Weed Control in Established Alfalfa

Tom Getts- UCCE

Outline

- Why worry about weeds?
- IPM
  - Cultural
  - Mechanical
  - Chemical
- Resistance?

- Tom Getts
- Weed Ecology and Cropping Systems Advisor
- Intermountain Region of California
- Weeds
  - Forage Production Systems
  - Irrigated and Rangeland
  - Valleys 3,000-5,500ft 915-1, 676 meters
  - Dormancy ratings from 3-5

Why worry about weeds?

- Competition

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  - Intake
  - Buyer perception

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Photo Courtesy of Science Direct.com- Kutasi et. al 2017

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- Poisonous Plants

Fiddleneck, Amsinckia spp., S. Orloff

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- Quality
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  - Buyer perception
- Physical Injury
- Poisonous Plants
- Economics-Can Vary

Nov 4th- Intermountain Region

High Quality Hay
$370/ton
($370/907kg)

Utility/Weedy Hay
$270/ton
($270/907kg)

Think about the weeds

Think about the crop

Identification!

- Know what you are dealing with
  - Books
  - People
  - Websites
  - Apps

Lifecycle-Prevent Reproduction!

- Prevent Seeds
  - Soil seed life
    - Years
    - Decades
- Roots/Tubers

Cultural Control

- Agronomic Practices
  - Irrigation
  - Fertilization
  - Harvest management
  - Stand age

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Cultural Control

- Rotation/Change up
  - Tillage
  - Herbicides
  - Cultural Practices

Physical Control?

- Cutting
  - Feeding on farm vs Dairy Quality?
  - Cut before Seed Produced!

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WSSA 2016 Top 5 Weeds in Alfalfa

(24 survey respondents)

	MOST COMMON
1	mustard spp. (19)*
2	dandelion (9)
2	foxtail spp. (9)
4	pigweed spp. (8)
4	Bromus spp. (8)

	MOST TROUBLESOME
1	Canada thistle (9)*
1	mustard spp. (9)
3	dandelion (8)
4	downy brome (cheatgrass) (7)
5	kochia (5)

*** number of survey respondents who listed the weed species as one of their top 5 weeds in this crop.**

- mustard spp. included shepherd's-purse, flixweed, tansymustard spp., field pennycress, yellow rocket, and blue, tumble and tall hedge mustard.
- foxtail spp. included giant and green foxtail.
- pigweed spp. included redroot pigweed.
- Bromus spp. included downy brome (cheatgrass) and cheat.

Winter Annual Control

- Germinate in the Fall/Winter
  - Continues into late winter spring
  - Multiple flushes
- Alfalfa slow growing
- Contaminate first cutting

Winter Annual Control

- Burn Down + Residual herbicide
- Fall- Late winter
- Dormancy is crucial!
  - Selectivity

Paraquat (Burn Down)

- Good on small emerged weeds
- PS2
- Controls Grasses and Broadleafs
- Health concerns
- NIS to spread
- Applied
  - Dormancy
  - Between cuttings

