

Hybrids vs. drought

By JOSH FLINT

ASIDE from attending church regularly, there doesn't appear to be a whole lot farmers can do to prevent drought.

When it comes to pollination, the corn plant is structured for success. Steve Butzen, agronomy information manager for Pioneer Hi-Bred International, says each plant has tens of thousands of pollen grains for less than 1,000 silks (approximately 800). Yet despite the pollen-heavy ratio, drought can pull some sneaky maneuvers, resulting in only partial pollination.

"Seed companies are currently about four to five years away from coming out with a 'drought-tolerant trait,'" notes Butzen.

Even though a drought trait is not commercially available, researchers have made great progress over the years in developing drought-tolerant hybrids through traditional plant-breeding methods. Butzen explains that Pioneer ranks hybrids on a scale of one to nine for drought tolerance, with nine being the best.

"We discard anything that performs below a four during testing," he adds.

Defense from ground up

Despite the absence of a commercially available trait, some hybrids are better suited for tolerating drought conditions, according to Butzen. Typically, hybrids that produce a solid root system are more drought-tolerant.

Key Points

- Corn plant is naturally geared for a successful pollination.
- Various Bt traits will help the plant survive a drought.
- Silk balling can occur, but is rare.

He says there are three primary goals for a plant's root system:

■ **Proper structure.** "First of all, the roots should be well-structured," notes Butzen. "This means the roots should grow deep as soil moisture is depleted in dry conditions."

Don't be fooled by a large, wide root mass, he advises. This will keep the plant from

falling over, but does little to help it find water in a drought. As the water table recedes, the root system's ability to quickly grow deeper is very important.

■ **Rootworm resistance.** Farmers should also select hybrids with a Bt rootworm-resistance trait to keep the insects from feeding on the root system. If rootworms destroy the roots during a drought, the effects are magnified, Butzen says.

"When you have a corn rootworm hybrid, the yield difference really shows up in dry conditions," he adds. In conditions with plenty of water, the yield difference between hybrids with and without rootworm protection might be 5 to 10 bushels per acre.

"If you take the same hybrids and put them in a drought situation, the yield difference can be 40 to 50 bushels or more," Butzen explains.

The yield potential for rootworm-resistant hybrids is so much higher in drought conditions, Butzen says he would go so far as to classify resistance to rootworm as a drought-tolerant characteristic.

■ **Quick regrowth of damaged roots.** Last on the list of root characteristics is the plant's ability to overcome insect damage. "There are still insects that Bt traits cannot protect against, such as white grubs and corn nematodes," Butzen says. "In these situations, a plant's ability to quickly

regrow the damaged areas of the root system is important."

Aboveground visual traits are not always reliable indicators of a hybrid's drought tolerance, Butzen says. For example, leaf rolling is a plant defense against moisture loss. However, hybrids that show this trait before others might actually be less drought tolerant.

Since these types of visual traits are not foolproof, the best indicator of drought tolerance is grain yield under moisture stress, says Butzen. Therefore, researchers focus on this trait in drought testing and hybrid rating. The difference between a hybrid's yield potential in a well-watered environment vs. a drought environment is the

Soil moisture retention: a love-hate relationship

THE soil's moisture retention capacity: It is cursed during a wet spring, but praised during a hot, dry summer.

Robert McLeese, soil scientist with the USDA Natural Resources Conservation Service, says Illinois farmers have some of the best soil, particularly Drummer silty clay loam, which is also the state soil. According to McLeese, Drummer soils formed in loess, or wind-blown silt, over loamy glacial outwash.

In most Drummer fields, the loess is 40 to 60 inches thick. McLeese says this soil has a very high available

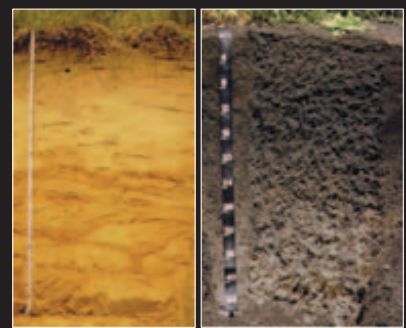
water capacity. "For nutrient- and water-holding capacity, it's one of the best out there," he says.

