

# Virginia Soybean Update

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Dear Reader,

Last month, I expressed my concerns about the spread of Palmer amaranth. This month, I continue with that theme because unless we take quick action to delay herbicide resistance, real and permanent damage will be done to our cropping systems.

The good news is that, we have a storehouse of proven soybean herbicides that can help us delay, and possibly prevent resistance. Not all that long ago, we were controlling weeds with these products. Back then, weed control wasn't necessarily as easy or as effective. Nor were those herbicides cheap; \$30 to 35 per acre would have been a minimum cost. In many cases, for tough to control weeds, costs could exceed \$50 or \$60.

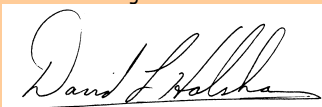
But the introduction of Roundup-Ready soybean varieties changed everything in the late 90's. Weed control improved and yields increased. Furthermore, the job became much easier. There was only one jug to pour in the tank, few if any tank-mixing requirements, a wider window of application, and less need for additives. That technology has to be one of the most influential changes in American agricultural history.

But today, as predicted, that technology is beginning to break down. Like always, weeds have adapted to a simple strategy.

It's now the eleventh hour for preserving one of our most effective weed control tactics. Herbicide costs will increase one way or another. Georgia and Carolina growers will attest to the truth of the old saying "an ounce of prevention is worth a pound of cure."

We must change or reap some very expensive consequences. Am I "crying wolf"? No! This is real. With \$10+ soybeans, not controlling weeds that can take our yields down to pre-Roundup Ready levels is more costly than ever.

Good weeding!



Extension Soybean Specialist

## Don't Rely Solely On Glyphosate for Soybean Weed Control

Worldwide, there are nearly 200 weed species that are resistant to one or more herbicides. Some once thought that weed resistance to glyphosate herbicide was unlikely because of its unique properties such as its mode of action, metabolism, chemical structure, and lack of residual activity in soil. However, with introduction of Roundup-Ready crops and our subsequent over-dependence on this herbicide in many crops, glyphosate resistant weeds are here. In Virginia, we have documented glyphosate-resistant horseweed (marestail) and lambsquarters. Just to our south in North Carolina is glyphosate-resistant Palmer amaranth.

Therefore, it is necessary to change our weed management strategies. We can no longer rely on the easiest, least expensive, or short-term (single-season) control strategies. Instead, we must take aggressive steps to delay the development of herbicide resistance and minimize the spread of resistant weed populations. Soybean weed management must quickly become a carefully planned and integrated control program that preserves herbicide and genetic technologies.

When planning weed control, look into the future and do not focus solely on herbicides and varieties. Multiple tactics are needed. They include: cleaning harvest and tillage equipment, integrating crop and herbicide rotation, diversifying in-season herbicides, closely monitoring fields, completely controlling resistant-prone weeds, and removing weed escapes before seed production.

Below are some general guidelines to prevent weed populations from developing herbicide resistance.

- Don't just develop a herbicide program to control this year's weeds. Instead, devise a long-term (3 to 5 year) weed management strategy that minimizes or eliminates weed seed production. Use cultural, biological, and

chemical controls. Integrate field history, scouting, and what's happening in neighboring farms, counties, and states when developing that strategy.

- Anticipate changes that may occur based on current practices; change those practices if necessary.
- Adjust the weed control program to reflect recent changes in cultural practices that may alter the weed spectrum and affect control tactics. For instance in no-till systems, grasses and small-seeded broadleaf weeds may become more predominant over time.
- Rotate crops. Different practices (planting date, tillage, quicker shading, herbicides, etc.) will disturb the niches that weeds tend to evolve into. If planting the same crop two years in a row, change herbicide strategies between the two years.
- Consider high-residue cover crops. Thick cover crops have shown to improve weed control. In a Georgia study, glyphosate-resistant Palmer amaranth control in cotton increased 40 to 50% with a high-residue cover crop.
- Manage small grain crops for maximum economic yield. High-yielding small grains result in more crop residue, which will help control weeds.
- Don't come to depend on a single herbicide or mechanism of action. Rotate modes of action from one year to the next and within the season if more than one herbicide application is needed.
- If using glyphosate-based weed control, introduce at least one more mechanism of action within the season. Rotate your cleaner fields to "conventional" (non-Roundup Ready) soybeans.
- Include residual herbicides with burndown, preemergent, or postemergent applications.