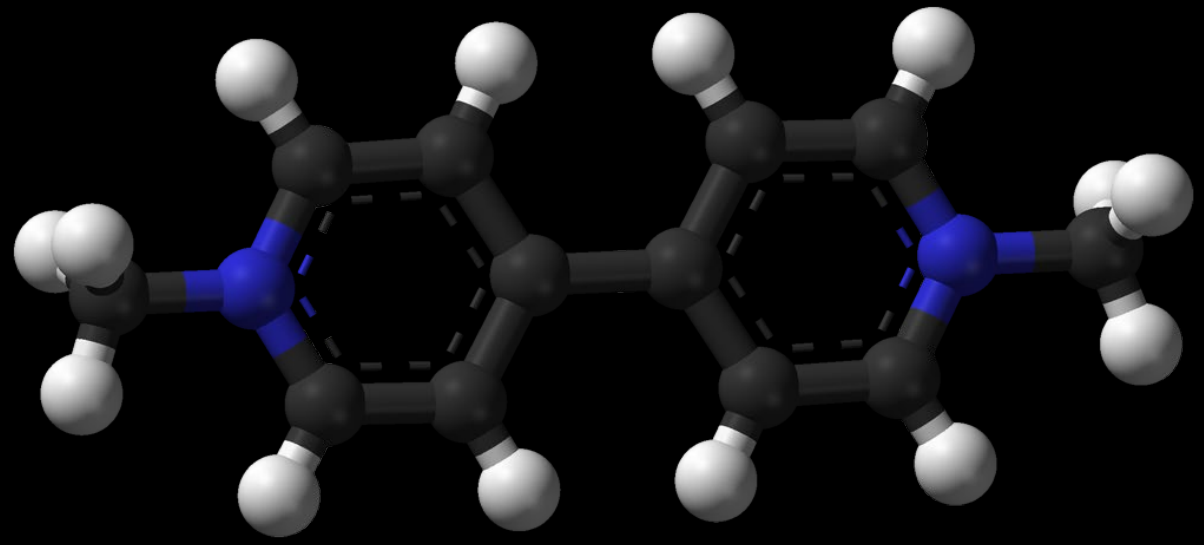
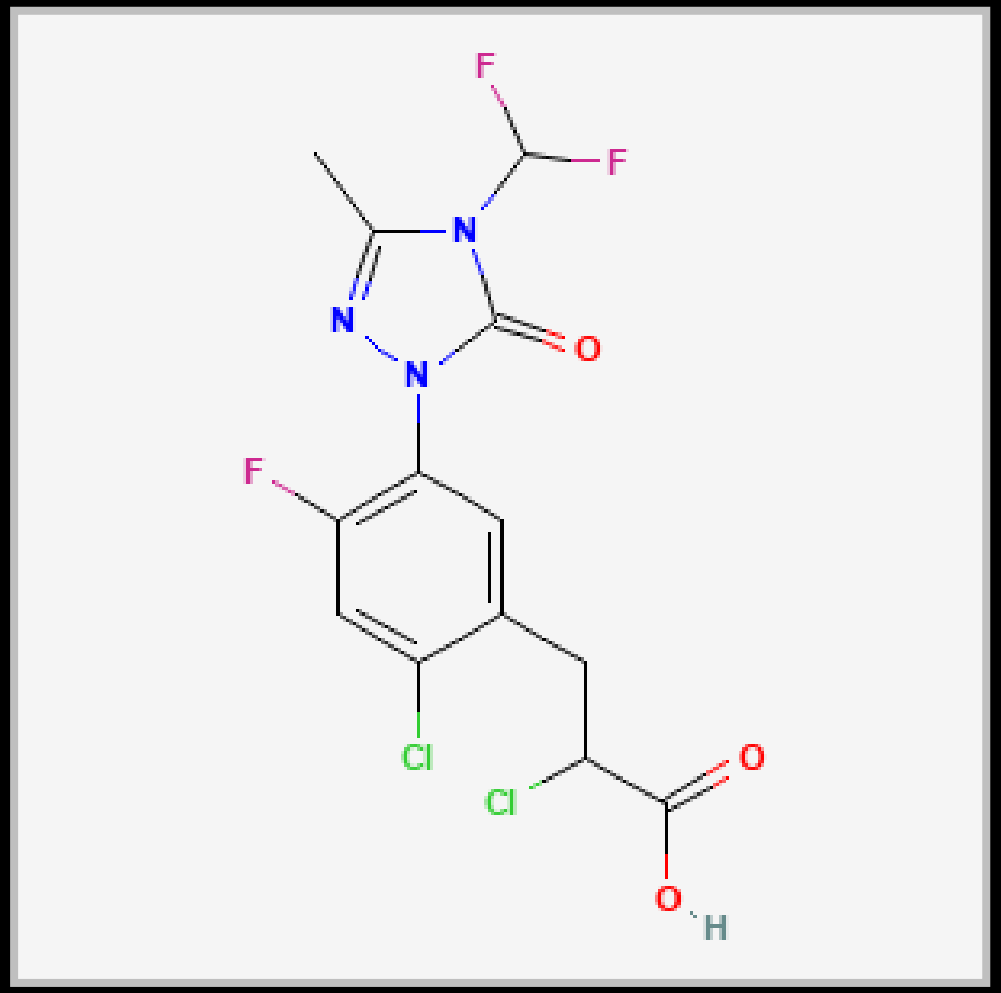


