

The background image shows a field of tall, green grass with several golden-brown seed heads in the foreground. A black metal fence runs diagonally across the middle of the frame. In the background, there are trees and a clear blue sky.

Managing weeds that escape conventional control measures

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Glyphosate: Recent and Upcoming

- March 2015: W.H.O International Agency for Research on Cancer (IARC)
 - Upon review of existing published data, IARC classified glyphosate in Category 2A, a category in which red meat was also recently placed.
 - Group 2A: *'Probably carcinogenic to humans'*
- 2015 (after IARC report)
 - The German Federal Institute for Risk Assessment (BfR)
and
European Food Safety Authority (EFSA)
 - Concluded that glyphosate is unlikely to pose a carcinogenic hazard to humans and the evidence does not support classification with regard to its carcinogenic potential.
- 2015: CALIFORNIA – as a result of IARC action, PROP 65 triggered a notice of intent to list glyphosate as a carcinogen.

US EPA

- Routinely reviews and re-registers pesticides in a 15 year cycle.
- Glyphosate re-registration review process began 5+ years ago. A final decision on re-registration is expected in 2016.
- The unusual delay is due to...
 - Huge economic interests at stake (>750 products).
 - Widespread exposures of applicators and homeowners/consumers.

...this decision is being weighed very carefully.

- Stay tuned for developments!

What's wrong with your weed control?

- The main goals of a weed management program:
 - Economic management of unwanted vegetation in the critical growth zones of the vines.
 - If herbicides are being used, then the least amount and the fewer chemicals the better.... **right?**

the least amount and the fewer chemicals the better...

- What are the assumptions behind that idea?
 - Usually this is the most economical approach (in the short run)
 - A lower environmental load is achieved with less herbicide.
 - Serious weed problems are not developing as a consequence of this practice.

What can go wrong?

- if the components of the program are not varied from year to year, and a weed scouting program is not followed, then..
 - A shift toward tolerant weed species can occur.
 - and/or resistant weed biotypes can begin to get established without being noticed.

Weed resistance to herbicides

- How does it occur?
 - Repeated applications of the same mode of action (MOA) will apply heavy pressure to select for the very occasional individual(s) that will withstand the treatment.
 - This may occur hundreds of miles away....



Resistance vs. tolerance

Tolerance:

- Weeds are injured or suppressed to some degree, but not controlled.
- usually a species shift will occur that exploits an available infestation opportunity.
- End result: weeds that may be suppressed but not controlled.

Example:

- If Surflan is used on newly planted vines, usually grasses are well controlled but common ragweed begins to infest.

Steps to keep resistance at bay

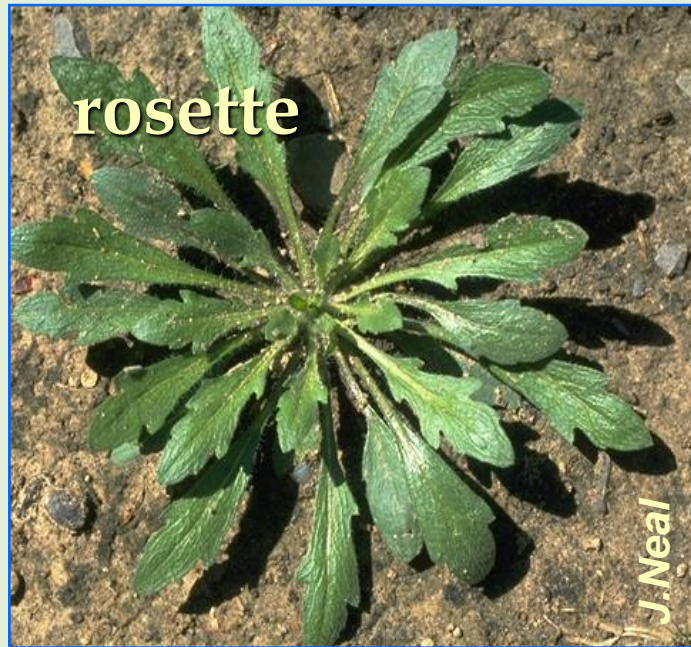
Monitor areas that have recently been treated:

- A single weed species that appears uninjured or only slightly injured (if a postemergence has been used).
- Single weed species emerging soon after a preemergent has been applied.
- During the late summer, a sudden appearance of a weed that has been well controlled in previous years.

