Designer Corn 'Wave Of The Future'

ANDY ANDREWS
Lancaster Farming Staff

CARLISLE (Cumberland Co.) — Say goodbye to the days of growing your corn, hauling it to the mill, and getting the best market price.

Say hello to the days of forward-pricing with insurance and using yield monitors to see exactly how well your fields produced.

In the near future, you may welcome sensors on the combine to determine grain composition on-the-go, including protein and starch content, and using allocation devices to separate specific corn that is under contract for highly specific products.

That was the message that 225 corn, hay, and soybean producers took home from them during the corn production segment of the annual Pennsylvania Crops Conference at the Embers Inn last week in Carlisle.

It was a message shared by Dr. Peter Coaldrake, of Pioneer's corn breeding station based in Champaign, Ill., who spoke at the conference about the wave of the future in "designer crops."

"Corn is not just corn, it's not a grain we raise and just sell," said Coaldrake. Now, corn is viewed by many processors as a renewable resource with a wide variety of products that can be gleaned from it to make products in demand by consumers today.

There are varieties of "corn" that can be grown and shipped for further processing, encompassing white, yellow, yellow waxy, white waxy, blue, high lysine, high oil, high fructose — in short, corn that will meet further processing demands.

And processors will look more specifically at what is needed to grow a highly specific corn for a specific product.

The uses of corn evolve as consumers demand more specialty products. For instance, according to Coaldrake, a new niche market for specific corn products is Mexican food. One company even labeled corn for distribution on July 4 — red corn, white corn, and blue.

"You have to think of corn as no longer just corn," said the researcher. Corn has become a raw material to produce more specific products.

While the markets for corn evolve, researchers such as Pioneer are meeting demands for seed products that provide increases in harvestable yield, reducing crop losses, improving management costs, and creating more value-added and new uses for corn.

A part of that is creating "designer crops" that maximize overall yield and are more pesticide- and disease-resistant. This includes more feed energy intensive and more waste-product manageable varieties of corn.

Producers will see "a genetic solution to the corn rootwoorm problem and crops tolerant to insects early in the next century," according to Coaldrake.

Crop research now focuses on herbicide-resistant varieties that are environmentally safe. The first generation of herbicide resistance evolved in the 1980s, and the second generation in the late '90s will provide more options for disease and pest resistance. The "third generation" of herbicide-resistant corn, in the year 2000 and beyond, will allow growers to manipulate yields, maturity, and corn nutrient composition.

Corn could end up replacing "factories" that use a nonrenewable resource, such as seashells, for high-valued protein, with a renewable resource such as corn to extract the same product.

Also, corn that readily uses nitrogen and phosphorous from fields is on the horizon.

Some feed corn is being developed that would reduce the phosphorous content of manure. The variety lowers the bound phosphorous in the corn, making it more available to the animal. Research at Pioneer is under way to use microbial methods in the gut of the ruminant animal to make more effective use of the phosphorous in the grain.

For Pioneer, it is more effective to examine the whole picture of using feed, from the management of the variety to the animal that will be using it, rather than work on simply higher yields for varieties of corn.

The demand, in the future, may not necessarily be for the cheapest corn, but what the grower gives the most value for that product that can be made from it, according to Coaldrake.

Also, corn for human consumption will evolve as consumers demand more "convenient foods, healthier food, more environmentaly friendly foods, and ethic foods with more diversity," he said.

Coaldrake presented several slides on further processors of corn products, including a Frito-Lay plant in Illinois and a tortilla plant in Texas. The use of a consistent product that is readily processed under strict guidelines will become the norm for further processing for consumer products.

Technology will drive advances in corn products. Monitors on harvest equipment will show what the corn composition and quality are. Even grain elevators will have grain composition evaluation equipment — which could determine price paid to the seller.

Grain testing will involve more robotics, replacing people in levels of complexity.

Corn varieties will evolve to provide a producer with a product that has higher metabolizable energy, that is more energy dense with higher digestability, that will have lower levels of mycotoxins, with an improved amino acid balance and an increased protein content.

Pioneer research has examined varieties that look at a particular product, such as starch, and how easily extractable it is. They can now measure a trait such as starch extractability "cheaply and repeatably" said Coaldrake.