Image courtesy of: Wikipedia

Carfentrazone (Burn Down)

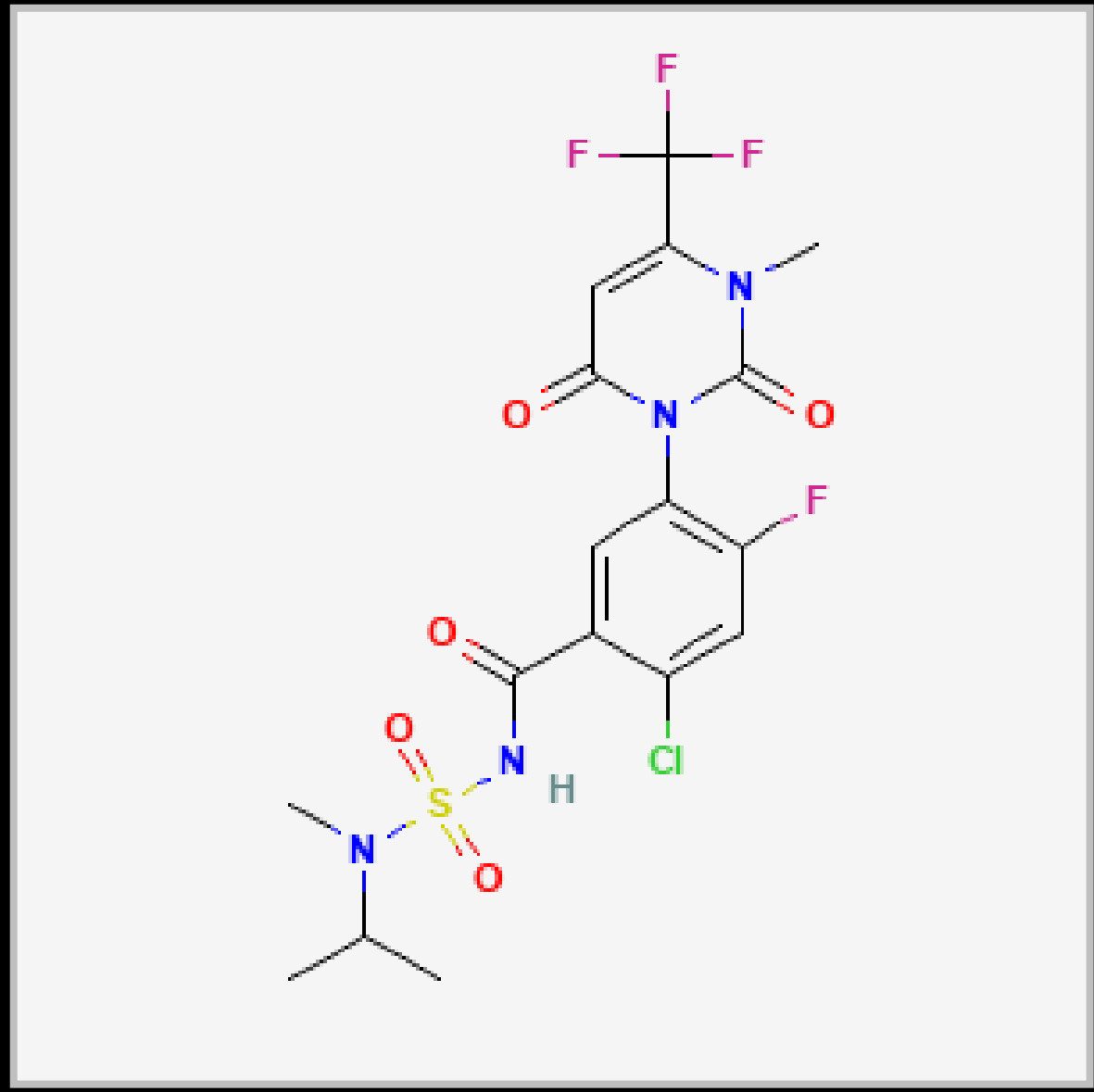
- Good on small emerged broadleaf weeds (no grasses)
- PPO inhibitor
- MSO- helps burndown (more crop injury)
- Applied
  - Dormancy
  - Between cuttings