Types of weeds to look for:

- Annuals with a high level of seed production:
 - A few escaped individuals can produce many progeny.
- Examples:
 - Known resistant weeds that we should watch for:
 - Horseweed/marestail
 - Palmer's amaranth





Horseweed

Aster family(Compositae)

(Conyza canadensis)



- winter annual broadleaf
- deep tap root
- rosette forms in the fall
- single main stem becomes highly branched as flowers form in the summer
- 10k-250k seeds/plant

Horseweed/marestail

Conyza canadensis

- glyphosate-resistant biotypes developed in no-till Roundup-ready corn 15 years ago and the seed was so widely dispersed, that the biotype is firmly established in much of the Midwest and some of the Northeast.
- What to do if this shows up?
 - Rosettes appear in the fall, but spring applications of glyphosate don't work.
 - Other post emergence options?

Horseweed/marestail

Conyza canadensis

- What to do if this shows up?
 - Possible postemergence substitutes for glyphosate in the spring:
 - Rely (glufosinate-ammonium)
 - Gramoxone (Paraquat)
 - Chateau (some suppression as a post app)
 - Matrix (rimsulfuron)
 - Aim (carfentrazone-ethyl)
 - Scythe (pelargonic acid)
 - Suppress(OMRI approved & labeled for grapes)(NYS 2015)

Horseweed/marestail

Conyza canadensis

- *What to do if this shows up?*
 - Several pre-emergence herbicides will control this weed.
 - The challenge is that the main germination flush begins in late summer.
 - Not practical or PHI-permitted in most cases at this time.

Pre-emergence options for residual control of annual weeds: seven different modes of action

- Chateau (flumioxazin)
- Goal/Goaltender (oxyfluorfen)
- Zeus Prime XC: (sulfentrazone) not yet in NYS
- Princep (simazine)
- Karmex (diuron)
- Matrix (rimsulfuron)
- Solicam (norflurazon)
- Surflan (oryzalin)
- Prowl (pendimethalin)
- Alion (indaziflam)

Recent registration (2013):
Alion (indaziflam)

- Alion can be used on grapevines established 5 or more years.
- 3.5 to 5.0 ounces/acre
- 0.045-0.065 lbs. (a.i.)/a
- Extremely low environmental load...
- 20 to 30 grams per sprayed acre
(Equivalent in weight to 4 to 6 nickels)

Alion (indaziflam)

- Indaziflam is a Group 29 class herbicide (alkylazine). It controls weeds by inhibiting cellulose biosynthesis which in turn prevents cell walls from forming in plants.
- Similar MOA: Casoron, Gallery
- Very low volatility and low leaching potential. It can be applied anytime during the year on unfrozen soil. PHI is 14 days.

Why choose Alion over other options?

- It has the potential to remain active with a Spring application long enough to inhibit horseweed germination in the late summer and beyond.

A study on field-grown ornamentals illustrates this:

Objective

- Evaluate the establishment of annual cover crops between nursery rows in the year **following** application of indaziflam (Alion) and flumioxazin (Chateau).

- June 7, 2012: day of cover crop seeding
- 13 months after herbicide application.
- Plots were tilled and seeded with buckwheat

