NORTHERN GRAPES PROJECT

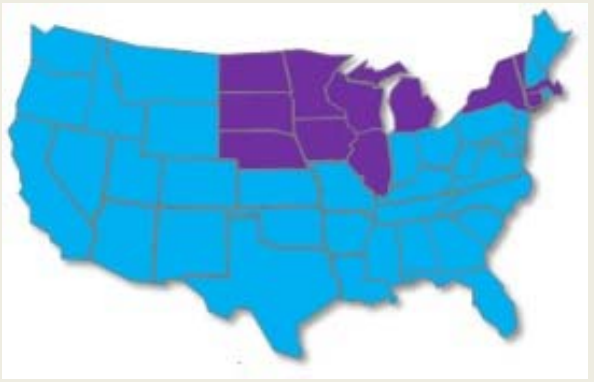
Viticulture, enology and marketing for cold-hardy grapes

Pesticide Drift Seminar

November 3, 2012

Nebraska Wine-Inspired Journey — Vintage Nebraska — Encounter the Unexpected

Nebraska Winery & Grape Growers Association



The view from New York: Diagnosis, Economics, Management Of Grape Injury from2,4-D and other Growth Regulator Herbicides

USDA NIFA

The Northern Grapes Project is funded by the USDA's Specialty Crops Research Initiative Program of the National Institute for Food and Agriculture, Project #2011-51181-30850

Nebraska Herbicide Injury

Photos by Cathy Oslzly and Tom Zumpfe

Outline

- Tom Zumpfe's Charge:
  - How to identify herbicide drift
  - How to take care of affected plants
  - How to document your loss
  - Who to call when your vineyard is 'hit'
- Tim Martinson's 'take':
  - Prevention is the best strategy
  - Management afterwards: ' It is what it is' Adjusting to smaller vines.

New York Grape Production

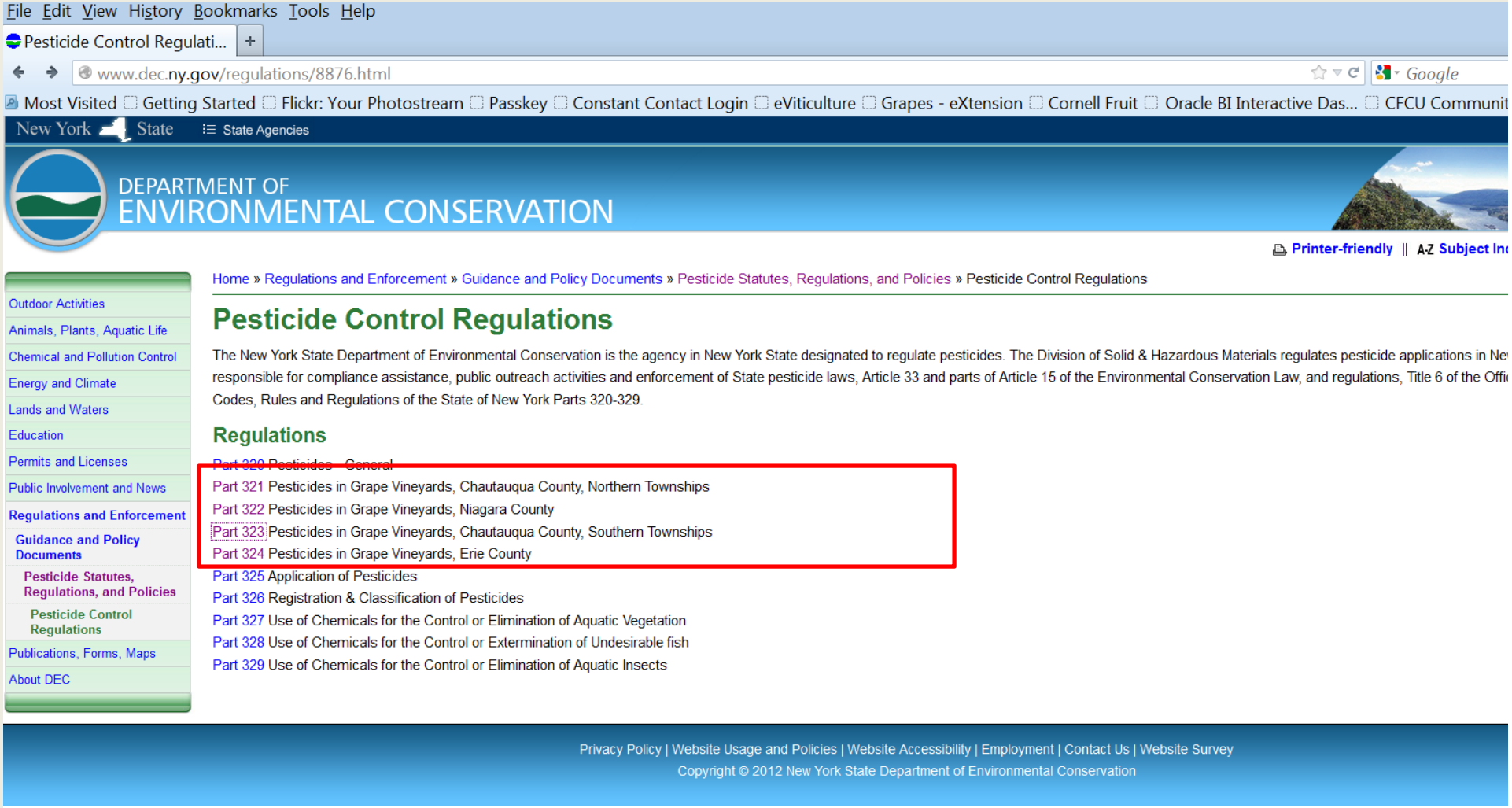
Topics

- New York history and regulations
- List of potential products
- Diagnosing injury
- 2,4-D formulations and risk
- Impact on vines
- Economics