The dry millers process, in the future, will look at ways to take the endosperm and break it into pieces that can be used by certain processors. Kelloggs, for example, for cereal processing, requires these pieces to be exact, with a higher percentable of hard endosperm, a high test weight, low levels of stress cracks in the kernel, low levels of crushed and broken kernels, and corn that is free of toxins. And they want that consistently.

The masa processors, for tortillas and other products, require corn that has a higher test weight, intact kernals, with an easily removable pericarp. The clear white or yellow corn must be free of toxins and have rapid moisture uptake.

In the future, markets will be small and segmented and processors will be going to more specific markets for a highly defined product.

"Farms are going to very different than what you know today," Coaldrake said. The product will be geared for the "ultimate consumer" and reflect those specific demands. This will require more vertical integration between the grower and supplier.

CORN TALK NEWS

PENNSYLVANIA MASTER CORN GROWERS ASSOC., INC.

Dr. Peter Coaldrake, of Pioneer's corn breeding station based in Champaign, Ill., spoke at the crops conference about the wave of the future in "designer crops."

Corn Talk News RESEARCH UPDATE

CORN TALK NEWS
PENNSYLVANIA MASTER CORN GROWERS ASSOC., INC.

Side Dress Nitrogen Source Efficiency For Corn On A Silt Loam Soil

The source, not just the quantity, of nitrogen at side dress application can make a difference in corn yields. Nitrogen can be lost from the soil by volatilization, denitrification, leaching, and, of course, plant uptake. N source, soil type, and soil conditions can interact and affect each of these losses. This study was designed to test the effectiveness of several commonly available nitrogen sources on a silt loam soil.

A uniform area 180 feet by 150 feet was selected in a large commercial corn field on a Matapeake silt loam soil. The field had been in wheat followed by double crop soybeans the previous year and was planted to DeKalb 623 corn at a population of 27,600 plants per acre the current year. Starter fertilizer was applied at a rate of 41-41-13.6 N-P-K at planting. The experiment was laid out as a randomized complete block with 11 treatments and 3 replications in plots which measured 15 feet x 45 feet. N treatments were applied to each row middle by hand on June 14, 1995.

Sidedress N rate was 80# N/A except for one ammonium nitrate treatment which had 20# N/A and the check plot which received no additional N. Plots were harvested by hand on September 20, 1995.

Table 1. Fertilizer treatments and grain yield.

N-Source	Yield (bu/A)
30 % UAN with 8-0-0-9 @ 24# S/A	169.83 A*
30% UAN with 0.105% NBPT	167.87 AB
Urea (46-0-0) @ 83 #/A + Ammonium Sulfate (21-0-0-24) @ 200#/A	166.13 AB
30% UAN	165.33 AB
Ammonium Nitrate (34-0-0) 112 #/A + Ammonium Sulfate @ 200 #/A	163.67 AB
Ammonium Nitrate (34-0-0) 174 #/A + Ammonium Sulfate @ 100 #/A	161.17 AB
Ammonium Nitrate (34-0-0) @ 80# N/A	156.87 AB
Urea (46-0-0) with 0.14% NBPT	155.57 AB
Urea (46-0-0)	154.10 AB
Ammonium Nitrate (34-0-0) @ 20# N/A	149.80 B
Check-Starter N-P-K only	115.10 C
LSD (0.05)	18.31

*Yields followed by the same letter are not significantly different.

Plot yields were statistically analyzed by analysis of variance which determined that there were statistical differences at the 0.05 probability level. Means were separated by calculating a Least Significance Difference at the 0.05 level. The check plot with no additional N produced the lowest yield which was significantly different from all other yields indicating that more than 41 #/A starter N was necessary. The next lowest yeild resulted from the ammonium nitrate treatment of just 20# N/A. This was not, however, signficantly different from the next 8 treatments which had 80# N/A applied at side dressing. There was a positive but not significant yield increase when NBPT (a nitrification inhibitor) was used with urea over urea alone. There were also yield increases when ammonium nitrate and ammonium sulfate were applied with 48 and 24# S/A over plain ammonium nitrate with no additional S. The top two yields were produced with 30% UAN solution with nearly a 3 bushel yield advantage seen when 24# S/A is included.

Overall silt loam soils with their excellent nutrient and water holding capacities are efficient at using a variety of N sources with little chance of unwanted nutrient loss. Silt loam soils also have the ability to supply a large amount of residual N as evidenced by yields of nearly 170 bu/A with only 121 #N/A from fertilizer.