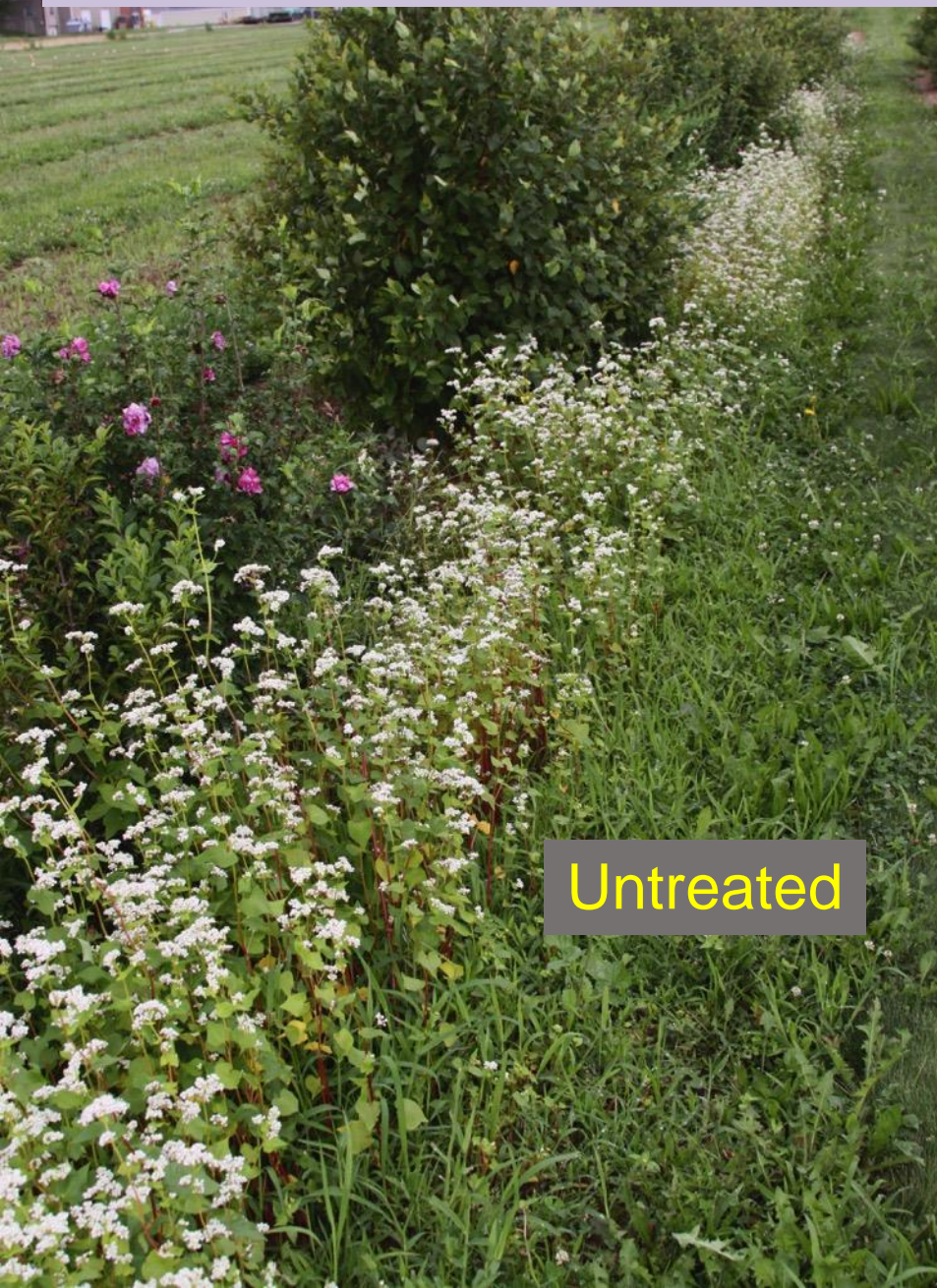


Result S

Cover crop establishment 13 months after application

Treatment	Rate	Buckwheat Percent Cover
		6weeks after Seeding
Untreated	~	83
Alion	2.8 fl oz	58
Alion	5.4 fl oz	35
Alion	11 fl oz	14
Chateau	8 oz	54

Cover crop 13 months after application



Untreated



Alion @ 2.8 fl
oz
Slightly below
labeled rate for
grapes

Cover crop 13 months after application



Cover crop 13 months after application



Untreated



Alion @11 fl oz
-Twice the High
labeled rate

Results

- 13 months after treatment, buckwheat germination was significantly affected by all treatments.
- Alion (low LUR) and Chateau had similar effects. Neither prevented adequate establishment of buckwheat.
- Higher rates of indaziflam did inhibit buckwheat establishment.

Results

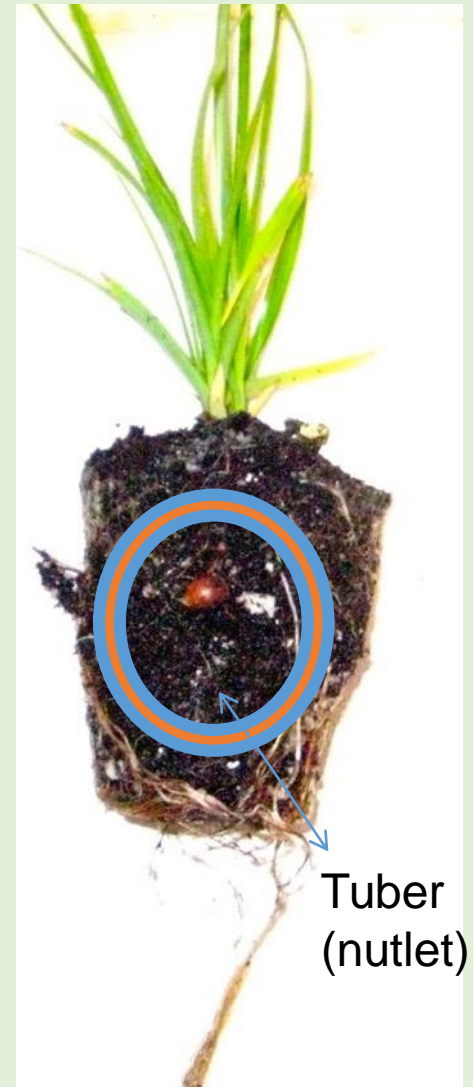
- The long field residual life of Alion appears to be largely a benefit-in providing a long lasting level of weed control.
- It did not appear that the lower use rate will interfere with an annual cover crop established the year following application.
- However, at higher rates and different conditions, this may be a concern for growers.

