

Weed Control Options Begin with Selection of Herbicide Tolerant Soybean Traits

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The number of decisions a producer must make when thinking about the upcoming growing season are ever increasing. Before ever selecting a soybean variety, producers will first likely need to decide what herbicide trait package they want. The options of herbicide trait packages have dramatically increased over the last couple of years beyond Roundup Ready and Liberty Link, which both will likely become rarities as single traits amongst the growing multi-herbicide trait packages.

In this article we will describe the different herbicide trait packages available and our insights of where each trait may be best utilized taking into consideration weed species spectrum and surrounding crops. We will start with the traits offering single events and move into the multi-event traits and future traits with pending approvals.

STS Tolerance

STS tolerance has been available for several decades now and has found a niche market in Kentucky. There are two iterations of STS tolerance both of which offer tolerance to sulfonylurea herbicides and both events are non-GMO events. The STS event is often offered in combination with one of the other GMO herbicide traits listed below.

Fields Best Suited: The best niche in which STS tolerant soybean has been used in the state of Kentucky is for planting double-crop soybean following wheat crops that often receive sulfonylurea herbicide applications. Soybean varieties designated as STS tolerance may also be suited for fields where sulfonylurea herbicides are applied in-season such as products containing chlorimuron (eg. Canopy, Classic, Fierce XLT, etc.). Again this trait is often paired with the herbicide traits below and further variety selection should be based on the notes below.

Roundup Ready 2

All farmers are likely familiar with this herbicide resistant package containing only glyphosate-tolerance that has been a standard in many soybean varieties over the last decade. The introduction of additional herbicide traits and the rapid spread of glyphosate-resistant weeds now limits the utility of these soybean. Roundup Ready 2 soybean varieties will still be offered this coming year, but they are likely to be phased out in the future.

Fields Best Suited: It is likely that farmers selecting Roundup Ready 2 soybean varieties are selecting for other attributes beside the herbicide tolerance trait. These varieties are best suited for the few fields that do not yet have glyphosate-resistant weeds and have overall low weed pressure.

Fields Least Suited: Roundup Ready 2 varieties should not be used in fields with heavy weed pressure or that are infested with glyphosate-resistant weeds such as marehail, Palmer amaranth, or waterhemp. Fields that will be surrounded by soybean varieties that will be receiving dicamba applications are poorly suited for these varieties as off-target movement and injury is likely to occur to the Roundup Ready 2 soybean field.

Liberty Link

This is another herbicide resistant package that many Kentucky farmers are familiar with and have had success with over the past decade. The high prevalence of Palmer amaranth and spread of waterhemp in Kentucky, especially in the Purchase area, had led to a high adoption rate of Liberty Link soybean up until the recent release of Roundup Ready 2 Xtend soybean technology.

Fields Best Suited: Fields that are infested with glyphosate resistant marehail, Palmer amaranth, and waterhemp are great candidates for the Liberty Link technology. Fields that are in close proximity of specialty broadleaf crops and tobacco are also well suited, as glufosinate is a low volatility product that can be applied with minimal off-target movement risk to the neighboring crop. (Like all herbicides, glufosinate can move off-target via physical drift if applied incorrectly and when winds are blowing towards a sensitive crop).

Fields Least Suited: Fields that are heavily infested with grass species and certain broadleaves are not good candidates for Liberty Link soybean varieties as it is known that glufosinate has inconsistent control of grasses and smooth pigweed. Also, similar to the Roundup Ready 2 soybean avoid planting Liberty Link varieties in fields that will be surrounded by dicamba applications as dicamba injury is likely to occur to the Liberty Link soybean field.

LLGT27

The LLGT27 soybean has only been available to Kentucky farmers over the last two seasons; thus, their full potential has yet to be utilized. The LLGT27 varieties have resistance to glufosinate (eg. Liberty), glyphosate (eg. Durango), and contain an HPPD-inhibitor (Group 27) resistance event. These varieties have essentially only been available as a glufosinate and glyphosate resistant soybean as the HPPD herbicide, Alite 27, has yet to be registered by the EPA. There is hope of Alite 27 receiving EPA approval by the 2020 season and will be offered as a pre-emergence herbicide for use on LLGT27 soybean fields.

Fields Best Suited: The LLGT27 soybean varieties are best suited for those fields that contain both glyphosate-resistant marehail, Palmer amaranth, or waterhemp as well as heavy grass weed pressure. The option to apply both glyphosate to control grass species and glufosinate to control the glyphosate-resistant weeds is the strength of this trait package. Also, with the pending approval of Alite 27 this will give farmers the ability to place another herbicide Mode of Action group on those fields with heavy Palmer amaranth and waterhemp pressure.

Also, similar to the Liberty Link varieties these varieties are a great fit for fields with specialty broadleaf crops or tobacco in close proximity.

Fields Least Suited: A primary limitation of these soybean varieties (within the context of this article) is that they should not be placed in fields that are surrounded by fields that will be receiving dicamba applications as possible off-target movement and injury may occur to the LLGT27 soybean field.

Enlist E3

Enlist E3 varieties became more widely available in 2019 and offer resistance to glyphosate (eg. Durango), glufosinate (eg. Liberty), and 2,4-D (i.e. Enlist One and Enlist Duo). Numerous Kentucky growers planted these varieties on a limited basis last year and we expect acreages of these varieties to increase in the coming seasons.