- Use the recommended herbicide rate and apply at the recommended timing. Don't let weeds exceed the size or leaf stage specified on the label or poor control may be the end result. It is better to spray small weeds twice rather than trying to time a single application that control a year's worth of weed flushes. Saving a trip over the field this year can increase the cost of weed control in the future.
- Some weeds germinate all year (Palmer amaranth, nightshade, etc). Tank mix with glyphosate a herbicide that will provide residual control of that weed. Just because a late-emerging weed may no longer compete and lower soybean yield doesn't mean it should not be controlled. A 4- to 6-inch weed lying below the canopy can still produce viable seed and some of those offspring could be resistant.
- Clean equipment when moving from an infested field, especially if that field is suspected to contain herbicide-resistant weeds.
- Scout regularly and monitor for weed escapes. If a weed comes through repeated herbicide applications, contact your County Extension Agent or Certified Crop Advisor.
- Don't let weed escapes produce seed. Hand remove. Bring the rope-wick applicator back out of the shed.

Remember, stewardship of our soybean herbicide and seed traits will result in long-lasting economical returns. It is a myth that strategies to prevent and delay herbicide resistance costs just as much as controlling the weed after it become resistant. Furthermore, while resistance to glyphosate is of greatest concern, we must also be good stewards of other herbicide families as well.

## **Integrate Herbicides with Different Mechanisms of Action to Delay Glyphosate Resistance**

Of the strategies listed above, integrating herbicides with different mechanism of actions will have the greatest benefit within the soybean growing season. This can be accomplished by including a soil residual herbicide with the burndown application, using soil-applied residual herbicides at planting, and tank-mixing postemergent herbicides with different mechanisms of action. The following are some suggestions that will help delay herbicide resistance in Roundup Ready® soybeans. Be sure to refer to the label regarding weeds controlled, application rate and timing, and other special instructions.

Start clean! Even if you've already burned down, consider paraquat to control any recently emerged weeds.

Preemergence. There are several very good preemergence soybean herbicides and the list is growing. Although there will be no new active ingredients, crop protection companies are bringing back several old and proven herbicides. These herbicides may not provide complete control, but will assist in resistance management and broaden the application window for glyphosate. Some examples by their mechanism of action are: seedling growth-inhibiting herbicides such as Prowl, Dual Magnum, Intro, Cinch, and Outlook for grasses and some small-seeded broadleaves; PPO-inhibiting (cell membrane-disrupting) herbicides such as Valor and Spartan for broadleaves; photosynthesis inhibiting herbicides such as Linex and Sencor for broadleaves; ALS-inhibiting herbicides such as Pursuit, Sceptor, FirstRate, Python, Synchrony XP for broadleaves.

There are several pre-mixtures of herbicides with different mechanisms of action on the market as well. These pre-mixes not only help prevent new resistant weeds, but also increase of number of weed species controlled. Some examples are: seedling growth-inhibiting and ALS-inhibiting herbicide combinations such as Squadron for grasses and broadleaves; seedling growth-inhibiting and PPO-inhibiting combos such as Prefix for grasses and broadleaves; photosynthesis- and ALS-inhibiting combos such as Canopy and Authority MTZ for broadleaves; ALS- and PPO-inhibiting premixes such as Valor XLT, Envive, Authority First, Authority Assist, and Sonic for broadleaves.

Postemergence. Tank-mixing a different mechanism-of-action herbicide with glyphosate is also good resistance management. The tank-mix partner can either enhance postemergence control and/or provide residual control. Residual control is especially important for weeds that germinate throughout the season. If targeting a specific weed, make sure the herbicide tank mixed with glyphosate controls that weed. Some examples are: residual herbicides such as Dual, Intro, or Sequence for preemergence control of grasses and some small-seeded broadleaf weeds; ALS-inhibiting herbicides such as Synchrony XP (use full rate only with STS soybeans or at ½ rate with glyphosate for non-STS soybeans), Classic, Harmony GT, FirstRate, Frontrow, Pursuit, Raptor, and Sceptor for broadleaves; Cell membrane-disrupting herbicides such as Aim, Reflex, Flexstar, Ultra Blazer, Cobra, and Storm for broadleaves. In addition, there are several pre-mixes of these herbicides with glyphosate such as Sequence (Dual + glyphosate) and Extreme (Pursuit + glyphosate).