

# Hexazinone Alternatives

Matthew Fossen, Ph.D.

Staff Environmental Scientist  
Pest Management and Licensing Branch  
California Department of Pesticide Regulation

June 7, 2011

# Primary Uses

- Rights-of-way
- Forestry
- Alfalfa
  - Perennial weeds
  - Annual weeds
  - **Common Groundsel**

# Common Groundsel



- *Senecio vulgaris*
- Produces pyrrolizidine alkaloids
  - Causes irreversible liver damage and death when consumed by livestock
- Up to three generations per year
- One plant can produce up to one million seeds in a season
- Seeds can be very long-lived (up to 50 years)

## Cultural Controls

- Tillage
  - Kills plants, but brings seeds to the surface to germinate
- Soil solarization
  - Works, but applicability is limited

# Non-Chemical Alternatives

## Biological Controls

- Rust fungus
  - *Puccinia lagenophorae*
  - Plant survives and increases nutrient uptake
- Cinnabar moth
  - *Tyria jacobaeae*
  - Evaluated for groundsel control in Oregon and Washington
  - Larvae eat plant but allow seeds to disperse and germinate



According to UC IPM, the following herbicides display varying levels of control of Common Groundsel in **established** alfalfa:

- Control (100-80% control)
  - Hexazinone
  - Halosulfuron-methyl
  - Glyphosate
  - Flumioxazin
- Partial control (79-65% control)
  - EPTC
  - Imazethapyr, ammonium salt
  - Metribuzin
  - Paraquat dichloride

## Pre-emergent Activity

- EPTC
- Flumioxazin
- Metribuzin

## Post-emergent Activity

- Glyphosate
- Halosulfuron
- Imazethapyr
- Paraquat

# Physical/Chemical Properties

AI	Product	Solubility (SNV > 3)	$K_{oc}$ (SNV < 1900)	Aerobic (SNV > 610)	Anaerobic (SNV > 9)	Hydrolysis (SNV > 14)
EPTC	Eptam	345*	170*	42	65*	stable*
Flumioxazin	Chateau	1.79	350*	16	1	3.4
Glyphosate	Roundup	11600*	6920	96	22*	35*
Halosulfuron	Sandea	1650*	124*	51	23*	14
Hexazinone	Velpar	29800*	640*	222	232*	56*
Imazethapyr	Pursuit	351*	54*	2410*	568*	stable*
Metribuzin	Sencor	1030*	106*	140	276*	4760*
Paraquat	Gramoxone	626000*	NA	620*	644*	stable*

- Active ingredients currently on the 6800(b) list
- \* values exceed SNV

# Use Considerations

## EPTC

- Apply in Spring
- Need repeat applications
- Mechanical incorporation or water-applied

## Imazethapyr

- Long residual/plantback period
- Resistance issues with halosulfuron

## Metribuzin

- Use north of Interstate-80 only

## Paraquat

- Only 1 application per year

## Non-chemical alternatives

- Few options exist
- Low efficacy

## Chemical alternatives

- Several options are available
- Many products have potential to contaminate ground water
- Efficacy is debatable

- Aldrich-Markham, S. 1994. Common Groundsel. Oregon State University, Pacific Northwest Extension. Publication 466.
- Bergin, R. 2011. 2010 Status Report Pesticide Contamination Prevention Act. California Department of Pesticide Regulation, Sacramento, CA.
- Canevari, W.M. *et al.* 2009. UC IPM Pest Management Guidelines: Alfalfa. University of California, Agriculture and Natural Resources. Publication 3430.
- DiTomaso, J.M. and E.A. Healy. 2007. Weeds of California and Other Western States. University of California, Agriculture and Natural Resources. Publication 3488.
- Paul, N.D. and P.G. Ayres. 1988. Nutrient Relations of Groundsel (*Senecio vulgaris*) Infected by Rust (*Puccinia lagenophorae*) at a Range of Nutrient Concentrations II. Uptake of N, P and K and Shoot-Root Interactions. *Annals of Botany* 61(4): 499–506.