Field Best Suited: Very similar to the LLGT27 soybean these varieties have a great fit on fields that are infested with glyphosate-resistant marehail, Palmer amaranth, or waterhemp as well as heavy infestations of grass species. These varieties are also well suited for fields that are in close proximity to sensitive broadleaf crops as producers will have the option to apply glufosinate postemergence using best judgement of weather conditions to reduce off-target movement potential.

Fields Least Suited: Enlist E3 soybean should be limited in fields that are in close proximity to tobacco, vineyards, or tomato plantings. These crop species are extremely sensitive to 2,4-D and applications of this active ingredient should be avoided to prevent any potential of off-target movement.

It should also be noted that Enlist E3 soybean are still sensitive to dicamba and caution should be used when planting in fields within close proximity of dicamba applications to avoid injury to the Enlist soybean field.

Can I apply Roundup PowerMax to Enlist E3 or LLGT27 soybean?

The short answer is that we (University of Kentucky) cannot currently recommend the application of Roundup PowerMax (or any other glyphosate not designated for use on “glyphosate tolerant crops”) to Enlist E3 or LLGT27 soybean varieties due to specific language on the EPA approved labels. The language on the Roundup label specifically indicates “Roundup Ready Crops” as allowable for applications of this product; whereas, the Enlist E3 and LLGT27 soybean do not contain the “Roundup Ready” event and thus do not qualify.

Okay I understand that is the standard extension weed scientist answer, but can LLGT27 and Enlist E3 soybean tolerate a Roundup PowerMax application?

Yes, the LLGT27 and Enlist E3 events can tolerate all glyphosate applications. This is really a legal and labeling issue rather than a biology issue. The EPA has indicated they are working to clarify the label languages to avoid this confusion and conflict. However, in the meantime the applicator takes responsibility for non-performance with weed control or any other issues relative to the application of a product like Roundup PowerMax to Enlist E3 or LLGT27 soybean.

So, then what glyphosate can UK recommend that I can apply to LLGT27 and Enlist E3 soybean?

You may have noticed the LLGT27 and Enlist E3 sections in this article we list “Durango” as the trade name product for glyphosate. This is because the Durango label language indicates it can be applied to “Glyphosate Tolerant Crops” rather than only “Roundup Ready Crops” which gives this product the flexibility to be applied to any glyphosate tolerance event. Therefore, within EPA labeling standards we can legally recommend this glyphosate product to be applied to either LLGT27 and Enlist E3 soybean as well as to Round-

Roundup Ready 2 Xtend

The Roundup Ready 2 Xtend trait has been available since 2017 and has rapidly become in recent years the most popular herbicide resistance package despite continual controversy surrounding its use since its introduction. It is no secret that this technology has caused a lot of division and controversy amongst the agriculture community due to the wide spread off-target movement of dicamba during postemergence applications to these soybean varieties. The Roundup Ready 2 Xtend trait package offers resistance to glyphosate (Roundup) and certain dicamba products (ie. Xtendimax, Engenia, FeXapan, and Tavium).

Fields Best Suited: The Roundup Ready 2 Xtend varieties are best suited for those fields with heavy infestations of marestail, Palmer amaranth, and waterhemp that are glyphosate-resistant. Fields that contain marestail and other heavy winter annual weed pressure will greatly benefit from the ability to apply dicamba as the burndown treatment and plant without any delayed timing restriction.

Fields Least Suited: Roundup Ready 2 Xtend varieties should be avoided in fields that are in close proximity to specialty broadleaf crops, grapes, tobacco, and sensitive soybean varieties. Tobacco and soybean are extremely sensitive to dicamba and thus dicamba applications within close proximity of these sensitive crops should be avoided to prevent any chance of off-target injury.

Also, use caution when planting Roundup Ready 2 Xtend varieties into fields with heavy grass pressure. Researchers in Tennessee has observed significantly reduced control of grassy weed species with glyphosate when tank mixed with dicamba due to suspected antagonism.

Roundup Ready 2 XtendFlex (Approval Still Pending)

The Roundup Ready 2 XtendFlex technology is the next generation of the Xtend portfolio and offers glyphosate (Roundup), dicamba (Xtendimax, Engenia, FeXapan, and Tavium), and glufosinate (Liberty) resistance. These soybean varieties are still waiting for approval from the European countries before they can be released for commercial use. The University of Kentucky Weed Science program has had the benefit of evaluating this soybean event the last two season and believe they offer a very versatile and flexible package to Kentucky farmers.

Fields Best suited: Similar to the Roundup Ready 2 Xtend varieties these soybean have a good fit on fields with heavy infestations of glyphosate-resistant marestail, Palmer amaranth, or waterhemp. In contrast though, the XtendFlex offers much more flexibility with the addition of glufosinate as a herbicide option for control of these weed species. The addition of glufosinate allows for these varieties to be planted in closer proximity of sensitive soybean and tobacco and still allow for a viable postemergence herbicide option (glufosinate) with reduced risk of off-target movement onto these sensitive crops.

The flexibility of these soybean varieties with three potential sites of action make them a good fit for many Kentucky fields, once they become available.

Fields Least Suited: The planting of Xtend Flex soybean in fields within close proximity of specialty crops or tobacco should still be done with caution. All herbicides have off-target movement potential and caution should always be used when applying any herbicide around tobacco or other specialty crops.