New York Pesticide Regulations

2,4-D Esters in Grape Counties

1972 Pesticide Law



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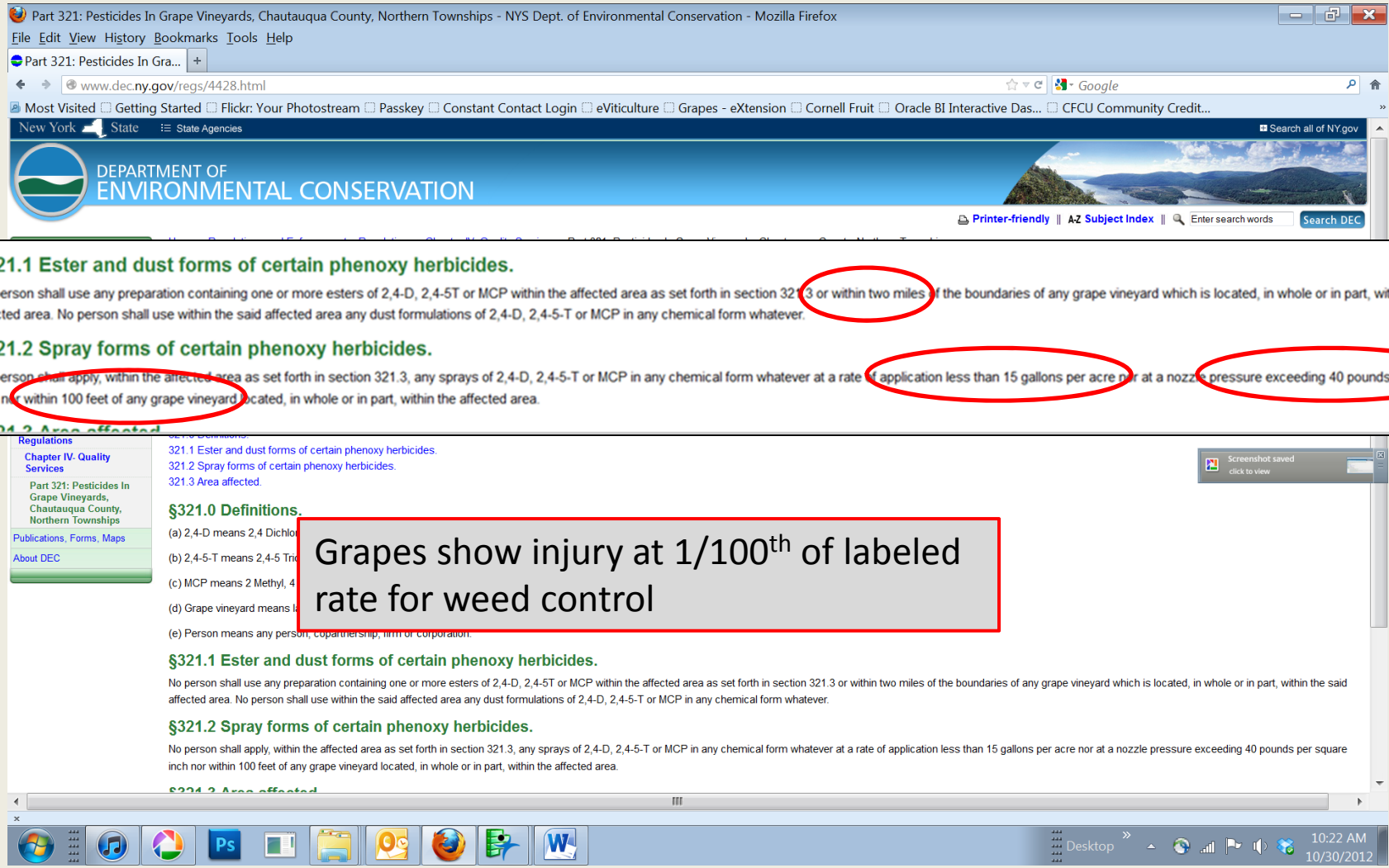
2,4-D Esters in Grape Counties



Click to show one page at a time

Table 1. Herbicides that have potential to injure grapes.

Growth regulators				ALS inhibitors		
2,4-D	**Dicamba**	**Others**	**Glyphosate**	**Sulfonylurea**	**Imidazolinone**	**Others**
Amine 4	Banvel	Bronate*	Roundup	Ally	Arsenal	Gramoxone
Barrage	Clarity	Crossbow*	Rodeo	Ally Extra	Assert	Aim
Esteron 99	Rave*	Curtail*	Roundup Ultra	Amber	Beyond	Boa
Formula 40		Landmaster*	Roundup	Canvas	Pursuit	
Hi Dep		MCPA	UltraMax	Cimarron	Raptor	
LV-4		RT Master	Roundup	Express	Plateau	
LV-6		Starane	WeatherMax	Finesse		
Saber		Tordon	Landmaster*	Glean		
Salvo		Turflon	Glyphos	Harmony Extra		
Savage		Trimec	Glypro	Harmony GT		
Tricep			RT Master	Oust		
Weedar 64		Garlon	Touchdown	Peak		
Weed-B-Gon				Rave*		
Weedmaster						
Weedone						

Pyradine + 2,4 D

Pyradines

This list is not all-inclusive; other herbicides also may injure grapes.

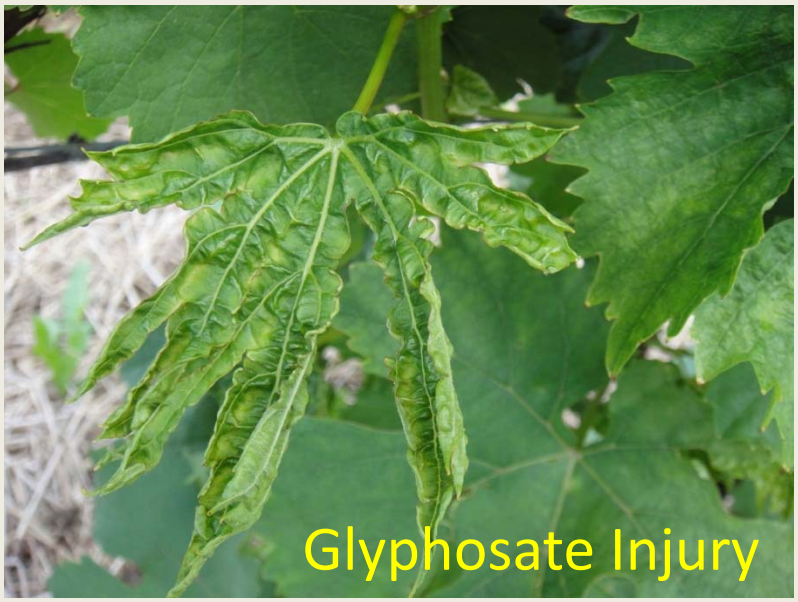
**A prepackage mixture containing a growth-regulator herbicide as at least one active ingredient.*

Source: Ball, D., R. Parker, J. Corquhoun & I. Dami. 2004. *Preventing Herbicide Drift and Injury to Grapes.* Oregon State University Cooperative Extension Service, Bull #EM8860, Corvallis.

