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Preventing Off-target Herbicide Problems in Cotton Fields



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Introduction

Off-target movement of agricultural chemicals, including pasture and right-of-way herbicides, can be detrimental to cotton production. While these herbicides are valuable tools for weed management, off-target damage to cotton often results in expensive fines and/or lawsuits, delayed harvests, reduced yields, and bad publicity for the industry. Fortunately, preventive steps can be taken to avoid these problems.

Herbicide Selection

Although highly effective on several broadleaf weeds in pastures and rights-of-way, the auxin, or growth regulator herbicides, can damage sensitive crops if not used properly. The characteristics of these herbicides determine which product to use in different situations. Under the right conditions, volatile herbicides change from a liquid to gas or vapor and move away from the target. Typically, dicamba and 2,4-D are more volatile than aminopyralid or picloram. Keep in mind that while ester formulations are more likely to volatilize than amine (salt) formulations, some salts of 2,4-D and dicamba are more volatile than others.



Fig. 1. Off-target herbicide damage to cotton.

The persistence of herbicides is also important to consider when choosing a product. While dicamba and 2,4-D are highly active on cotton even in minute doses, these materials are relatively nonpersistent in soil and in treated pasture grasses and hay. However, aminopyralid and picloram can stay active in soil, pasture grass and hay for a year or longer. When these forages are consumed by animals, the chemical passes through their digestive and urinary systems without change and into the manure and urine. It takes several days for aminopyralid and picloram to pass through the digestive and urinary systems of an animal. Producers should handle treated hay and manure so that placement will not affect future production. **Herbicides that contain aminopyralid or picloram are for use in permanent grass pastures and grass hay fields only. They should not be used in fields that will be rotated to cotton or other broadleaf crops.**

Another characteristic to consider is water solubility. Picloram is more soluble than aminopyralid and therefore more likely to be moved off-site by runoff.

Newer pasture and right-of-way herbicides such as aminopyralid have strong attributes in that they control some of our worst pasture and hay field weeds such as horsenettle, tall ironweed and beggarweed. Also, volatility, unlike in the case of 2,4-D, is not an issue.

Drift Prevention

Because cotton is sometimes planted near pastures, hay fields and other row crops, the probability of herbicide drift is high unless preventive measures are taken. Several factors can contribute to herbicide drift to sensitive areas. Two types of drift, physical and vapor, can occur. Physical drift is the movement of liquid spray droplets away from the target, and it is influenced by spray equipment and wind. Calibrating your sprayer for low pressure (30 psi or less) and high volume (20 to 30 gallons per acre) applications will reduce the number of fine spray droplets. Lowering the boom height also reduces drift, but make sure that the correct spray pattern overlap is achieved. New advances in spray tip design, such as air induction technology and Turbo TeeJet Induction nozzles have allowed for adequate spray patterns while producing large droplets. In many cases, induction nozzles require higher operating pressures than flat fan nozzles, so be sure to check the nozzle specifications. Another rule of thumb is to spray on calm days and when wind direction is away from sensitive areas. Calm conditions are more likely to occur early or late in the day. Another common sense approach is to allow some buffer area that is not sprayed adjacent to sensitive crops. Drift reduction agents can also be used to reduce physical drift, but check the labels for compatibility.

Common auxin herbicides.

Common name	Chemical family	Trade names
aminopyralid	Pyridine-carboxylic acid	Milestone, ForeFront R&P, ForeFront HL, GrazonNext
picloram	Pyridine-carboxylic acid	Tordon, Surmount, Grazon P+D
2,4-D	Phenoxyacetic acid	Various names and mixtures
dicamba	Benzoic acid	Banvel, Clarity, Oracle, Rifle, Brash, Rangestar, Weedmaster



Fig. 2. Healthy cotton results from good planning when pasture herbicides are used nearby. (Photo by Bob Hayes)

