



Herbicide Drift on Grapes; Suggestions for Successful Response and Management

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The Problem from NDA's Perspective

- Herbicides are definitely causing plant damage in vineyards and other sensitive sites. In fact, it is rare to NOT find some kind of herbicide residue on grape leaves when we investigate a complaint.
- The Nebraska Department of Agriculture has had limited success proving a single herbicide application caused any specific damage to grapes. Too often there are multiple nearby applications that confound the legal resolution of the complaint.
 - It is obvious something other than typical particle spray drift is going on. The incidents are complicated, and a lack of personnel, financial resources, technology, training, and cooperation among applicators and growers is part of the frustration we are all experiencing.

A Look at Some Sites From 2016

- Observations:
 - Nearly every single sample collected from grape vines was found with both 2,4-D and glyphosate residues.
 - NDA has had few cases showing a “drift gradient” from a nearby application that proves conclusively it was the source of the chemical.
 - Few, if any, cases appear to be due to temperature inversions, but the hypothesis of dust-borne residues is worth exploring.



Lab found 110 ppb Glyphosate; 45 ppb 2,4-D. There were four applications of this mix within one mile of the vineyard.



Lab found 580 ppb Glyphosate; 36 ppb 2,4-D. There were three applications of 2,4-D and two applications of glyphosate within .5 miles of the vineyard.



Lab found 220 ppb Glyphosate; 77 ppb 2,4-D. There were five applications of glyphosate and three applications of 2,4-D within 1 mile of the vineyard.



Lab found 62 ppb Glyphosate; 1.2 ppb Sulfentrazone; 500 ppb 2,4-D; 14 ppb Dicamba. One nearby application of the first three was found, but no application of dicamba could be found within 1 mile of the vineyard.

Process of Herbicide Drift Complaint Investigation

- Grower discovers possible herbicide injury symptoms on grape leaves
- Grower verifies symptoms are herbicide related (check for insects, diseases, weather, etc.) If herbicides are most likely cause, grower should call NDA as soon as feasible, not one or two weeks later.
- NDA takes basic information over the phone and assigns field inspector yet that day.
- Inspector visits vineyard, takes photos, plant samples, and statements. Then does the same with surrounding land owners.
 - The inspection is scheduled based on workload and weather.
 - NDA's Enforcement Response Policy requires on-site inspection within 5 working days of complaint being filed (2 days for human health incidents).

Elements of Investigation

- Inspectors are trained to collect evidence that provides a comprehensive assessment of the claim, as well as other possible violations of the Nebraska Pesticide Act.
 - Written and verbal statements
 - Photographs
 - Samples for lab analysis
 - Application records
 - Pesticide labels
 - Weather data
 - Eye witness accounts
- Some evidence **MUST** be collected **ONLY** by the NDA inspector due to rules of evidence:
 - Samples for analysis (except for clothing)

What Can Growers Do To Help NDA?

- Call NDA as soon as symptoms appear. The more time it takes for samples to be collected, the less of a chance we have of finding a true representation of chemical residue
- Consider leaf indexing (described later)
- Make and maintain good relationships with neighbors and commercial pesticide applicators
 - Don't stop with just adjoining land owners; consider those folks who live or farm for two or three miles in all directions.
- Take photos of plant development from March 1st to August 1st
 - It wouldn't hurt to do the same with surrounding native broadleaves
- Keep a diary of any observations, such as bud development and bud break, nearby farming/spraying activities, vineyard work (fertilizer, water, pesticides, pruning, etc.)
- DO NOT strip leaves or fruit off the plants until NDA has been able to inspect and collect samples

Grape Leaf Indexing

- Developed by Washington State University and the Washington State Department of Agriculture
- Relies on both grape growers to record specific things:
 - Bud development, bud break, leaf and vine development, and leaf marking
- Restricts certain pesticide use in-season, and places more responsibility on the applicators:
 - Mandatory records of all pesticide applications, submission of records upon request, observance of state-required restrictions
- WSDA will not investigate complaints by grape growers unless they participate honestly (there have been incidents of “leaf fudging”)
- Leaf Indexing takes time and attention, but can be very useful in determining when herbicide exposure/s occurred; this is then used in concert with lab results and application records to determine source of spray drift.
- The following slides are courtesy of WSU and WSDA

0 - No visible symptoms of phenoxy-like herbicide exposure. Margins and lobes are well defined. No apparent rugose texture. Leaf margin tips appear 'normal'



2 - Rugose features as well as disfigured margins. The leaf will be noticeably, but not significantly, smaller than leaves with a lesser rating.



1 - Possible rugose (bumpy) features on leaf surface. Possible slight shortening of lobes and sinus. The leaf will grow to normal or near normal size, but start to develop a leathery feel.



3 - Deformation of leaf margins. Has diminished or possible lack of sinus. Lobes may be blunt. Lighter leaf color. Leaf will be leathery and significantly smaller than those with a lesser rating.



4 - A Definite deformation of leaf margins and sinus. Noticeable vein clearing. The leaf will be very stunted in size, eventually becoming crisp or brittle.