2,4-D Injury

Baco Noir, Western NY

Photos courtesy Tim Weigle, NY State IPM Program



Photos courtesy Bruce Bordelon, Purdue University

Roundup (glyphosate) Injury

- Carryover from Aug application
- Glyphosate ‘safe’ until close to bloom
- Most symptoms appear following year and are milder than this.
- Glyphosate does not move through bark or periderm.

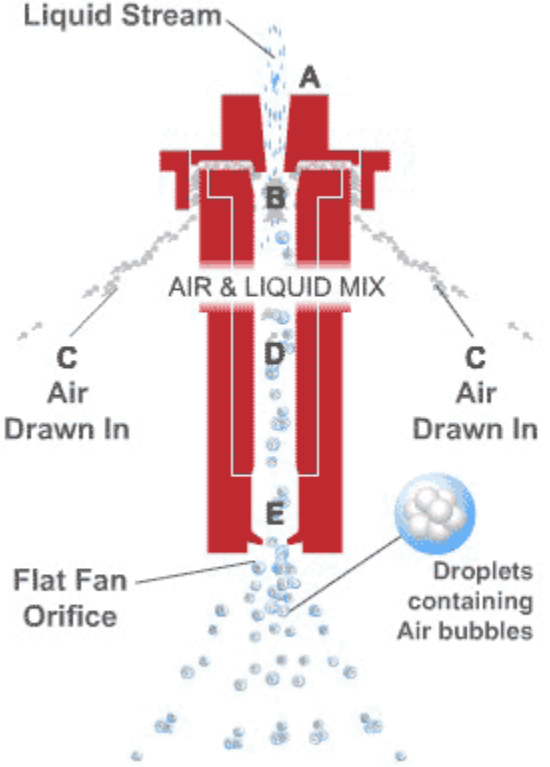

Roundup Injury

Roundup Injury

Don’t apply Roundup in August!