Vapor drift is the movement of spray vapor away from the target after the herbicide has been deposited on the target. It is mainly influenced by air temperature but also by relative humidity (RH) and herbicide formulation. Some chemicals volatilize readily at warm (higher than 85 F) temperatures, and dry air (RH less than 40 percent) increases the likelihood of vapor drift. Cotton is especially sensitive to 2,4-D. If sensitive crops are nearby, use the amine formulation of 2,4-D rather than the low volatile ester formulation. Amine formulations are much less volatile than the low volatile ester formulation. During late spring to summer applications, warm temperatures are likely to be encountered at or shortly after spraying. Keep in mind that vapor drift will be worse under warm conditions, and that it can occur even a few days after application. Dicamba herbicides are also temperature sensitive (see table). Drift reduction measures such as low pressure, special nozzles, drift retardants, etc. do not reduce vapor drift.

Other considerations to bear in mind are proximity to sensitive fields and timing of herbicide application. Be familiar with adjoining properties and owners, so you know when they will be planting cotton, and in which field. If you are planting cotton, be sure that your neighbors know your plans. Try to spray at a time of year when sensitive crops are not growing. This is often difficult to accomplish, because the optimum time for weed control may occur when a sensitive crop is in the field. However, some weeds, such as musk thistle, may be treated after mid-October with 2,4-D. Winter annual weeds such as buttercup also can be sprayed with 2,4-D in early spring. These are good approaches for a field across the fence from your neighbor's cotton field, in that you could treat at a time of year when the crop is not up or has already reached maturity. A little communication with your neighbors can go a long way to reduce the likelihood of negative consequences.

Sprayer Contamination

A common way for pasture herbicides to make it into cotton fields is through sprayer contamination. Pasture herbicides are notoriously difficult to rinse from sprayers. Rinsing with water does not remove all herbicide residues from a sprayer and hoses. Residues are bound to porous materials such as rubber, plastic and polyethylene and can be dissolved later when another application is made. Common solvents used for cleaning sprayers include ammonia and various commercial cleaning agents. The longer a herbicide sits in the sprayer, the more difficult it will be to clean, so always try to end the day with a clean sprayer. Stainless steel tanks can be easily cleaned, but rubber hoses and fittings should be replaced to avoid contamination. Be sure to read the herbicide label for proper cleaning instructions. Due to the difficulty with which these herbicides are removed from a sprayer, dedicating a sprayer to be used only on pastures and hay fields is the best way to avoid herbicide tank contamination issues on cotton and other sensitive crops.



Fig. 3. Off-target herbicide damage to cotton can delay harvest and reduce yield. (Photo by Andy Rowsey)

Field Selection

The location, characteristics and history of a field influence future management strategies. A proper risk assessment should be performed before spraying a pasture with some of these herbicides. Rains can wash certain herbicides downhill to sensitive areas. Applications of picloram should not be made on sites with steep slopes and bare soils. It is also important to avoid situations where herbicide runoff can contaminate streams or reservoirs that may be used to irrigate cotton or other sensitive crops. Vegetated buffer strips around ponds can help to reduce herbicide surface movement. Hay feeding areas should not be rotated to cotton or other sensitive broadleaf crops. Also, treated bales should not be stored on land where cotton will be planted, as herbicides can leach into the ground and injure the next crop.

Monitoring Results

Producers are encouraged to assess the performance of herbicides in pastures and hay fields. It is important to keep a log of all applications with dates, products, field locations and weather conditions. (This practice is required by law for picloram, as it is a restricted use pesticide.) Adequate records will help producers keep herbicides contained within the target area, thereby reducing negative impacts to other farm operations and ensuring the availability of these important tools for the foreseeable future.

Important considerations for spraying near cotton fields:

- *Proximity of sensitive crops.*
- *Herbicide label instructions.*
- *Potential volatility of the herbicide you choose.*
- *Separate sprayer for pastures and hay fields.*
- *Current and forecast weather.*
- *Sprayer calibration and adjustment to minimize drift.*
- *Potential runoff into sensitive areas or irrigation waters.*
- *Inform your neighbors of your plans.*

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