

GLYPHOSATE-RESISTANT WEEDS OFFER NEW OPPORTUNITIES

By Jim Barrentine

Glyphosate-resistance has now been observed in several weed varieties in the USA and is not just going to go away. But the phenomenon may offer new opportunities for Cheminova.

It is important to stress that glyphosate is still of considerable value to farmers, and that demand for the product will remain high. However, it is also worth recalling that an important resistance management tool is alternating between several types of chemistry for combating weeds. Cheminova has just introduced two new formulations of the active ingredient fomesafen under the names of Dawn™ and Rhythm™.

THREE PRODUCTS IN THE TOOLBOX

These two products not only strengthen our product programme – when it comes to integrated resistance management, the new products underpin sales of glyphosate



Dr. Jim Barrentine, Technical Director, Cheminova Inc., USA

in that we can offer a better solution than glyphosate on its own.

Earlier, we also launched Tackle™, which is a mix of the herbicides imazethapyr and glyphosate. The product has a residual effect, i.e. it is effective for longer after spraying, which is also an important element in reducing glyphosate resistance.

The new herbicides are now central to Cheminova's sales of crop protection products for key crops such as soya and cotton.

We are still developing value-adding technologies for the market. We have many projects on the go – both for imminent launch and with a longer horizon.

WHAT EXACTLY IS GLYPHOSATE RESISTANCE?

Scientists in the USA define herbicide resistance as the inherited ability of a weed to survive and reproduce following exposure to a dose of herbicide normally lethal to the plant.

CHEMINOVA
HERBICIDES FOR CROPS

DAWN™
HERBICIDE

Because DAWN contains fomesafen, it is an excellent and economical alternative to Reflex® Herbicide!

DAWN™ Herbicide is a selective, preemergence cotton herbicide that effectively controls or suppresses key broadleaf weeds!

HERE'S WHY: DAWN is tough on Palmer amaranth!

CHEMINOVA
HERBICIDES FOR CROPS

RHYTHM™
HERBICIDE

Because RHYTHM contains fomesafen, it is an excellent and economical alternative to Flexstar® Herbicide!

RHYTHM™ Herbicide is a selective, postemergence soybean herbicide that effectively controls or suppresses more than 50 broadleaf weeds!

HERE'S WHY: RHYTHM is tough on broadleaf weeds, but gentle on soybeans, so you'll get dependable weed control with excellent crop selectivity. RHYTHM is flexible and fast-acting and can be tank-mixed with many other registered herbicides to control specific grass weeds plus additional broadleaf weeds.



Palmer amaranth in cotton.



Mare's-tail tolerates sixteen times the normal glyphosate dose.



Giant Ragweed.

Field tests with resistant weeds have shown that the plants can resist even high-dose spraying – up to 6 kg of glyphosate per hectare.

The herbicides cannot be said to cause resistance. What happens is that the herbicide, so to speak, selects the plants which already have inherited properties which make them less sensitive to the herbicide in question. These plants stand the greatest chance of surviving glyphosate spraying. For resistance to develop, there must be at least one plant with the right genetic make-up. Subsequently, any herbicide treatment will, of course, favour exactly this type of plant and its successors as they can survive and thrive after the treatment.

Generally speaking, approximately 20% of a weed population must be resistant before the farmer realises that he has a problem.

To begin with, plants which are resistant to herbicides will be present in extremely small numbers – perhaps one in a million or one in 100 million plants. The more there are, the faster resistance develops into a problem. The original prevalence of glyphosate-resistant plants was extremely low, so furthering evolution has taken a very long time and quite a lot of glyphosate.

DIFFERENT TYPES OF GLYPHOSATE RESISTANCE

Glyphosate works by attacking/blocking a particular enzyme in the plants which controls the formation of essential amino acids. This enzyme is, incidentally, not present in humans and mammals. The enzyme is thus glyphosate's target site in the plants.

The enzyme can be genetically modified so that it retains its properties and is not affected by glyphosate. This principle is fundamental to the Roundup-ready GMO crops. They can be sprayed with even very high doses of glyphosate without suffering any damage.

However, resistance in the weeds has been shown to rest on an entirely different principle, i.e. the plants' acquired ability to break down glyphosate before the herbicide can destroy the above enzyme. Such resistance is rarely complete, but can be overcome with a suitable treatment strategy. Consequently, the continued use of glyphosate makes a lot of sense, especially in combination with other products in the resistance management programme.

RESISTANT WEEDS

So far, only eight types of weeds have displayed resistance to glyphosate in the USA: Horseweed or mare's-tail are probably the most widely dispersed resistant weeds to date. However, resistance is spreading in Palmer amaranth, waterhemp, ragweed, ryegrass and Johnson grass.

While residual-effect herbicides are increasingly playing a role in controlling weeds, glyphosate remains one of the cornerstones of the programme. Farmers have, however, realised that the correct use of this product has a significant bearing on the way in which problems can be expected to develop in the longer term.

RATIONAL USE OF GLYPHOSATE

Even though reducing the frequency with which glyphosate is applied would probably be the most effective way of reducing resistance, this is not always a practicable solution for farmers. As an alternative, many farmers decide to focus on using the right dose, spraying at the right time, i.e. when the product is most effective, and choosing the optimum droplet size and spraying height above crops. Such technical measures are important for safeguarding the effectiveness of glyphosate in future.

This means that if glyphosate is used correctly and supplemented with the sensible use of other products with a different chemistry and working mechanisms, glyphosate may continue to play an important role for another fifteen years. The times when glyphosate could be used to control any weed are over, but the use of glyphosate-tolerant GMO crops is here to stay. And that is good news for Cheminova!



Giant Ragweed in a cornfield.