Spring Glyphosate Applications

Reducing Herbicide Drift in Your Vineyard



Dicamba spray – 24 h post-treatment

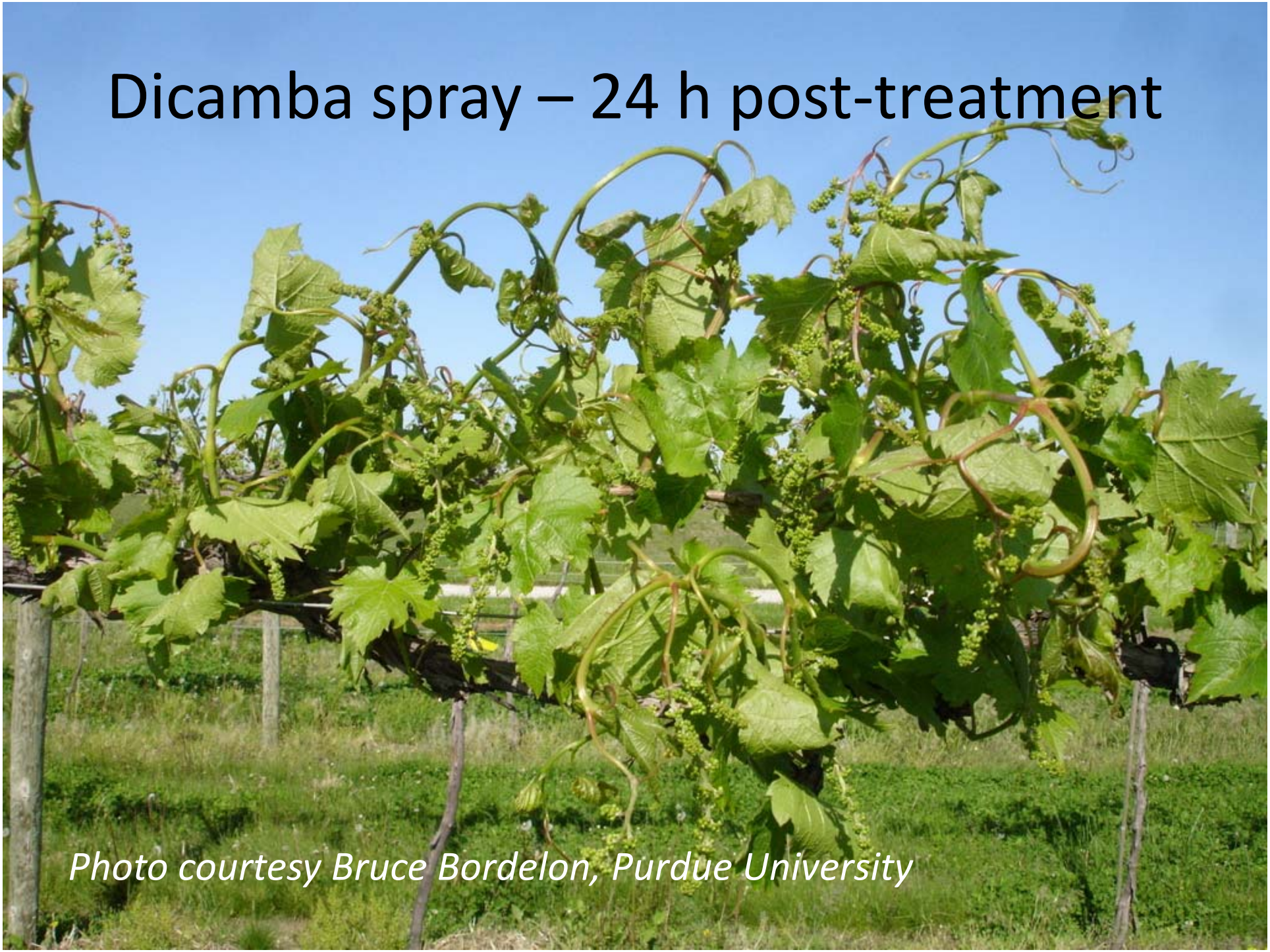


Photo courtesy Bruce Bordelon, Purdue University

Dicamba – Unsprayed vs Sprayed

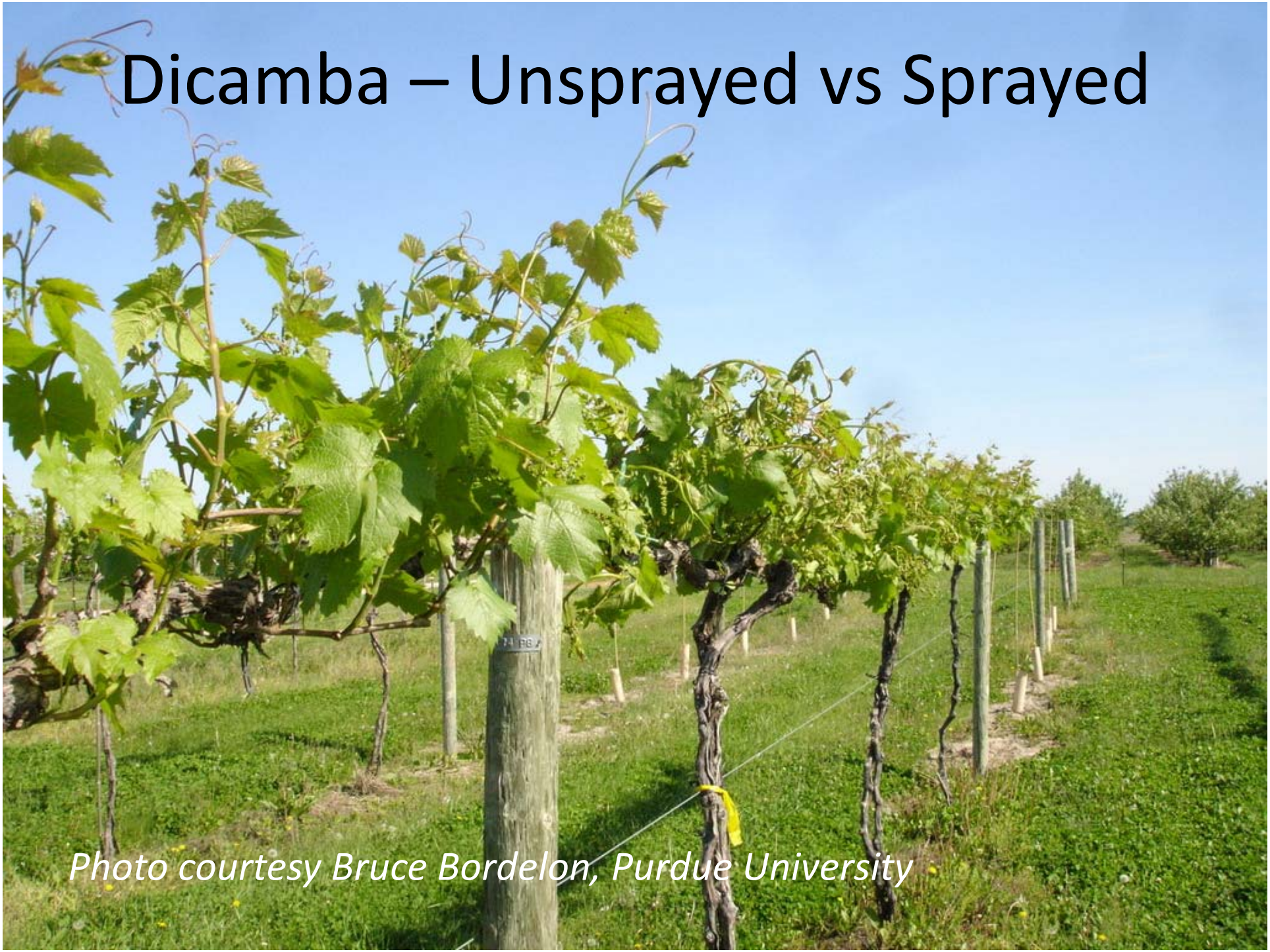


Photo courtesy Bruce Bordelon, Purdue University

Dicamba – Fruit Set

Photo courtesy Bruce Bordelon, Purdue University

Economic Impact

Photos courtesy Bruce Bordelon, Purdue University

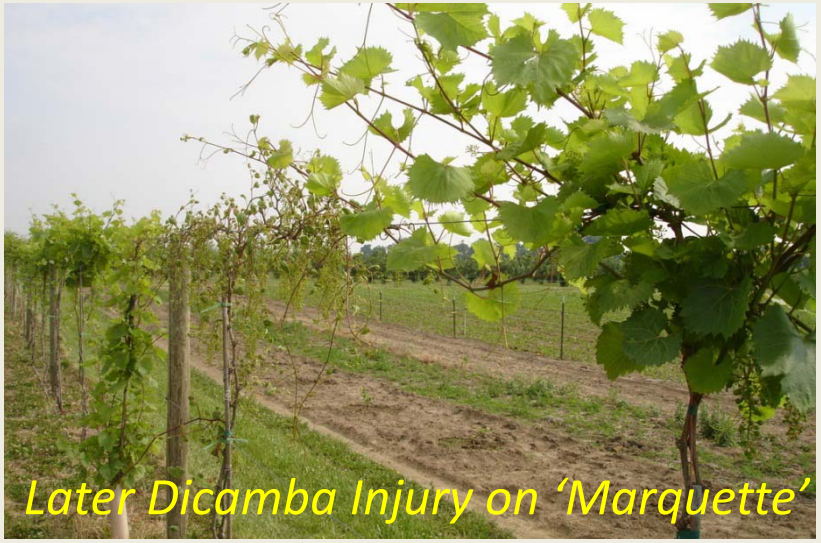
Economic Impact - Dicamba

Canopy:

- Loss of active leaf area during active growth phase.
- Carryover: Low pruning weight (>50% loss)


Dicamba Injury on 'Cabernet franc'


Early Dicamba Injury on 'Marquette'


Later Dicamba Injury on 'Marquette'

Photos courtesy Bruce Bordelon, Purdue University

Economic Impact - Dicamba

Fruit:

- Poor fruit set in Year 1.
- Smaller vines support fewer clusters following year.

