



***A Private Landowner's Experience with  
Non-target Herbicide Drift and Tree Mortality  
(Full Case Study Version)***

by: A concerned private landowner

***CASE STUDY OF TREE DAMAGE IN RANDOLPH  
& MONROE COUNTIES 2015-2019***

***VALUABLE DECIDUOUS TREES ARE DYING AT AN  
ABNORMAL RATE. ANALYSIS CONFIRMS ACTIVE  
INGREDIENTS IN HERBICIDES PRESENT IN SEVERELY  
DAMAGED FOLIAGE OF TREES.***

This is a summarized account of an Illinois Forestry Association Private Landowner's personal experience with wide-spread tree decline and mortality. This is offered to you as an informative piece. In no way does this article intend to place blame on any individuals or parties, but simply outlines the timeline and factors involved with the unusual deciduous tree decline and mortality documented on two rural properties in Randolph County in Illinois.

Beginning in 2015 and continuing into 2019, abnormal foliage damage was observed and documented on multiple tree species on rural properties in Randolph and Monroe counties in southwestern Illinois. Through sampling and analysis conducted by representatives from either the Illinois Department of Natural Resources (IDNR) or the Illinois Department of Agriculture (IDOA) the organic compound 2,4-Dichlorophenoxyacetic acid (hereafter referred to as 2,4-D) was confirmed to be present in multiple separate damaged foliage samples taken from trees at four different rural locations. In addition, some of the samples also tested positive for the compound dicamba.

In that same time period, it was observed that an abnormal number of valuable hardwood trees died prematurely on each of the four rural properties affected by off target herbicide drift.

In 2017, when we observed that the damage was not isolated to our counties, we began to discuss our findings with other individuals in an effort to urgently resolve this problem. Since then we have shared information with representatives of the Illinois Forestry Association, IDNR, IDOA, Illinois Farm Bureau, U of I Plant Sciences Department, EPA, IEPA, local farmers, local applicators, other affected land owners, loggers, chemical representatives, and individuals from universities in other states. With the help of these individuals we have been working to assemble the pieces to this complex and sensitive puzzle.

Our focus is to eliminate additional damage and loss of valuable trees by focusing on the problem-- not on blame. To date we have gathered significant data that should prove valuable in helping to

determine a solution. At this point we do not have all the answers nor do we claim to know everything. We thought it would be important to share this information with our fellow Illinois Forestry Association members and request your support and effort to help resolve this serious threat to our trees and forested lands.

### ***What We Observed:***

- Foliage damage observed and documented in these two counties as well as multiple counties throughout the state beginning in 2015 and continuing into 2019.
- Foliage damage observed occurring in the months May thru September.
- Foliage damage spanning multiple species of trees and shrubs.

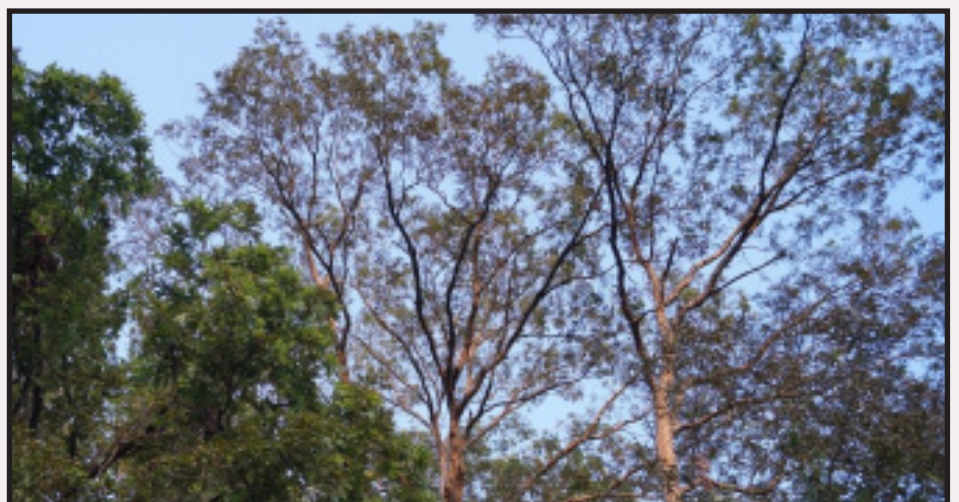


Figure 1: Thinning canopy of white oaks within property 2 (loss of foliage density)

- Severely damaged foliage is symptomatic of herbicide exposure (examples include but are not limited to: leaf cupping up, leaf cupping down, rolled leaves, twisted leaves, early leaf drop, discolored leaves, stunted leaf development, overall thin canopy).



Figure 2: Foliage damage to a white oak within property 2

- Increased mortality rate of trees in both the year of acute herbicide exposure as well as the years following exposure.
- Mast producing trees (walnut, oak, hickory & pecan) with severely disfigured foliage were unable to produce fruit. This was observed on three separate properties in 2017 and 2018.



Figure 3: Red oak foliage damage within property 2

## ***Sampling and Analysis Results:***

- Sampling and analysis (by representatives of IDOA and IDNR) confirmed the presence of the compound 2,4-D in each of twelve foliage samples taken from 4 rural properties (four in 2017, four in 2018 and four in 2019). Of those samples four also tested positive for dicamba (one in 2018, and three in 2019).

