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Corn Segregation: A Necessary Evil in Today's Biotech Age?

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The recent approval by the US EPA (2003) of the new rootworm-resistant Bt corn technology raises again the important issue of corn segregation or identity-preservation for the purpose of minimizing uncertainty in the marketplace. This latest plant-incorporated protectant for corn, developed by Monsanto™, is referred to as the YieldGard® Rootworm trait and contains the "MON 863" transgenic event that results in the production of the Bt protein known as "Cry3Bb1".

Contrary to the earlier marketed Bt traits, this one targets the pesky corn rootworm insect rather than the European corn borer. There is no question that many Indiana corn growers have been waiting impatiently for this new transgenic trait and are eager to test out hybrids containing this trait. Supply of hybrid seed for the 2003 season is rather limited, but will increase markedly in coming years.

As with some other transgenic corn traits (e.g., Herculex® Bt, Roundup Ready®, most Bt/RR stacked hybrids), Indiana growers need to temper their enthusiasm with the recognition that the MON 863 trait has not received global approval in the marketplace, especially with the European Union (EU). Consequently, some grain buyers may not be willing to purchase grain of these transgenic hybrids or non-transgenic grain that contains detectable levels of transgenic contamination. It will be imperative for growers of the new Bt hybrids to identify buyers who will accept the grain at harvest time.

The intentions of major grain buyers regarding acceptance of grain from hybrids not yet approved by the EU is available on the Web (National Corn Growers Assoc, 2003). In addition, the American Seed Trade Association (2003) maintains a grain buyer database that helps growers identify "grain handling facilities that have indicated a willingness to purchase, receive, and handle genetically enhanced corn products that have full U.S. registration for food and feed use, but are not yet approved for import into the European Union."

As with the earlier Bt traits, production of corn hybrids with the MON 863 event will require planting a non-Bt corn hybrid as a refuge to minimize genetic selection pressure on the pest that may otherwise result in the development of pest resistance to the Bt protein (Monsanto, 2003). The refuge design is similar to that for Bt corn borer hybrids, but may change in the future. According to the US EPA, "A 20% non-Bt corn refuge is sufficient for a 3 year interim period while additional information is being gathered. The

non-Bt corn refuge should be planted as continuous blocks adjacent to the MON 863 fields, as perimeter strips, or as non-transgenic strips planted within the transgenic field. A 20% non-Bt corn refuge is necessary to produce an adequate number of CRW susceptible to the Cry3Bb1 protein. Considering the limited movement of CRW larvae, planting refuges close to transgenic fields in large blocks is preferred to narrow strips. If a 20% refuge is planted as row strips within a corn field, then the strips must consist of at least 6 to 12 consecutive rows."

This lengthy introduction finally leads to the important issue of grain segregation for the express purpose of keeping grain of non-transgenic hybrids (or transgenics with full market approval) segregated from grain of transgenics that may require delivery to specific buyers. The US EPA is requiring that Monsanto make available Cry3Bb1 strip tests to grain handlers by September 2003. These qualitative tests will be used by some buyers to detect the presence of the Bt protein in loads of grain that are purportedly not from MON 863 fields.

Successful segregation of transgenic and non-transgenic grain includes a number of factors. The most commonly talked about factor is the risk of pollen drift from transgenic corn fields to non-transgenic corn fields. Two recently published on-line newsletter articles address this issue (Gray, 2003; Thomison, 2003), so I won't spend much more time discussing it.

Simply recognize that while it is true that the overwhelming majority of a corn field's pollen load likely drops very close to the source field, experience also tells us that small amounts of pollen can travel a quarter mile or greater and still remain viable (Burris, 2002). Thus, prudence dictates that growers be aware of what is being grown in adjacent fields, monitor the calendar dates of pollination among those fields to determine the risk of cross-pollination, and take appropriate steps at harvest time if necessary to separately harvest and segregate grain along field edges within several hundred feet of a possible contaminant field (Nielsen & Maier, 2001).

Other factors important to successful grain segregation include planter hygiene, harvesting hygiene, transport hygiene, and grain handling hygiene (Maier & Nielsen, 2001). The key consideration here is to identify and eliminate all opportunities for seed or grain commingling between transgenic and non-transgenic hybrids throughout the entire production cycle.

Follow the principle of First-In-Field, First-Out-Field (FIF-FOF). This means that fields of non-transgenic varieties should be planted first to avoid transgenic seed commingling with non-transgenic seed in the nooks and crannies of the planter. Similarly, the non-transgenic fields should be harvested first in the fall before transgenic fields in order to avoid transgenic grain commingling with non-transgenic grain from the nooks and crannies of the combine. Obviously, the planter and combine should be thoroughly cleaned of remnant seed or grain from previous years prior to their first use this season. Following the FIF-FOF principle will facilitate proper hygiene of the transport, drying, and grain handling activities also.

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