Photos courtesy Bruce Bordelon, Purdue University


2,4-D Injury

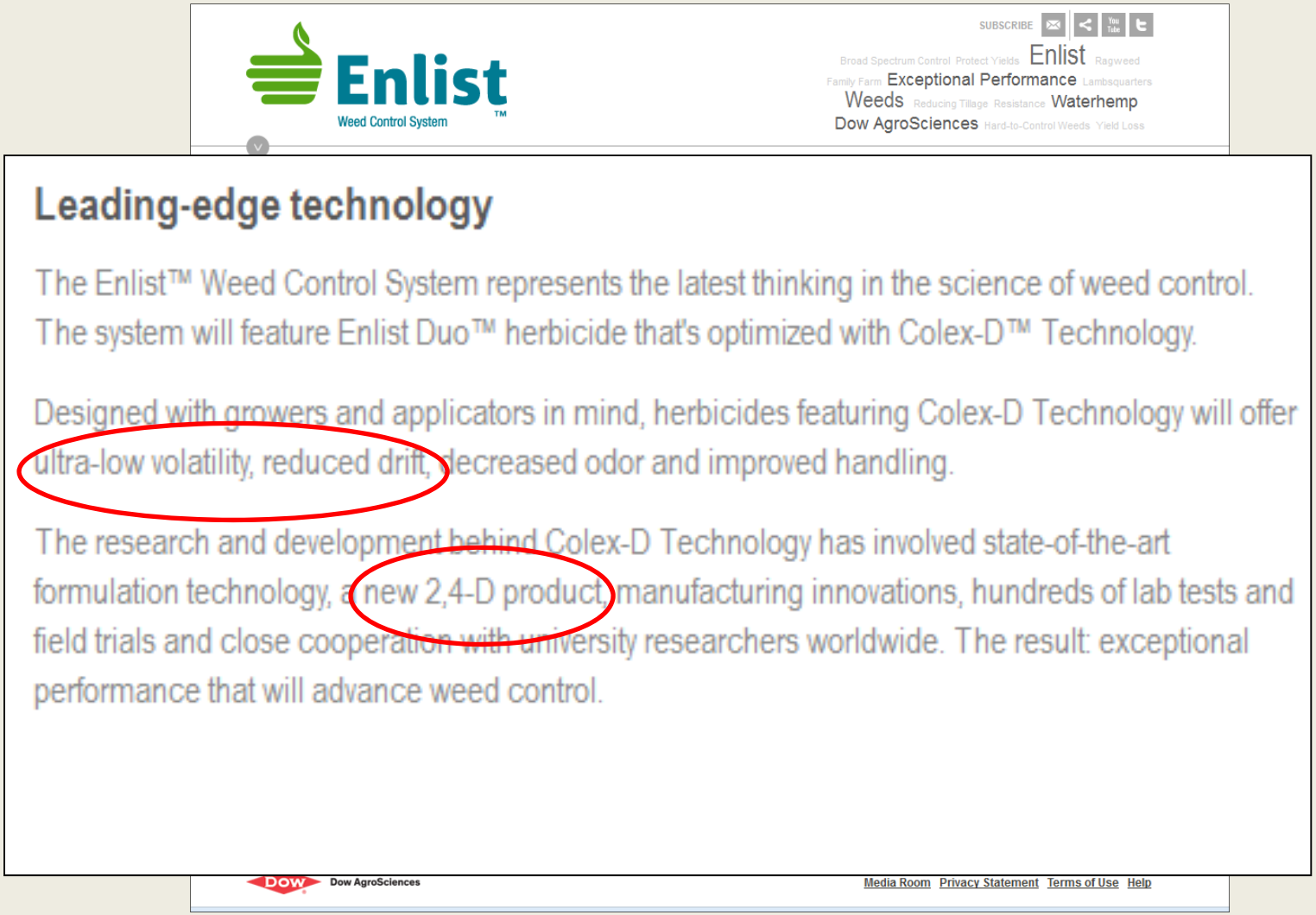

NE Vineyard

2,4-D Formulations and Volatilation

- Spray Drift vs. Volatilization
- Formulations
  - Esters (very volatile)
  - Amines (lower volatility)
  - 'Low volatility Esters' – higher molecular wt
  - New: Colex-D – Low volatile, Dow Agriscience "Choline formulation"
- Get your neighbors to use 'amines', not 'esters'
- Road crews: Beware. Often use pre-packaged formulations with >1 active ingredient.

New: 2,4-D resistant Soybeans

(Dicamba to follow)