## ***IDOA Pesticide Incident Investigations:***

- In three Pesticide Incident Cases (two in 2018 and one in 2019), IDOA investigations indicated that a low volatility formulation of 2,4-D ester was the suspected source chemical for the off-target foliage damage observed and documented on two rural properties in Randolph county.
  - o In one 2018 case the source of the off-target damage was suspected to be from a “burndown” which occurred on 4/30/18 on property approximately ½ mile south/ southwest of damaged property. This property is referenced as Property 1 in the accompanying photos.

**Burndown definition - pre-planting weed control in agricultural fields.**



Figure 4: Foliage damage observed on a hickory within property 1, symptomatic of herbicide exposure.

- o In another 2018 case the source of the off-target damage was suspected to be from a “burndown” for soybeans which occurred on 5/14/18 on property adjacent to the damaged property along the south west property line. This property is referenced as Property 2 in the accompanying photos.
- o In the 2019 case, the source of the off-target damage was suspected to be from an application by the county highway department prior to 5/27/19 on a roadside easement adjacent to the damaged property. This property is referenced as Property 2 in the accompanying photos.



Figure 5: Hickory foliage damage within property 2

## **Tree Mortality Data**

**(from two of the four properties in Randolph County subject to documented off-target 2,4-D damage):**

- Property 1 - 33 Acre Parcel with approximately 12 wooded acres.
  - o 22 Documented tree deaths (2016-1, 2017-5, 2018-5, 2019-11) (Species included white oak, red oak, elm & ash)
  - o Estimated average age of trees - 101 years. Estimated cumulative years of growth - 2223 years.
  - o Observation and IDOA/IDNR sampling results indicated 2,4-D chemical present in foliage of trees in September 2017 and May 2018. Damage symptomatic of 2,4-D not observed in Spring of 2019
  
- Property 2 – 73 Acre Parcel with approximately 54 wooded acres.
  - o 29 Documented tree deaths (2017-7, 2018-10, 2019-12) (Species included white oak, red oak & hickory)
  - o Estimated average age of trees - 106 years. Estimated cumulative years of growth - 3086 years.
  - o Observation and IDOA sampling results indicated 2,4-D chemical present in foliage of trees in September 2017, May 2018 and May 2019.

## **What We Suspect:**

- **2,4-D exposure is a significant contributing factor to the death of the majority of the trees documented on the two properties.**
  - o Trees need photosynthesis to produce energy.
  - o Damaged and disfigured foliage disrupts photosynthesis.
  - o Severely compromised photosynthesis alone or in combination with any of the many potential other casual factors; disease, insects or chemical toxicity are likely contributing to the premature death of the trees.
  - o Severe foliage damage resulted in acute death as observed in 2017 and 2018 on the two properties documented.
  - o The trees documented on Property 1 received off target 2,4-D damage in 2016, 2017, 2018. The cumulative affect appears to be a contributing factor to the high mortality.

**• The timing of herbicide exposure relative to leaf development appears to be critical to the extent of foliage damage caused by the herbicide.**

- o In our region we have observed that tree leaf development occurs approximately between April 1 – May 15 (+/- 2 weeks depending on the species of the tree and timing of spring warm up.)
- o Through observation it appears that most hardwood deciduous trees typically bud out later than softwood deciduous trees. Also observed is that red oak, white oak and pecan trees appear to be some of the latest trees to develop leaves.
- o Observed and documented that the damage to the foliage on the Property 1 trees in 2018 was more severe than the damage on the Property 2 trees.
- o As noted in the IDOA report, the suspected source of the off-target damage to the Property 1 trees resulted from an application that occurred on 4/30/18. It was noted by observation and documented in photos, that at the time of application, the red oak and white oak trees were in the early stage of leaf development.

o As noted in another IDOA report, the suspected source of off-target damage to the Property 2 trees resulted from an application that occurred on 5/13/18. Also noted by observation and documented in photos, that at the time of application, the red oak and white oak trees were in the late stage of leaf development.

o It appears that in both cases the foliage development was stunted once exposure to the herbicide occurred resulting in significantly smaller leaves and thinner foliage on the Property 1 trees.

**• The off-target risk of volatility and damage from products containing 2,4-D and dicamba are well documented, but those risks may not be generally known or well understood by agricultural producers.**

o The risk of volatilization and drift for many days after application under certain atmospheric conditions (beyond control or prediction) does not seem to be common knowledge.

o The data sheets for some of these chemicals have vague and/or non-definitive recommendations for minimizing off target damage during application.

o It appears that many farmers/applicators are not aware of the volatilization risk and damage to trees caused by the ester formulations of 2,4-D, including the low volatility formulations.

