

Corn ear design speeds grain drydown

LANCASTER — Corn ear "engineering" may soon be a major factor in farmers' fuel bills.

Already, some hybrids, because of fewer husks for example, dry down more quickly in the field naturally than do other hybrids, say seed corn researchers at DeKalb AgResearch, Inc. Quicker drydown means lower moisture grain when it comes from the field, and probably shorter artificial drying time.

Modern corn hybrids were developed primarily in an age when fossil fuels were

abundant and cheap. In an effort to meet the world's rapidly expanding food needs, seed corn researchers bred corn hybrids that use more of the growing season — sometimes adding grain weight right up to frost. More usable grain is produced than if plants were to shut off the growing process early, so that the grain could dry down naturally in the field during warm late-summer days.

The drawback, at least for those farmers who store dry grain, is that grain has required artificial drying to bring it down to a moisture content low enough to keep in storage. Naturally, farmers who utilize high moisture corn don't share this concern.

High moisture grain was no problem when propane gas, an oil derivative, was readily available and cheap. But today's farmers are feeling the pinch of higher fuel prices and short supplies, as are all consumers.

According to Bill Crum, associate director of temperate corn breeding, many

of the corn ear characteristics that help determine how rapidly drydown takes place can be manipulated genetically in the process of breeding new hybrids. These include husk cover, moisture content at physiological maturity, kernel size, and kernel osmotic potential (water attracting force).

Research is under way to alter these hybrid characteristics so that they are more suited to an energy-short world.

Wayne Fowler, the firm's agronomic education director, feels one of the challenges facing the seed industry is to familiarize corn growers with the characteristics of drydown as opposed to early "die-down", which is simply corn plants dying before they have a chance to produce all the grain weight they're capable of producing.

Technically, drydown is the term used to describe the rate at which the ear loses moisture after the plant has reached physiological maturity. Weather factors such as temperature, humidity and wind influence the rate of drydown along with the characteristics of the hybrid.

The number of husks, their thickness, how tightly they seal off the tip of the ear, and the degree to which they open at maturity all influence drydown rate. In the process of altering these characteristics genetically, corn breeders must keep in



Ron Castleberry displays ears and their husks from two different hybrids. The top ear had seven husks and the bottom ear had 10. Ears represented by the top hybrid have from seven to nine husks, while the hybrid represented at the bottom have from nine to 11.

mind that the husk cover still should provide protection for the ear.

Crum points out the number of husk leaves varies considerably in today's corn hybrids.

For example, one hybrid can have as few as seven husk leaves, while another may have as high as 14. Square inches of husk can double from one hybrid to another.

"Husks are a big factor in drydown rate that we can manipulate in our breeding," says Crum.

Low grain-moisture

content at physiological maturity is another desirable trait, he adds.

"The range of moisture percentages between hybrids is from the low to the mid 30's. We probably can't go much below 30 percent. We've seen some helpful differences in our tests."

The researcher also feels that kernel size, an alterable trait, affects drydown rate. The important question is whether or not kernel size can be decreased while high yield is maintained, he says.

The permeability of the seed coat to water and osmotic potential (water-attracting force) inside the kernel may also be important in drydown rate, says Crum, and it may be

possible to alter these factors genetically.

Another factor being considered is altering plants genetically is changing the ratio of time required for a corn plant to complete the parts of its growth cycle. Usually 60 percent of the time is used to develop the plant and the remaining 40 percent to fill the ear. "Altering this ratio may help us to improve early drydown," he says.

Ron Castleberry, corn physiologist at DeKalb, says the breeding job is achieving early drydown is complex.

"For example, while kernel black layer formation at the base of the kernel at maturity definitely shuts off the movement of carbohydrates into the corn kernel, it is not known what effect black layer formation has on water movement through the kernel," he comments.

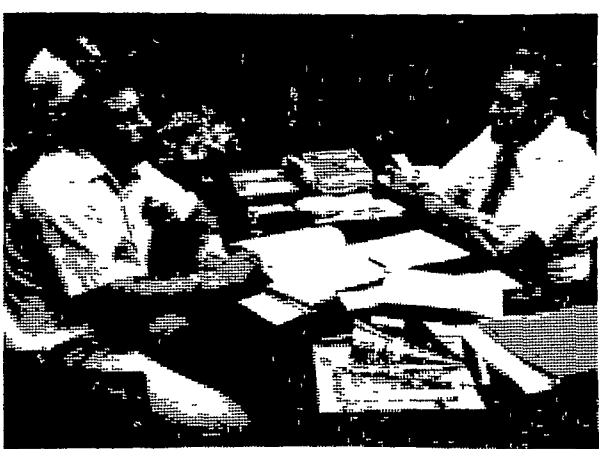
"Early 'die-down' is when a plant quits filling the kernels before it would normally mature," explains Dave Smith, plant pathologist. "Put simply, yield is reduced."

Yield reduction takes place in two ways, points out (Turn to Page B10)

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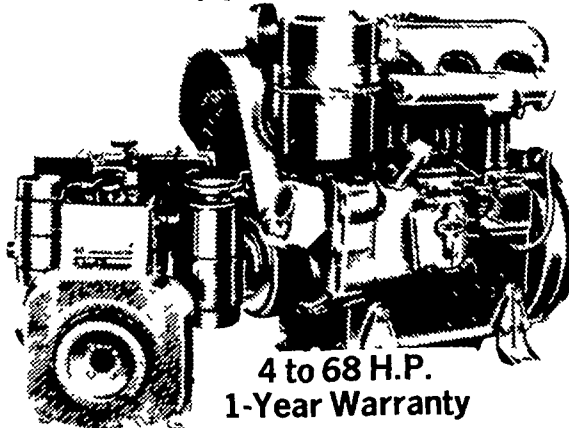
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