Economic Impact

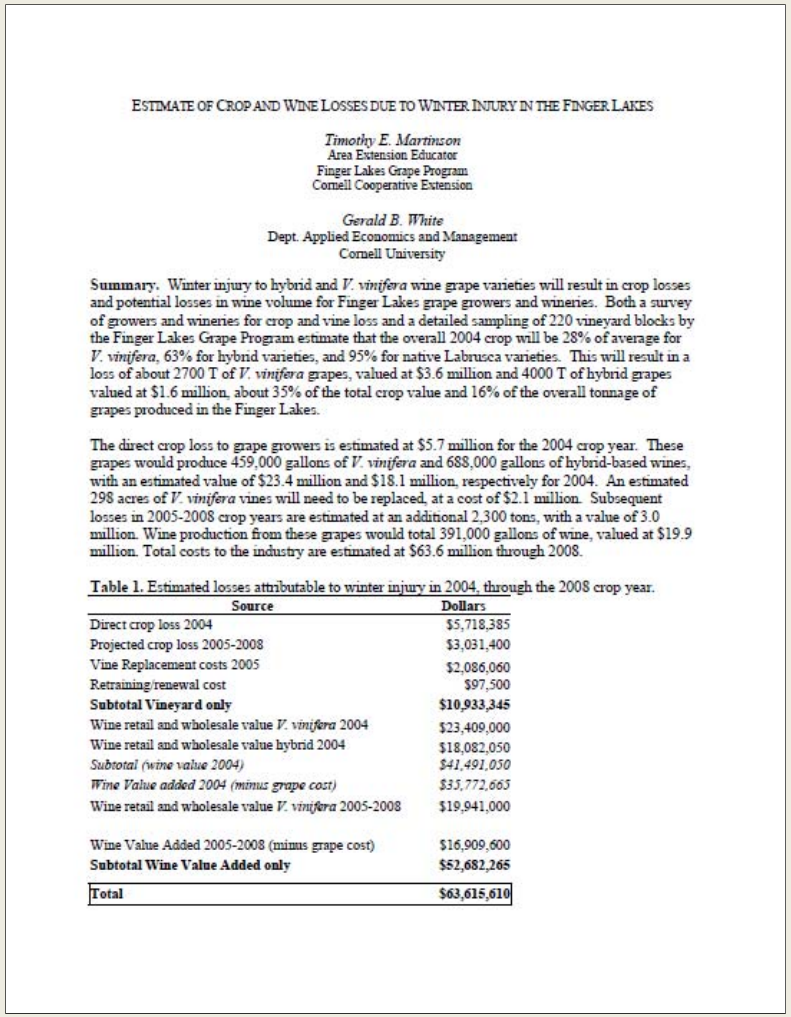
Costs of the 2004 Freeze


June 2004

July, 2004

Carryover in 2005

Economic Impact of 2004 Freeze



ESTIMATE OF CROP AND WINE LOSSES DUE TO WINTER INJURY IN THE FINGER LAKES

Timothy E. Martinson
Area Extension Educator
Finger Lakes Grape Program
Cornell Cooperative Extension

Gerald B. White
Dept. Applied Economics and Management
Cornell University

Summary. Winter injury to hybrid and *V. vinifera* wine grape varieties will result in crop losses and potential losses in wine volume for Finger Lakes grape growers and wineries. Both a survey of growers and wineries for crop and vine loss and a detailed sampling of 220 vineyard blocks by the Finger Lakes Grape Program estimate that the overall 2004 crop will be 28% of average for *V. vinifera*, 63% for hybrid varieties, and 95% for native Labrusca varieties. This will result in a loss of about 2700 T of *V. vinifera* grapes, valued at $3.6 million and 4000 T of hybrid grapes valued at $1.6 million, about 35% of the total crop value and 16% of the overall tonnage of grapes produced in the Finger Lakes.

The direct crop loss to grape growers is estimated at $5.7 million for the 2004 crop year. These grapes would produce 459,000 gallons of *V. vinifera* and 688,000 gallons of hybrid-based wines, with an estimated value of $23.4 million and $18.1 million, respectively for 2004. An estimated 298 acres of *V. vinifera* vines will need to be replaced, at a cost of $2.1 million. Subsequent losses in 2005-2008 crop years are estimated at an additional 2,300 tons, with a value of 3.0 million. Wine production from these grapes would total 391,000 gallons of wine, valued at $19.9 million. Total costs to the industry are estimated at $63.6 million through 2008.

Table 1. Estimated losses attributable to winter injury in 2004, through the 2008 crop year.

Source	Dollars
Direct crop loss 2004	$5,718,385
Projected crop loss 2005-2008	$3,031,400
Vine Replacement costs 2005	$2,086,060
Retraining/renewal cost	$97,500
Subtotal Vineyard only	**$10,933,345**
Wine retail and wholesale value *V. vinifera* 2004	$23,409,000
Wine retail and wholesale value hybrid 2004	$18,082,050
Subtotal (wine value 2004)	*$41,491,050*
Wine Value added 2004 (minus grape cost)	*$35,772,665*
Wine retail and wholesale value *V. vinifera* 2005-2008	$19,941,000
Wine Value Added 2005-2008 (minus grape cost)	$16,909,600
Subtotal Wine Value Added only	**$52,682,265**
Total	**$63,615,610**

Grower Survey Responses:

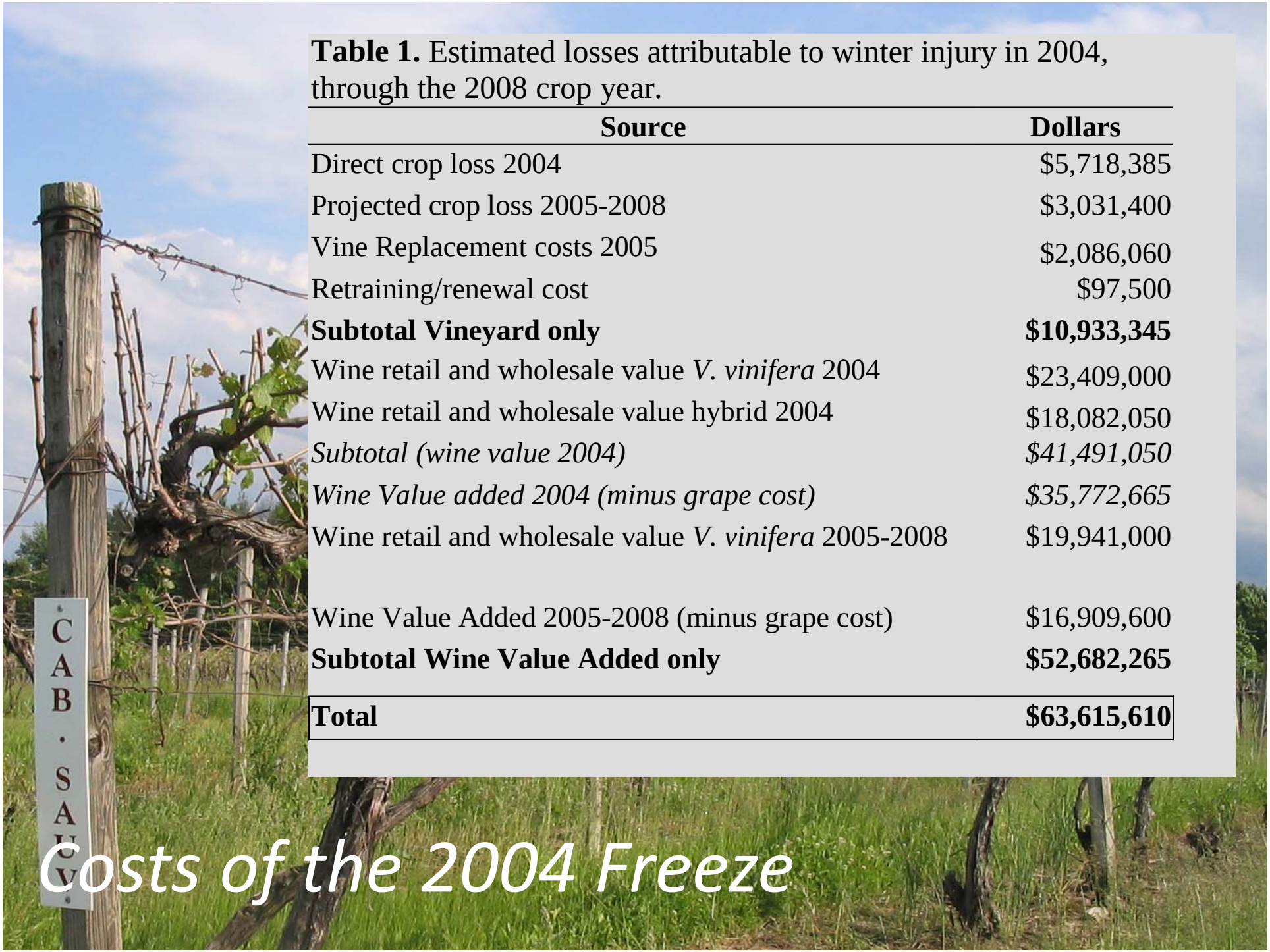
Table 5. Percentage of acres in each category