Courtesy of Pub Chem

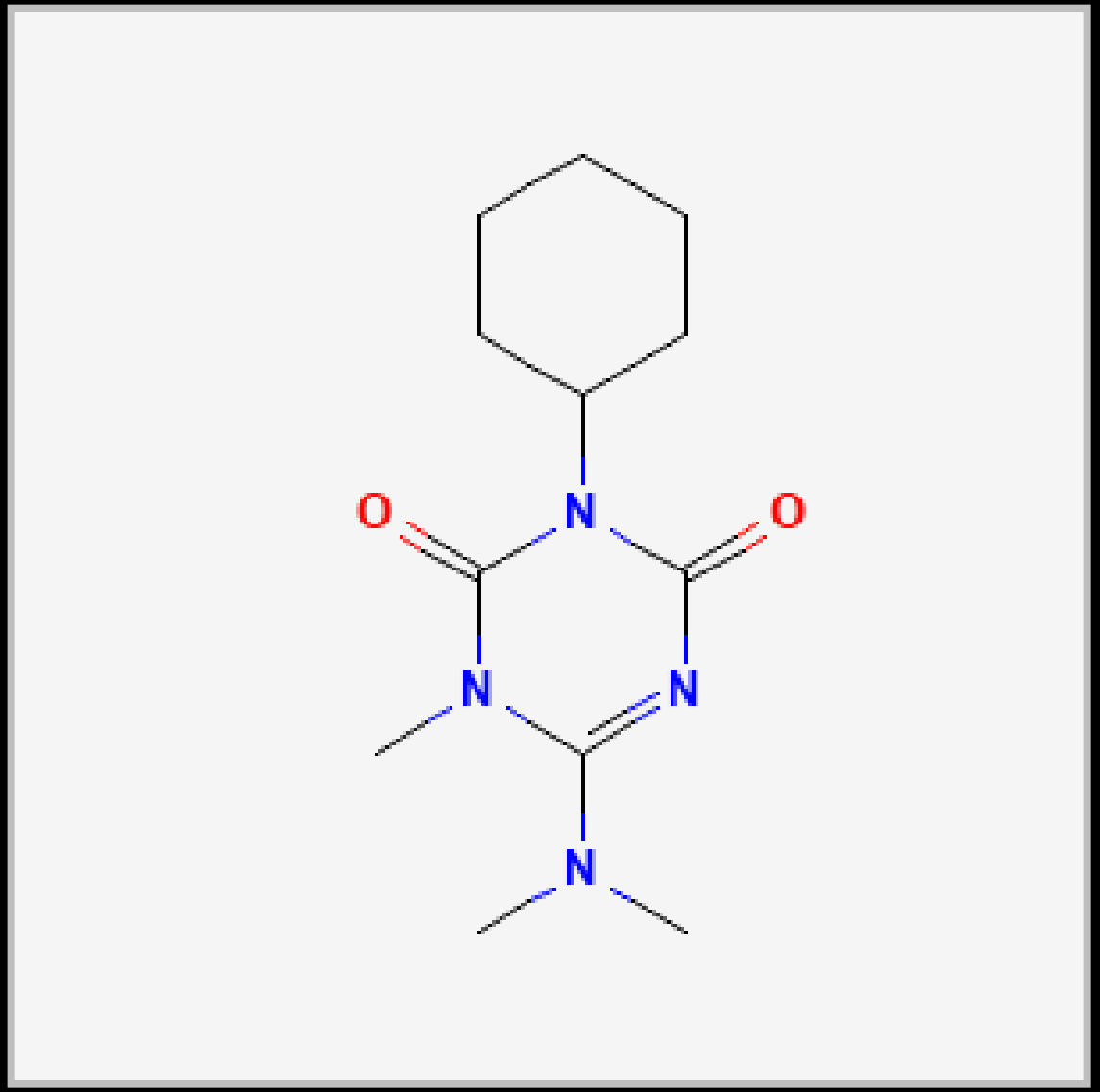
Saflufenacil (Burn Down)

- Good on small emerged broadleaf weeds (no grasses)
- PPO inhibitor
- MSO- helps burndown (more crop injury)
- Applied
  - Dormancy
- Really hot



Hexazinone (Pre)

