

Understanding Bt MAIZE

Farmers who stack the benefits of YieldGard® which contains the Bt gene and Roundup Ready® technology will reap several benefits.

For crop farmers who want to achieve higher yields and improved grain quality insect and weed resistance management is critical.

They often use genetically modified stalk borer-resistant maize (YieldGard maize*) that contains the Bt gene. Bt stands for *Bacillus thuringiensis*, a good bacterium that is common in soil. However, farmers that plant Bt maize are required by law to manage possible insect resistance to the Bt gene.

According to regulations, a refuge crop should form part of the total planting in order to prevent the eventual build-up of a resistant insect population that will negate the use of Bt technology; it should thus theoretically prevent the creation of a superbug against which Bt resistance is ineffective.

Farmers have two options when it comes to planting a refuge crop.

THE 20% OPTION

A producer of stalk borer-resistant maize might choose to protect his/her entire planting by using insecticides (excluding those with Bt-containing substances) registered for the control of the maize borers *Busseola fusca* and *Chilo partellus*. Then at least 20% of the area planted to YieldGard maize must be planted with non-Bt maize.

For example, for every 80ha planted with YieldGard maize, also plant 20ha of

maize that does not contain the YieldGard gene. This maize can then be treated with the insecticides mentioned above.

Use a Roundup Ready® hybrid as refuge to enable you to apply a single weed-control programme on the entire field.

THE 5% OPTION

Producers of stalk borer-resistant maize could also choose to plant at least 5% of the area planted to YieldGard maize with non-Bt maize. For example, for every 95ha planted with YieldGard maize, plant 5ha of non-Bt maize without the YieldGard gene. This maize may then not be treated with any insecticide registered for the control of the maize borers *Busseola fusca* and *Chilo partellus*.

What are the advantages and disadvantages?

Both options have the disadvantage that planting a refuge crop is managerially challenging for the farmer, who has to change seed [in his planter], calculate the area, work out distances and keep a good record (GPS) of where he planted his refuge area.

The 20% option means that he has less Bt crop, so there's more chance of insect damage and also more to spray. On the

other hand, less Bt means his seed will cost him less because the conventional variety will not carry a technology fee.

The 5% option allows the farmer 95% Bt crop and thus very good protection, but there is a chance that the 5% will be completely destroyed

by insects, plants will lodge, give poor quality grain and when mixed with the other grain could easily lead to downgrading of the crop – in other words, reduced profitability.

Is it possible to quantify the damage stalk borers cause if a farmer doesn't plant Bt maize?

The literature says this could be a yield loss of 6 – 30%, depending on insect pressure. And there are also management issues. Infested maize tends to lodge. Then the farmer cannot harvest mechanically, and the grain has to be collected by hand.

What are volunteer maize plants and why should their occurrence be prevented?

A volunteer is a plant that just comes up, rather than being planted. In agricultural rotations, volunteer plants from the previous year's crop may become established as weeds in the current crop. Volunteer weeds reduce yield. Volunteer plants that do not carry the Bt gene could allow insects to feed, multiply and reach adulthood. And these insects could migrate to adjacent Bt plants.

Bt is only effective against young insects; adult worms can still cause serious damage to Bt maize crops. That's also why you cannot just blend 5% or 20% conventional seed with your Bt seed to create a refuge; the risk of migration is too high, so the refuge must be in a separate block.

Maize farmers are advised to consult a seed company representative for guidelines on optimal use of Bt technology.

(Source: Pannar) 