5 - Grossly deformed leaf, severely dwarfed, with parallel and translucent veins. (sometimes called a “witch’s broom”).

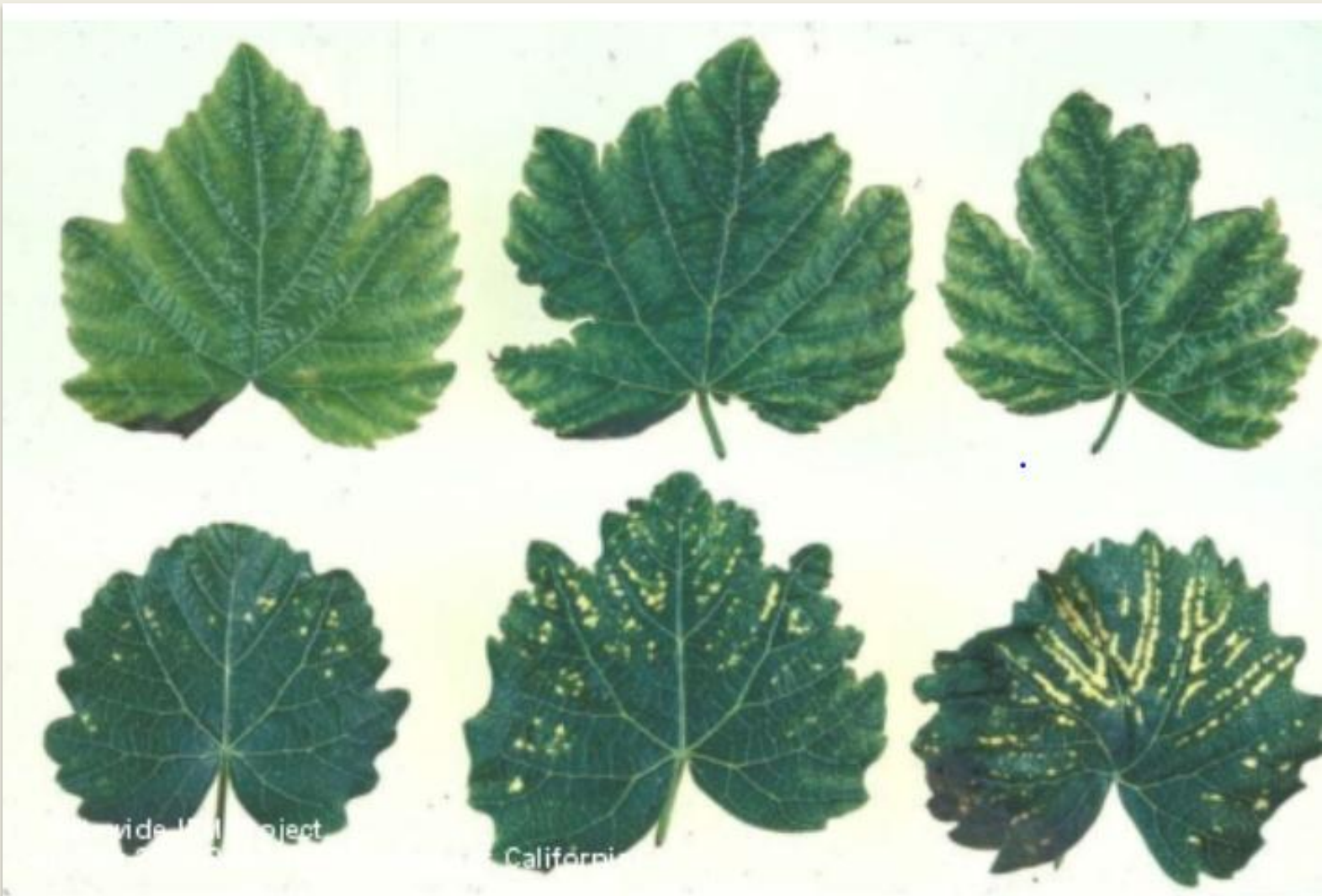


Other herbicides:
Dicamba causes pronounced “cupping”



Glyphosate:
Glyphosate also deforms leaves. Symptoms can be stunting of newly emerging shoots, narrowing of vein widths, but veins tend to be darker more than chlorotic (yellowing).





Plant: grape

Progression of glyphosate symptoms. Note the veins remain dark, the interveinal areas lighten up.

Credit: Univ. of California



Some final thoughts:

- NDA will be changing laboratories for 2017, and hopes test results will speed up and costs will come down.
- Soybean varieties tolerant to 2,4-D and dicamba will be planted in NE in 2017. The 2,4-D choline product (Enlist Duo) is currently registered, but it is uncertain if the dicamba product will be as well (Xtend), due to the large number of problems experienced in southern states in 2016.
- NDA's Pesticide Program may have two field inspectors retire in the next two or three years, creating more challenges in covering pesticide complaints in a timely basis. It typically takes two years to hire and fully train a new field inspector.