Vinews
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Columbia, MO

Herbicide Drift: What to do?

When your vines experience herbicide drift be responsive and follow a reasonable response plan but don't forget about using the incident as means to implement a proactive prevention plan.

A couple of months ago at a meeting with Missouri Regional Horticulture Extension Specialists we talked about topics that were pertinent to the Missouri Grape and Wine Industries. The topic of herbicide drift resulted in the most discussion. From this discussion it became apparent that a coordinated plan was needed for responding to herbicide drift inquires. Below you will find information on how to respond and prevent herbicide drift in your vineyard.

Reasonable Response to Herbicide Drift

Action Steps

1. Document the damage using pictures and record the date the damage was first noticed. Also record the number of grape vines damaged, age of vines, and cultivars damaged. In addition document the phenology of when the damage occurred. For example, 3-inch shoots, 10-inch shoots, immediate pre-bloom, bloom etc.

2. Try to identify the potential source of herbicide drift and types of herbicide(s). Be neighborly and try to resolve the problem without accusations. Remember that there are many potential sources of herbicide drift, including custom pesticide applicators, home owners, lawn care professionals, golf course managers, highway crews, etc.

3. Contact the Missouri Department of Agriculture if you want to formalize a complaint. The Pesticide Incident Report (see link on page 2) should be filed within 30-days of when the damage was alleged to have occurred.

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Pesticide Enforcement/Pesticide Use Complaints
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Missouri Department of Agriculture Enforcement and Inspections

Fill out Pesticide Incident Report

4. Document the progression of the damage over time using pictures.

5. Document and record yield and continue to document damage the following season(s).

Auxiliary Step: For those that want to go the extra step and fully document what herbicide(s) may be causing the damage, the affected tissues can be screened for the presence of herbicides. Contact SGS Analytical Services for pricing and sample submission. If interested in this service be sure to collect a sample when symptoms first appear because over time the grape plant will metabolize the active ingredient into metabolites. I do not endorse this lab over any others.

Another Consideration. Also be aware that if a herbicide residue is found within a crop in which the product is not labelled that there is the potential that the crop may not be able to be harvested. For example, if 2,4-D resides are found within grape leaves that would be off label as 2,4-D is not labelled to be used in grapes. Even though the product was not applied but drifted onto the grape crop.

Proactive Prevention of Herbicide Drift

1. Site selection is your best tool to avoid herbicide drift. Select a vineyard site that is not in close proximity to row-crop agriculture, or other areas where phenoxy herbicides are used regularly such as golf courses, right-of-ways, and housing subdivisions.

2. Create awareness of your vineyard to neighbors and educate neighbors about the sensitivity of grape vines to phenoxy herbicides. Explain alternative practices that can reduce the potential of herbicide drift. For example, using 2,4-D amine instead of ester formulations of 2,4-D, applying phenoxy herbicides when the air temperature is below 80° F, using spray nozzles that increase droplet size such as air induction nozzles, applying pesticides when the wind is calm and the wind is not blowing towards the vineyard, and using appropriate sprayer boom height.

3. Consider planting buffer zones of trees to limit drift into your vineyard. If planting trees for a buzzer zone, do not plant trees that will limit cold air drainage. Also consider using distance if your vineyard site is adjacent to an area in which phenoxy herbicides are used.

4. Register your vineyard on the Drift Watch website. This creates more awareness for your vineyard and also allows pesticide applicators to know the exact location. Many commercial applicators use the Drift Watch site to identify sensitive crop areas and plan accordingly.

Herbicides Causing Grape Injury

Grapevines are sensitive to a number of herbicides. Many grape growers are familiar with the damage caused by 2,4-D. The herbicide 2,4-D is classified as a phenoxy herbicide. There are a number of herbicides that can cause similar symptomology as 2,4-D on grapes. All of these herbicides are classified as auxin growth regulators (Table 1). Some of these herbicides are used in agricultural row-crops to control broadleaf weeds. However be aware that 2,4-D, MCPA, and dicamba are also available in premixes to control many broadleaf weeds in lawns or turf. The picolinic acids and pyridines that includes products containing picloram, clopyralid or triclopyr are often used to control woody vegetation in ditches, fence lines, right-of-ways, and grass pastures. All the herbicides listed in Table 1 have the potential to volatize and lift off the intended target site after application.

Table 1. Common auxin growth regulator herbicides that can cause injury to grape vines.