Other weeds that can move in and disrupt weed management

- Perennials that spread by seed and rhizomes.
- Examples: bindweeds or yellow nutsedge
- Can be moved into the vineyard during the summer by wildlife or cultural practices.
- Then the underground rhizomes and roots will help it **evade** control the following spring.

Yellow nutsedge management in vineyards

- Preemergence herbicides with activity against the germinating tuber.
 - Zeus Prime (not yet labeled in NYS) (sulfentrazone): a new and potent tool to manage this weed.
- Others that claim activity but not control:
- Solicam
 - Matrix
 - Devrinol



A close-up photograph of a Hedge Bindweed plant, showing its characteristic heart-shaped leaves and thin, winding stems. The plant is green and appears to be growing in a field or garden. The background is dark and out of focus.

Hedge Bindweed

Matrix is labeled on potatoes and tomatoes and **grapes**.

Matrix is not labeled for Hedge Bindweed control, but has appeared to have some activity on this weed.

Question:

Can adjuvants increase activity enough to get control at low rates?

Hedge Bindweed Control with Matrix

Post emergence applications @ 6"-12"

Treatment	Rate oz prod	Adjuvant	Percent Injury	Fresh Weight (grams) 24 DAT	
				Whole plant	Rhizome only
Untreated	~	~	0	17.3	10.0
Matrix	1	None	31	9.5	5.3
Matrix	1	NIS 0.25	63	5.2	2.8
Matrix	1	AMS (2.5%)+ NIS	99	0.5	0.2
Matrix	1.5	None	31	7.3	4.0
Matrix	1.5	NIS 0.25	77	4.5	1.9
Matrix	2	None	74	3.2	1.2
Matrix	2	NIS 0.25	89	2.7	1.2
Matrix	2	AMS (2.5%)+ NIS	96	1.4	0.6
Matrix	4	None	96	0.6	0.2
Matrix	4	NIS 0.25	94	1.7	0.7
Sandea	1	NIS 0.25	0	13.6	5.2
Fisher's LSD @ 0.05			18	4.2	2.9

Hedge Bindweed @12 DAT



Untreated

Matrix 1 oz

Matrix 1 oz
& NIS

Matrix 1 oz
& NIS & AMS

Postemergence Hedge Bindweed Management, 2015 container study

Location: Long Island Horticultural Research and Extension Center

Trade Name	Rate Prod/ A	Adjuvant	Percent control		Fresh Weight (gm) 35 DAT	
			3 DAT	35 DAT	Shoot	Rhizome
Untreated	~	~	0	0	9.6	15.5
Chateau	6 oz	MSO & AMS	50	98	0.1	0.4
Matrix & Chateau	1 oz & 6 oz	MSO & AMS	60	100	0.0	0.0
Matrix	1 oz	NIS	0	50	2.8	4.5
Matrix	1 oz	MSO	0	94	1.5	0.7
Matrix	1 oz	MSO & AMS	9	81	2.5	0.7
Matrix	1.5 oz	NIS	0	35	1.8	2.9
Matrix	2 oz	MSO	0	93	0.8	0.8
Matrix	2 oz	NIS	0	83	0.5	0.5
Matrix	4 oz	NIS	0	99	0.2	0.3
<i>Fisher's LSD @ 0.05</i>			6	22	2.9	5.1

Matrix (rimsulfuron) and Chateau (flumioxazin) treatments applied 6/ 4/ 15.

Nonionic Surfactant (NIS) applied at 0.25% v/ v

Methylated Seed Oil (MSO) applied at 0.5% v/ v

Spray grade Ammonium sulfate (AMS) applied at 2.5% v/ v

Hedge Bindweed results

- Some adjuvants appear to enhance Matrix activity to a level of suppression.
- Further study of larger, in-ground bindweed needs to confirm this.
- Difficult to find plot size infestations, hence lack of data on this weed.

Take home

- Nothing in nature stays the same for long.
- Monitoring control levels at key times in the season will give early warning to potential issues.
- Variety of options in vineyard culture allow for better choices if problems arise.