Vinifera	Hybrid	Labrusca
604 acres	592 acres	948 acres
24% Replant Acres	1% Replant	0% replant
42% Total Crop loss	8% Total Losses	0% total crop
34% Less than 1/2 crop	26% less than 1/2 crop	2% less than 50%
17% 50-75% crop	31% 50-75% crop	12% 50-75%
6% Full crop	35% full crop	86% full crop

Finger Lakes Grape Program Samples of 219 vineyard blocks:

Table 6. Percentage of blocks surveyed in each category

Vinifera	Hybrid
185 blocks	34 blocks
19% replant blocks	3% Replant
34% Total Crop loss (19+15%)	6% Total Losses
49% Less than 1/2 crop	41% less than 1/2 crop
9% 50-75% crop	32% 50-75% crop
8% Full crop	21% full crop



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Costs of the 2004 Freeze

One Year crop loss in Vineyard and Winery

Table 1: Cost of loss of 1 year's production in terms of grape and wine value.

Vineyard Losses	Hybrid	Vinifera	Nebraska
Yield (T/acre)	4.7	3	4.67
Vines per acre (6x9 spacing, or 7x10 NE)	806	806	623
Price per ton	$ 500	$ 1,500	$1,200
Gross receipts per acre	$ 2,350	$ 4,500	$5,607
Gross receipts per vine per year	$ 2.92	$ 5.58	$9.00
Wine Loss			
Gallons/acre @170 gal/ton	799	510	794
Cases per acre @ 2.4/gal	333	213	331
Bottles per acre @ 12/case	3,995	2,550	3972
Retail Price per Bottle	$9	$15	$15
Gross Wine Receipts per acre	$35,955	$38,250	$59,574
Wine value added/acre	$33,605	$33,750	$53,967

Table 2: Losses per acre and per vine with 1 year of lost grape production.

Losses Per Acre	**Hybrid**	**Vinifera**	**Nebraska**
Vineyard gross receipts per acre	$ 2,350	$ 4,500	$5,607
Wine Value added/acre	$33,605	$33,750	$53,967
Losses Per Vine			
Grape value/vine	$2.92	$5.58	$9.00
Wine value added/vine	$41.69	$41.87	$86.63
Total annual receipts loss per vine	**$44.61**	**$47.46**	**$95.63**

2,4-D Scenario

- Year 1: Total loss of crop, 50% reduction of growth (& Pruning Weight)
- Year 2: 50% loss in yield, some recovery in vine size
- Year 3: 25% loss in yield, vine size completely recovered

Table 3: Loss with 50% carryover in Yr 2, 25% carryover loss in Year 3

Vineyard	**Hybrid**	**Vinifera**	**Nebraska**
Year 1 vine revenue loss (100% loss)	$2,350	$ 4,500	$5,607
Year 2 vine revenue loss(50% loss)	$1,175	$2,250	$2,804
Year 3 vine revenue loss (25% loss)	$587	$ 1,125	$1,402
Total vineyard losses (1-3)	**$4,112**	**$7,875**	**$9,812**
Winery			
Year 1 wine value added (100% loss)	$33,605	$33,750	$53,967
Year 2 wine value added (50% loss)	$16,802	$16,875	$26,984
Year 3 wine value added (25% loss)	$8,401	$8,437	$13,492
Total wine value added/acre (1-3)	**$58,808**	**$59,062**	**$94,443**
Total (Per Vine)			
Total wine value added/vine (1-3)	$72.96	$73.28	$151.59
Total vineyard losses per vine (1-3)	$5.10	$9.77	$15.75
Total economic loss	**$78.07**	**$83.05**	**$167.34**

Vine Replacement Scenario

- Year 1: Total crop loss and vine death
- Year 2: Partial replant of missing vines
- Year 3-4: Vines defruited, no production
- Year 5: Partial crop (50%)
- Year 6: Back to full production

Table 3: Losses per vine, assuming vine replacement, with full production in Year 5

Vine replacement	**Hybrid**	**Vinifera**	**Nebraska**
Grape value lost/vine (1-5)	$13.12	$25.12	$40.50
Wine value lost/vine (1-5)	$187.62	$188.43	$389.81
Total gross receipts loss/vine	**$200.74**	**$213.55**	**$430.31**
Replanting cost/vine	$8.30	$8.30	$10.74
Total	**$209**	**$222**	**$441**