Herbicide Class	Common name	Active ingredient	Trade name
Phenoxyacetic	2,4-D	Dimethylamine salt of 2,4 -dichlorophenoxyacetic acid	2,4-D
	MCPA	Dimethylamine salt of 2-methyl-4-chlorophenoxyacetic acid	MCPA
Benzoic Acids	dicamba	3,6-dichloro-2methoxybenzoic acid	Banvel, Clarity
Picilinic Acids (Pyridines)	picloram	4-amino-3,5,6-trichloropicolinic acid	Tordon, Grazon[1]
	clopyralid	3,6-dichloro-2-pyridinecarboxylic acid	Stinger, Transline
	triclopyr	2,5,6-trichloro-2-pyridinyloxyacetic acid	Crossbow[2], Garlon

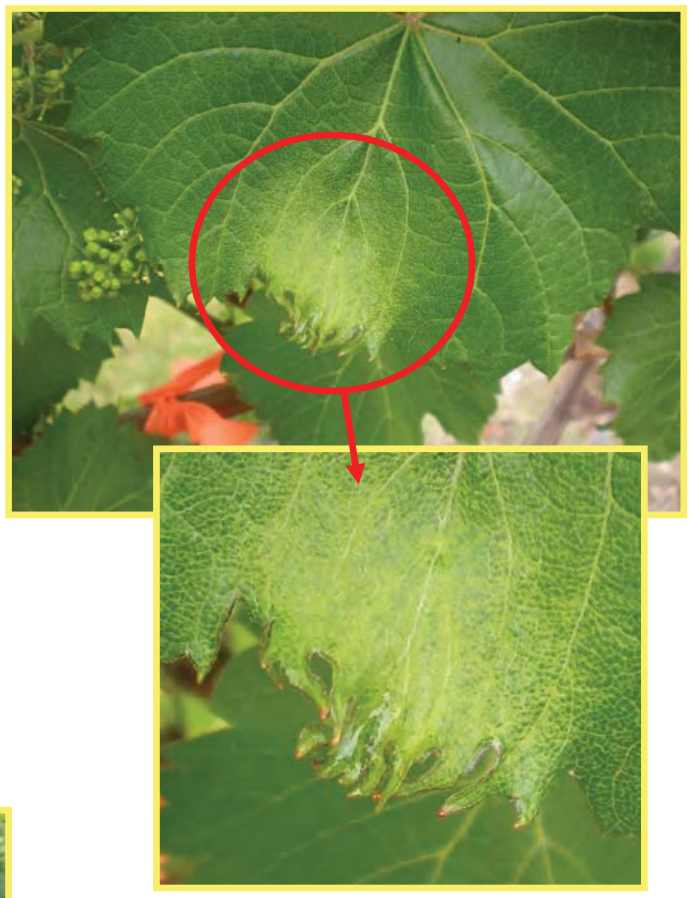
[1] Grazon is a premix and also contains 2,4-D.
[2]Crossbow is a premix and also contains 2,4-D as a butoxyethyl ester.

Although the growth regulator herbicides are often reported as causing injury to grapes there are also a number of other herbicides that can cause herbicide injury to grapevines. Glyphosate the active ingredient in a number of herbicides (Roundup Ultra, Weathermax, Touchdown etc.) can cause substantial damage to grapevines if it comes in contact with green tissue. As I mentioned in an earlier report this season, the Weathermax label specifically states to keep the spray mixture off green grape tissues such as leaves, shoots, suckers, and green trunks. Glyphosate is a systemic herbicide and is readily translocated to growing points in the roots and shoots causing cell death. A number of glyphosate containing products are used both in row-crop agriculture, right-of-ways, and by homeowners. Although glyphosate does not have the propensity to volatilize like the growth regulator herbicides, the spray mixture can move off-target if not applied in accordance with the label.

Not sure what herbicide may be causing the damage? Review this herbicide mode of action chart to narrow the possibilities.

Herbicide damage symptomology on grapes caused by growth regulator herbicides such as 2,4-D.

Fan shaped, chlorotic leaf and fingering of leaf margins are classic injury symptoms of growth regulator herbicides. Photo credit: D. Volenberg



Fingering of the leaf margin is the result of a growth regulator herbicide. Note, compare to normal leaf margin. Photo credit: D. Volenberg

Some growth regulator herbicides will cause the leaves to cup as well as cause fingering on the leaf margins. Photo credit: D. Volenberg

The grape vine pictured above was in a urban setting in which Weed-and-Feed had been applied to the lawn in the vineyard. The vines are showing all the classic symptoms of growth regulator herbicide injury that includes; chlorosis, fan shaped leaves, fingering of leaf margins, and flower abortion. Photo credit: D. Volenberg

A look at other herbicides and their symptomology on grapes.

