Farm Talk

Jerry Webb

How does science fiction become science nonfiction?

In agriculture, that transition occurs in the laboratories of researchers who take those wild dreams and turn them into something farmers can use. For instance:

Hybrid crops that grow from their own seed;

A herd of identical animals developed from individual cells of a single, perfect carrot;

Completely new plant species created by blending the best features of entirely different crops;

Corn and cereal grain that make their own fertilizer;

Machines that produce food sugar, much the way green plants, do, but in places where plants won't grow.

Maybe all of those things are science fiction now, but that's not to say agricultural researchers aren't at work in the laboratories of the land-grant colleges and in other places, trying to find the breakthroughs that will lead to these developments. It may be years before some of these possibilities become realities, and some may never happen.

But creative, questioning, dedicated agricultural scientists are looking at some of nature's most complex secrets, and may be they will discover a super plant or some other breakthrough that will revolutionize food production.

Photosynthesis is the basis for all agriculture and that's where a lot of effort in agricultural research starts. Photosynthesis is the process through which green plants convert sunlight, carbon dioxide and water into food sugars and oxygen.

It accounts for up to 95 per cent of the dry weights of crop plants and all grain. And yet scientists say the most photo-efficient plants, including corn and sugarcane, use only three to four percent of the available solar energy.

Photosynthesis in soybeans and cereal grains is no more than half as efficient as it is in corn. So scientists are trying to unlock the secrets as to why this happens.

One group of researchers looking at this process has found that high concentrations of carbon dioxide allow soybean plants to be more efficient, making better use of the sun's energy.

They're raising soybeans in an atmosphere containing three to five times the normal amount of carbon dioxide and they're getting yield increases of up to 50 per cent.

Other scientists are trying to improve photosynthesis by using growth regulators. Most plants start to die and photosynthesis drops off rapidly just when sugars and starches are most needed to fill seeds.

Scientists are experimenting with a group of powerful growth regulating chemicals that prolong plant life and allow photosynthesis to continue much longer. Another group of scientists is trying to figure out why a growth regulating alcohol found in alflafa stimulates yield increase up to 24 percent in some vegetable crops, and causes rice plants to grow in the dark.

Rising nitrogen costs and the likelihood of shortages have triggered efforts in nitrogen fixation research.

If alfalfa plants, for instance, were improved enough to fix just 50 pounds more nitrogen per acre each year, the annual return in extra forage and fertilizer would be nearly two billion dollars—a goal well worth seeking.

Some scientists think they may be able to develop nitrogen-fixing varieties of non-legume plants, such as corn and wheat.

Then there's always cloning and tissue culture that could make science fiction a reality much sooner. Cloning is already fairly common in agriculture. Nurseries and houseplant producers have been cloning for years. If you've ever raised potatoes from eyes, you've done some cloning also.

A clone, according to the scientists, is simply a group of genetically identical individuals, derived from a single parent without normal sexual reproduction. Tissue culture is a form of cloning in which a small piece of plant tissue is grown in a nutrient medium to form a blob of identical cells.

If the right hormones are supplied in the growing medium, this blob differentiates into stem and root tissue to form a new plant, just like the original parent.

Of course, this technique is valuable in developing plants with desirable traits. Each culture produces millions of cells and potentially each one is an identical plant.

This helps reseachers speed up their efforts by giving them lots of identical material to be tested through such things as toxins, chemicals, temperature stress, and so on.

Mutated cells that survive these challenges are then cultured in an effort to obtain whole plants with new desirable charateristics.

When it works, tissue culture is years faster than conventional plant breeding.

Scientists have also learned recently how to remove the walls from single cells of entirely unrelated plants, then fuse them together. They've used this technique to combine soybeans with barley, soybeans with corn, peas with carrots, and rapeseed with soybeans.

They haven't been able to grow whole plants from these cells yet, but that's their goal.

Eventually, it may be possible to produce whole new plants of economic importance from this kind of hybridization.

Maybe the most far-out food production idea now under study in the laboratories is the concept of cell-free agriculture. This is a kind of no-plant farming, where solar powered reactors convert carbon dioxide and water into food sugar.

Scientists have made this work on a small scale, and although it doesn't sound as tasteful as what we now consume, some scientists think it may be the only way to feed the world in the future.

There are about four billion people on earth now and that number is projected at six to seven billion by the turn of the century, and it could reach 12 to 16 billion by the year 2100. Conventional agriculture just may not be up to the challenge.

That's why science fiction research is so important now, so that it can be nonfiction when it's really needed.

Wood fuel fad may hurt timber stands

HARRISBURG — The current use of wood for fuel will help reduce our dependency on imported oil, but may create future adverse environmental effects, according to a Soil Conservation Service woodland specialist.

"There are many inexperienced people cutting the wrong trees for firewood," reports Paxton Wolfe, woodland conservationist. "The result is the quality of our forests is being reduced."

Wolfe added that trees are this country's second most valuable renewable resource. Our soil is the most important source but it is renewable over a much longer period of time when properly managed.

Pennsylvania presently has an adequate supply of wood products since nearly 60 percent of the State is covered with woodlands. Growth rates currently exceed wood crop harvest rates.

The major problem, according to Wolfe, is that lumber and veneer quality trees are being cut for firewood. This will result in a low quality forest for future generations.

"It is best to use the poorer quality trees and culls for firewood," reports Wolfe. "Most of Pennsylvania's forests are in need of woodland improvement cuttings through thinning and removal of culls and low value species. These are the trees which should be used for firewood. Firewood can also be cut from the tops and culls left after a sawtimber or pulpwood harvest. Our forest wildlife would appreciate leaving at least one den tree per acre." A den tree is older, usually hollow, tree which is the home of small creatures, like squirrels.

Wolfe encourages land users to obtain the services of a professional forester before cutting firewood. This will assure maintaining and improving the quality of your woodlot while providing an adequate fuel supply.

The names of professional foresters can be obtained from your local conservation district or district forester.

Northumberland meeting held

NORTHUMBERLAND — A Farm tax information meeting was held at Line Mountain High School on Jan. 29. About a dozen farmers and some of their wives, from Northumberland County attended. Mr. Vernon Brose of the county's extension office gave pointers on filling out the farm tax forms and pointed out the changes in this year's forms. In addition, Mr. Brose told those present some ways in which they might plan for next year in order to obtain the most savings.

Swiss IFYE

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An expensive tax on luxury items, like television.

With the Bank of the World located in Switzerland, high finance is one of the key industries, along with a highly developed insurance industry. Fine craftsmanship has also made the Swiss noted for watches, chocolate, and cheese. Even the rocky jagged mountains are harnessed, with electricity generated from the rivers spawned by the ever present snowmelt.

Like citizens everywhere, Steve has one minor criticism of his country: "We have to many lawyers and doctor's." It's a complaint with a familiar ring.

When he boards the commuter train that takes him ten miles away to his classes in a matter of only eight minutes, Steve joins the thousands that take advantage of the country's highly developed rail system. Train travel is far more commonplace and efficient than in the United States, perhaps because acquiring a driver's license and a car are major economic obstacles. Young people may not begin driving until they are 18, and the cost of a license is $600. Insurance, says Steve, is very expensive also, and the costs prevent most students from getting their own "wheels." On the other hand, however, there is no age limit on the consumption of alcoholic beverages.

Switzerland has maintained the national policial policy of neutrality for many years. Nevertheless, there is a national conscription, and at age 20, every individual must serve the country for 17 weeks. After that basic training period, a three-week service period is served each year. So while his American counterparts debate the merits of military draft, Steve already knows that in just a few years he'll take his position in training for brief service to his country.