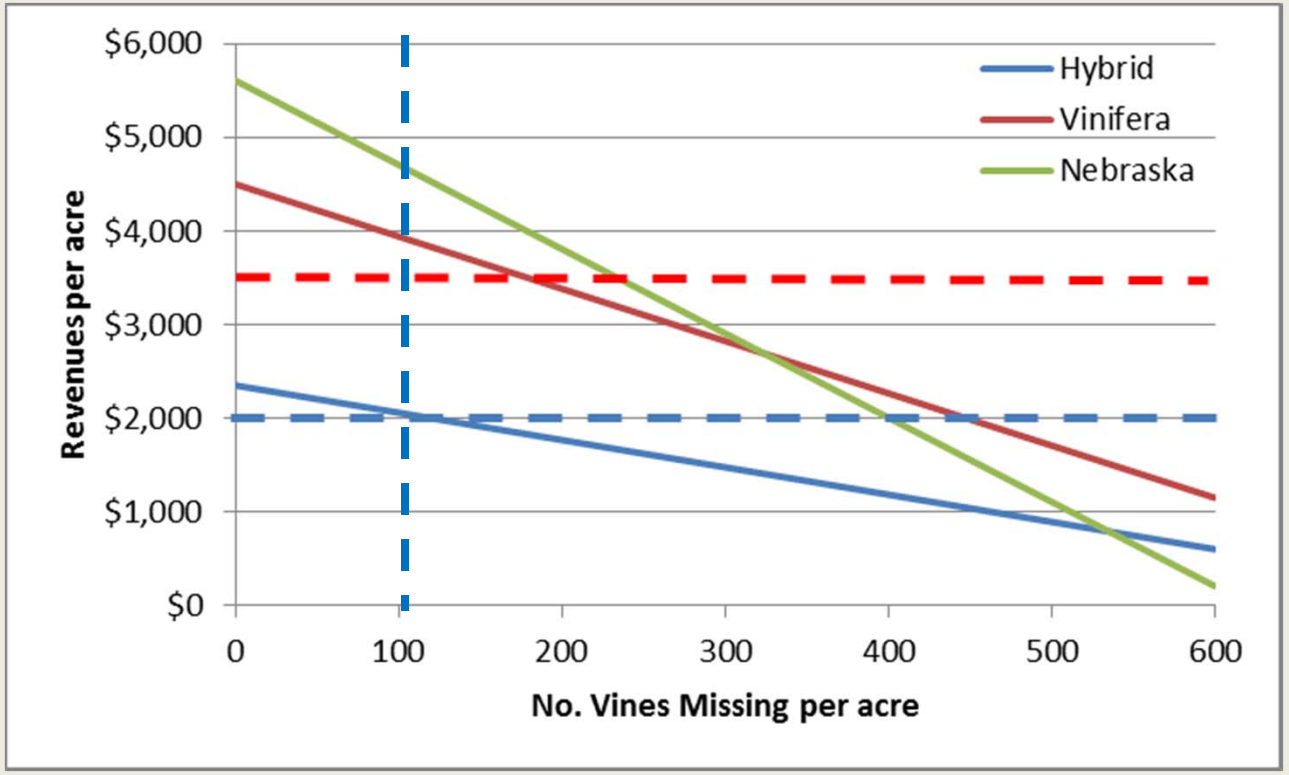
Fill-in of missing vines assumes cost/acre of $6,620, which is vineyard establishment costs of $9,976 minus site preparation and trellis construction.

What do missing vines cost?

Summary

Vineyard Losses	Hybrid	Vinifera	Nebraska
One year	$2.92	$5.58	$9.00
2,4-D (3 yr)	$5.10	$9.77	$15.75
Missing vine	$21.42	$33.42	$51.24
Vineyard and winery			
One year	$45	$47	$96
2,4-D (3 yr)	$78	$83	$167
Missing vine	$209	$222	$441

Crop Revenue and Missing Vines



Summary

- Herbicide injury symptoms distinctive
- Not just 2,4-D
- Immediate effects on canopy growth and fruit set.
- Carryover effects: Vine size, pruning weights, vine capacity
- Per-vine revenue losses : $9 (one year) to $51 (replacement) per vine
- Estate wineries: With retail wine value, $96 (one year) to $400 per vine (replacement)
- Prevention better than Reaction.

Management

Proactive:

- Talk to your neighbors, county road crews
- If 2,4-D, insist on amine form, not ester
- If other substitutes, offer to pay difference in cost

Reactive:

- Adjust pruning strategies, focus on regaining vine size.
    - Trunk replacement?
- Document injury, pursue remedy, hope it's a deterrent.

Spray Tech in your vineyard

APPELLATION CORNELL

Research News from Cornell's Viticulture and Enology Program — Research Focus 2011-1

RESEARCH FOCUS

Improving Spray Deposition with Engineering Innovation - What a Difference a Decade Makes

Andrew Landers
Senior Extension Associate
Department of Entomology, NYS Agricultural Experiment Station
College of Agriculture and Life Sciences, Cornell University

Dr. Andrew Landers' spray technology program provides research and extension to the grape industry to help growers reduce drift and increase deposition.

One of the greatest challenges for grape growers is applying pesticides precisely to the developing target throughout the growing season. As the canopy develops, more air and liquid are required for adequate penetration and coverage.

Our research at Cornell University over the past ten years has focused on developing canopy sprayers that increase deposition throughout the canopy using adjustable air flow and air direction.

Improved deposition may also be attained by correct nozzle selection and orientation, based on testing with a vertical patternator. Trials conducted in vineyards throughout New York and Pennsylvania over the past decade have shown that growers can increase spray deposition by up to 82% and reduce spray drift by 70% by adjusting the airflow coming from the sprayer.

We've developed three novel methods of airflow adjustment with the goal of keeping the air and spray plume within the canopy. The result is that growers have access to new tools and techniques for increasing spray deposition and reducing drift.

KEY CONCEPTS

- Airblast sprayers use fans to deliver spray solutions to grapevine canopies.
- Deposition on grapevine foliage is influenced by air volume and speed
- Standard, fixed air volume and speed on conventional airblast sprayers result in increased drift and reduced deposition, particularly early in the season when grapevine canopies are sparse.
- Adjusting air speed to match canopy development can reduce drift by 70% and improve spray deposition by 80%, particularly in early-season sprays.
- Adjusting air direction by re-orienting nozzles improves uniformity of spray deposition and reduces drift.
- Inexpensive spray 'patternators' can be used to show where the spray is going, and adjust nozzle orientation to improve uniformity and reduce drift
- Attention to detail in adjusting airflow and air direction will ensure that expensive sprays are not wasted.

Research Focus 2011-1: Cornell Viticulture and Enology — 1

Figure 1: Cornell "doughnut" used to restrict airflow from airblast sprayer fan.

Effective Vineyard Spraying
A Practical Guide

Andrew Landers has written a 260 page book on vineyard spray technology aimed at growers and industry. It includes a CD with video demonstrations of various topics. For more information:
www.effectivespraying.com

Figure 6: Inexpensive patternator built out of window screens. Plans are available at:
http://www.nysaes.cornell.edu/ent/faculty/landers/pestapp/PATTERNATOR.htm

http://grapesandwine.cals.cornell.edu/appellation-cornell/issue-5/upload/Landers-Research-Focus-2011-1.pdf

Or 'Google': Appellation Cornell

Thanks

- Nebraska Winery and Grape Growers' Association
- Bruce Bordelon, Purdue University
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- SE Nebraska Community College
- Tom Zumpfe