The vineyard above received herbicide drift from a herbicide product containing the active ingredient glyphosate. The symptoms of glyphosate damage are stunted shoot growth, strapped leaves, chlorosis and the following spring the vines typically will break multiple buds as in the picture on the right.

The vineyard above received herbicide drift from two herbicide products; 2,4-D and mesiotrione. Mesiotrione is the active ingredient in Callisto herbicide. These herbicides are classified as “bleachers” and inhibit an enzyme involved in carotene synthesis. This results in chlorophyll not being protected from sunlight and the chlorophyll breaks down. In the picture on the right, chlorophyll has broken down and anthocyanin pigments are seen in the red coloration of the leaves.

Japanese Beetles Have Arrived!

The Regional Horticulture Extension Specialist from throughout the state reported on Wednesday June 17 that Japanese beetles have appeared in both traps and within crops. With the cloudy rainy conditions occurring and being forecasted damage from adult Japanese beetles will likely be minimal. Japanese beetle prefer to feed high in the grape canopy and often in direct sunlight. Research suggests that adult Japanese beetles have a shorter life span during drought years. Do wet rainy conditions prolong the adult stage of the beetles? An adult Japanese beetle lives for about 30 days. Anecdotal evidence suggests that during wet springs the soil moisture helps the larval stage of Japanese beetle complete its life cycle. Although the Japanese beetle have a single generation per year, the emergence of adults is very extended. Once the weather pattern returns to warm, dry conditions expect Japanese beetle emergence and feeding to increase. The forecast for the next 7 to 10 days are for drier weather patterns and so be ready to manage Japanese beetles.

Japanese beetles should be managed in young establishing vineyards (1 to 2 years old) that are not yet producing fruit. Defoliation of young vines can severely delay the vines going into fruit production in proceeding years. Management of Japanese beetles should first focus on controlling vines in young establishing vineyards. Fruit bearing vines can also be negatively impacted by Japanese beetles.

In grape bearing vineyards focus your control first on low vigor vines or cultivars that will be negatively impacted by Japanese beetle feeding more than high vigor vines or cultivars. Japanese beetle preference from most preferred to least preferred (*Vitis vinifera* >Hybrids >American types).

There are a number of insecticides available to control Japanese beetle (See page 22 of the 2015 Small Fruit and Grape Spray Guide). The carbamates include Sevin and Lannate. Organophosphates include Imidan. Pyrethroids include Danitol, Brigade, and Mustang Max. Sevin will provide approximately 7 days or more of protection whereas Lannate will only provide a few days of control. Imidan will provide 10 to 14 days of control. Some work out of Michigan State University has shown that the pyrethroids, will provide 7 to 14 days of activity and also can repel Japanese beetles from the vineyard.

Extended Rain Fall and Fungicides: How Protected Are The Vines?

Some past research that was done at Michigan State University in 2010 is still applicable to the current situation we are experiencing here in Missouri this June with extended rainfall.

Although large amounts of rain can remove protectant fungicides from grape tissues, the fungicide remaining has pretty good activity against the targeted fungal problems. However cover sprays consisting of protectant fungicides such as captan and mancozeb that are 7 days or older should be reapplied if 1 inch or more of rain has fell since application.
Photo credit: http://nowiknow.com/making-it-rain/

The MSU research evaluated one-day old fungicide residues against Phomopsis with varying rainfall amounts. They found that for Ziram 0.1 inch of rain removed 25% of the residues, 0.5 inch of rain removed 30% of the residues, one-inch of rain removed 65% of the residues, and 2 two-inches of rain removed 75% of the residues. Although rainfall removed a lot of the fungicides residues, fungicide activity remained pretty good and protected the vine. The research found that Captec only lost 50% of the residues after two-inches of rain. Systemic rainfast fungicides like Abound also lost some residues after rainfall events. This suggests that some active ingredient is not fully absorbed into the plant and remains on the outside tissue surfaces. Even though some residues of Abound were washed off, the activity of Abound was not reduced significantly.

From this research came the following suggestions. If two-inches of more of rain fell on a recently applied protectant fungicide then the protectant fungicide should be reapplied. If the protect fungicide cover spray is 7 days or older and 1 inch of rain has fallen the protectant fungicide should be reapplied.

