a robotized combine harvester that senses the side of uncut grain and harvests it. When the operation is done, the robot stops and waits for somebody to give it further direction.

The Israelis have long been using a robotized arm for fruit picking. The arms sense the ripe fruit, cut it from the branch, and drop it into a waiting container.

And finally, Australia has developed a sheep-shearing robot that senses the contours of the sheep, and cuts the wool without harming the sheep or losing as much wool as human labor would.

Larger and more efficient tractors

In the United States, where the average-size tractor is 150-250 horsepower (hp), and the tendency has been to decrease the size, one Havre, Montana company, Big Bud, is now building a second generation of larger and more specialized machines that enable farmers to increase their harvests with less labor and more efficient cultivation. Big Bud, founded in 1969 by Ron Harmon, manufactured their first tractor at 280 hp. Now, they can produce an 860-hp machine, already in use in California. Big Bud's 525-hp model sells at $170,000, with sales of 75 units per year. These powerful tractors can pull large, heavy rigs that plow, till, plant and drill in one crossing of a field. Just one of them can replace five older tractors and tillage machines, while using only half as much fuel. A 650-hp Big Bud tractor has been sold primarily to large wheat growers in the southern Plains States and the Northwest. Big Bud believes that its greatest potential hasn't yet been tapped: large unbroken fields in Canada, Australia, and Argentina.

Merely by reducing the time factor involved in agricultural production, efficiencies could be increased twentyfold. The obstacles are purely political. Paul Volcker has deprived farmers and their suppliers of the credit required to survive, much less modernize.

Laser-guided farm machinery

Tillage is not the only advantage. Using special ploughs with lasers to guide them, the machines can install roughly one mile of continuous-roll plastic drainage tile per hour. This is many times the capacity of the old open ditch machines which are used to hand-set clay or concrete tiles.

The larger tractor is also better for soil conservation. Because the tractors can complete three or four processes in one field-crossing—whereas the smaller tractor would take, accordingly, three or four crossings—the wear on top-soil is reduced.The large models carry a no-till drill, which can apply as much as 2,000 pounds of packer-wheel pressure per seed opener, while simultaneously banding phosphates and nitrogen around the seed, and applying herbicides.

The packer wheel packs soil firmly around the seed, removing air pockets. The drill also applies liquid, gas, or dry fertilizers.

The largest model in the Big Bud line is 20-feet across, weights 33,000 pounds, and can carry a 25,000-pound payload. The manufacturer says that fuel for tillage and planting is cut from 6.5 to 1.5 gallons per acre.

There have also been new developments in sprayers improving chemical application to crops. Some planters and field preparation machines now apply chemicals at the same time that they accomplish other field work. "Broadcast" methods of chemical spraying are almost a thing of the past. Improvements in the all-in-one techniques include flotation tires that reduce impaction of soil.

Irrigation systems

New irrigation techniques are also improving efficiency on the farms. There are two types of such improvements possible, one reducing the amount of water run-off, and so improving the efficiency of the irrigation system itself, the other improving the efficiency of the plant in absorbing water. Most of the new techniques now in use are of the first type, while research continues into plant-quality improvement.

New lateral-move irrigation systems can travel across a field using a single pump to draw water. The system covers rectangular plots far better than center-pivot systems, which may need several pumps to cover the same area. Water is provided by an open ditch or a series of pipes at one end or in the middle of the area. The system can irrigate a field 2 miles by 1 mile or larger. Crops, chemicals and fertilizers can be applied with the same system.

An experimental, computer-controlled version of the lateral-move system is equipped with lasers that keep it perfectly aligned as it moves.

These are a few of the existing technologies that could and should be widely applied to American farming practices today. But first, we must remove the purely political obstacles—like Paul Volcker and the "post-industrial" crowd. We live in a nation that likes to eat. And we live in a nation, the majority of whose farmers are technology-proud. Provide them credit and parity prices, and they will feed the world.