### **A Few Questions For Consideration:**

**• Is the information provided in the data sheets of herbicides at risk of off-target damage (due to volatilization and drift under certain atmospheric conditions) effective in educating and informing applicators how to safely utilize the product to eliminate risk and damage? Can the instructions be improved upon to effectively eliminate risk?**

**• Are there safe, effective and economical alternatives to herbicides at risk of off-target damage?**

o In correspondence with an agronomist and other successful farmers in the area, we learned: Applicators have options as to which formulation of 2,4-D they choose to employ. These include amine (low volatility potential), ester (greater volatility potential), and choline (near zero volatility potential).

o Besides 2,4-D and dicamba, there are effective and economical alternative options for burndown applications that provide no volatility risk. These include chemistries like metribuzin, simazine, paraquat, and glyphosate.

o Several successful farmers in the area avoid herbicides prone to volatilizing and drifting because they are concerned about the risk and expense of damaging their neighbor's property or crops. They do not feel they are at an economic disadvantage by using alternative chemicals.

**• Would education and awareness regarding herbicides at risk of off-target damage help mitigate additional damage to trees?**

o By sharing the information that we obtained in 2018 with the responsible party, and their willingness to not utilize the suspect herbicide, we were able to eliminate repeated 2,4-D damage to Property 1 in 2019.

**• Could the current agencies responsible for training and licensing applicators take the lead in educating trainees about herbicides at risk of off-target damage and make a point to focus on alternatives which would minimize both the applicator's liability and risk of damage to trees?**

***• If other herbicide products exist that are safe, effective, efficient and are less risk to our environment, should the products at risk of off-target damage be restricted from use near areas of sensitive property (communities and timber land)? Is this something that could be included and effectively managed by the Driftwatch / Fieldwatch program?***

***• Does the State of Illinois have an effective formal process by which private property owners can efficiently report and document property damage to trees when there is suspicion of off-target herbicide damage?***

o The IDOA incident reporting program appears to be tailored toward crop on crop damage and may not accurately reflect the property damage occurring to trees.

o In an IDOA Pesticide Incident Case in 2019 at a location where damage symptomatic of herbicide was observed, samples were not taken for analysis due to the fact that even if the sample tested positive for a herbicide, a clear determination of the source of the chemical could not be determined. Subsequent sampling and testing by an IDNR representative 5 days later confirmed the presence of both dicamba and 2,4-D on three independent samples obtained from the property.

Thank you for taking the time to review this article. Any feedback that you can provide to resolve this problem is welcome and appreciated.

***Supporting Photos on Next Page-***

# Supporting Photos



Example of foliage damage to white oak tree on Property 2. Taken on 9/1/17.



Example of foliage damage to red oak tree on Property 2. Taken on 9/1/17.



Example of foliage damage to pignut hickory tree on Property 2. Taken on 9/1/17.



Example of thin canopy on white oak trees on Property 2. Taken on 9/1/17.



Example of damaged foliage on red oak tree from Property 2 sampled for analysis by IDOA Representative on 9/1/17.



Example of off target foliage damage on white oak tree on Property 1 from application on 4/30/18. Taken 5/13/18.



Same white oak tree represented in Photo 6 with purpose to show overall effect of stunted foliage. Taken 5/13/18.



Example of healthy foliage on white oak tree on Property 2. Taken 5/13/18.



Example of healthy foliage on red oak tree on Property 2. Taken 5/13/18.



Example of healthy foliage on chinkapin oak tree on Property 2. Taken 5/13/18.



Example of healthy foliage on sugar maple tree on Property 2. Taken on 5/13/18.



Example of damaged foliage on dogwood tree on Property 2. Taken on 5/20/18



Example of damaged foliage on walnut tree on Property 2. Taken 5/20/18.



Example of foliage damage to chinkapin oak on Property 2. Taken 5/25/18.



Example of healthy foliage on red oak tree on Property 1. Taken 5/14/19.



Example of healthy foliage on white oak tree on Property 1. Taken 5/14/19.



Example of healthy foliage on hickory tree on Property 1. Taken 5/14/19.

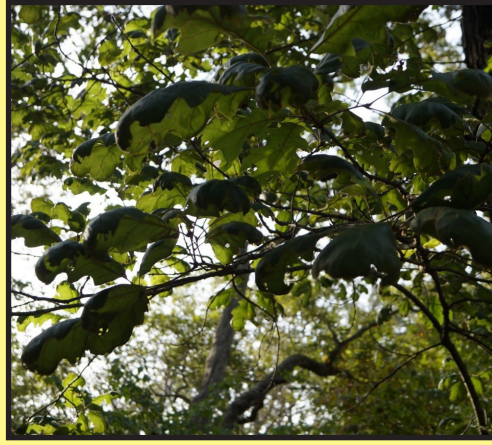


Example of foliage damage on white oak tree on Property 2. Taken 5/27/19.





Example of foliage damage to walnut tree on Property 2. Taken on 5/27/19.



Example of foliage damage on property which tested positive for both 2,4-D and dicamba. Samples taken 6/26/19. Photo taken on 9/26/19.



Example of foliage damage on hickory tree on Property 2 symptomatic of herbicide. Taken on 9/2/19.



Example of foliage damage on dogwood tree on Property 2 symptomatic of herbicide. Taken on 9/2/19.



Example of foliage damage on dogwood tree on Property 1 symptomatic of herbicide. Taken 9/26/19.