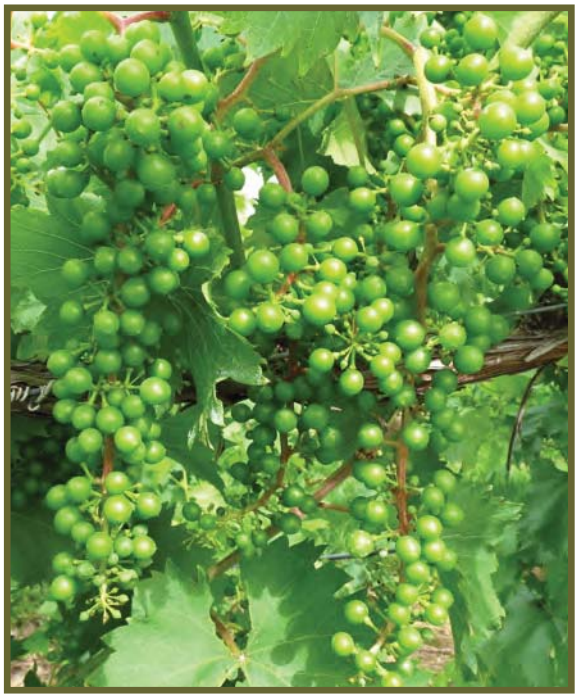
An applied fungicide needs time to dry before the next rainfall event. If a rainfall occurs and the fungicide has not dried then the fungicide will be washed off. Systemic fungicides can be rainfast after a few hours. However many systemic fungicides need time, up to 24 hours to be fully absorbed into the tissue.

In the end with the current rainy periods, the best compromise may be to apply a mixture of a systemic fungicide and protectant fungicide. The limitation currently is finding that window in which the fungicide can be applied and adequate time to dry and become absorbed into the tissue.

From the Mailbag: What growers are seeing in the vineyard.

Anthracnose is showing up in some vineyards. Typical symptomology are curled leaves with angular lesions that form from the leaf margin inward. On shoots and petioles roundish lesions will form and will coalesce as the disease progresses. On berries the lesion symptomology gives the Anthracnose disease its common name - “birds eye” disease. Photo credit: D. Volenberg, Concord seedless 6.18.2015 MO.

Phenology from Gasconade County



Chambourcin 4 to 6 foot shoots, June 15, 2015. Gasconade County

Vignoles 4 to 6 foot shoots and approaching bunch closure on June 15, 2015. Gasconade County

Cumulative Growing Degree Days for the Seven Grape Growing Regions of Missouri from April 1 to June 15, 2015.

Region	Location by County	Growing Degree Days[1]		
		2015	2014	30 Year Average
Augusta	St. Charles	1139	1072	1040
Hermann	Gasconade	1061	1002	999
Ozark Highland	Phelps	1182	1123	1083
Ozark Mountain	Lawrence	1130	1108	1061
Southeast	Ste. Genevieve	1175	1147	1122
Central	Boone	1062	983	1004
Western	Ray	1019	1021	982

[1]Growing degree days at base 50 from April 1 to June 15, 2015. Data compiled from Useful and Useable at https://mygeohub.org/groups/u2u/tools . Click on link below to determine growing degree days in your area.

To determine the number of growing degree days accumulated in your area since April 1, click this link Search for GDD at your location using this tool.

Please scout your vineyards on a regularly scheduled basis in an effort to manage problem pests. This report contains information on scouting reports from specific locations and may not reflect pest problems in your vineyard. If you would like more information on IPM in grapes, please contact Dean Volenberg at 573-882-0476 or volenbergd@missouri.edu

Grape Berry Moth (GBM) Update

Presently we have accumulated between 676 GDD (Gentry County), 745 (Boone County and 836 GDD (Cape Girardeau County) at a base temperature of 47 since May 15. May 15 was selected as the biofix date based on the blooming of wild grape. A total of 810 GDD at base 47 are needed to complete a generation of GBM according to MSU entomologist Rufus Isaacs. Egg laying of the second generation likely started in Cape Girardeau. I estimate egg laying will begin in Boone County on June 20th and Gentry County on June 23.

Many of you may be using a broad spectrum insecticide to control both Japanese beetles and GBM. If using a pyrethroid (Baythroid, Danitol, Capture, or Mustang Max) be sure to rotate to another chemical class of insecticide. Consider Sevin or Imidan which are in different chemical classes. Another good insecticide for GBM is Intrepid applied at the initiation of egg hatch.