During the months of June and July, when a corn plant needs about ¼ inch of water per day, Drummer soil is set up to deliver, McLeese explains. "If we get decent rain in the spring, the water is held in the soil profile until it is needed by the crop later in the growing season," he notes.

Some unique soil-forming factors set central Illinois soil apart from others in the U.S.

"Most of the central part of the state's soils, which formed in loess under prairie vegeta-

RIGHT: About 65,000 acres of Bloomfield soil are scattered across Illinois. The majority is used for pasture or woodland.



FAR RIGHT: About 1.7 million acres of Drummer soil are mapped throughout northern and central Illinois.

tion, are relatively young on nearly level to undulating glacial landscapes," McLeese explains.

While not all Illinoisans are blessed with Drummer fields, most of the soils have a very high available water capacity. Yet McLeese adds some parts of the state have soils that were

formed in wind- and water-deposited sands. "A typical soil of these areas is Bloomfield sand. The Bloomfield soils have a low to very low available water capacity."

Farmers in areas with sandy soils often rely on irrigation during hot, dry summers.

Ready to pull the trigger?

By JOSH FLINT

SPRAYING an entire field with insecticide to zap a small number of active insects during pollination is often overkill.

Although spraying is ultimately a judgment call, Emerson Nafziger, University of Illinois Extension crop specialist, says there are a lot of factors to consider before treating a crop with insecticide. First, he explains why seeing a few insects may not be a big deal. "You can often see quite a bit of silk clipping without much effect on pollination," he says.

While rootworm beetles and Japanese beetles tend

Key Points

- Presence of insects doesn't always indicate a problem.
- Don't apply insecticides if you don't have a problem.
- Drought will magnify insect damage.

to work the silks in the afternoon, silks do the majority of their growing at night, Nafziger notes. "So even if beetles eat most of the exposed silks in the afternoon, silks will often grow back overnight and be ready to accept pollen the next morning. In some cases, silks will have received pollen before they're eaten off, which can also mean successful pollination."

Drought also plays a part in how tolerant the plant is to silk clipping. According to Mike Gray, University of Illinois Extension entomologist, if soil moisture is adequate, corn plants can tolerate a greater level of silk clipping.

Timing is everything

An insect population's timing can help a farmer determine whether or not to spray. Fertilization of the kernel on the cob usually occurs approximately 24 hours after the pollen grain makes contact with the silk.

"If you start to see silks being eaten off several days after they emerged, then you've probably had a successful pollination,

and the insects are just feeding on the silk material after it is no longer needed," Nafziger says.

Conversely, if insects show up immediately after the first silks begin to emerge, trouble may be brewing. More insects per plant mean higher potential for problem. If there is a small amount of scattered feeding, Nafziger recommends waiting before pulling the trigger on the insecticide.

"It takes a lot of insects to stay ahead of silk emergence," Nafziger says. "Plus, insect populations tend to move from field to field, so they could be gone after a day or two."

According to Gray, the economic threshold regarding silk clipping for western corn rootworm adults is five or more adults per plant. For Japanese beetles, economic damage may result from silk pruning when three or more Japanese beetle

adults are present per ear tip.

"In addition to these beetle numbers, you need to look for evidence of actual silk clipping," Gray explains. "I become concerned when you have these economic thresholds and less than ½ inch of silks protruding from ear tips, and plants are under moisture stress."

Silk clipping caused by Japanese beetles is often concentrated in border rows or end rows of fields, Gray adds.

"It's always a good idea to scout the inner portions of fields before making any treatment decision," Gray says. If silk clipping is concentrated along field edges, only these areas may require insecticide.

Dispersal of corn rootworm adults throughout a field is common. Late-planted fields are often the primary targets of concentrated silk clipping by this insect, Gray notes.