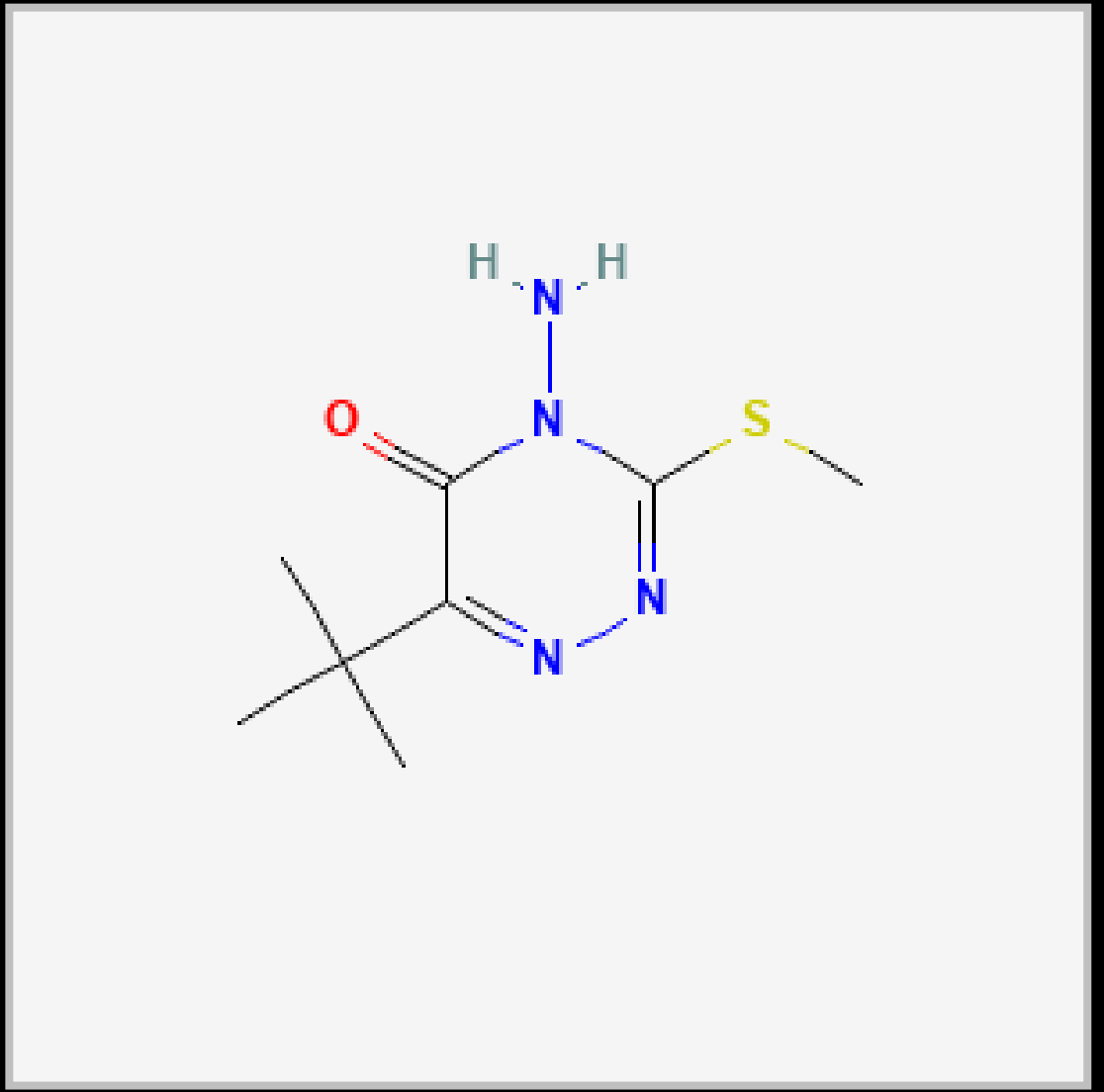
- Generally Pre-emergent but some post emergent
- Grass and Broadleaf activity
- Photosystem 2 inhibitor
- Long residual activity
  - Plant back issues
  - Don’t use in last year of stand
- Only in established stands
- Applied during dormancy



Courtesy of Pub Chem

Metribuzin (Pre)

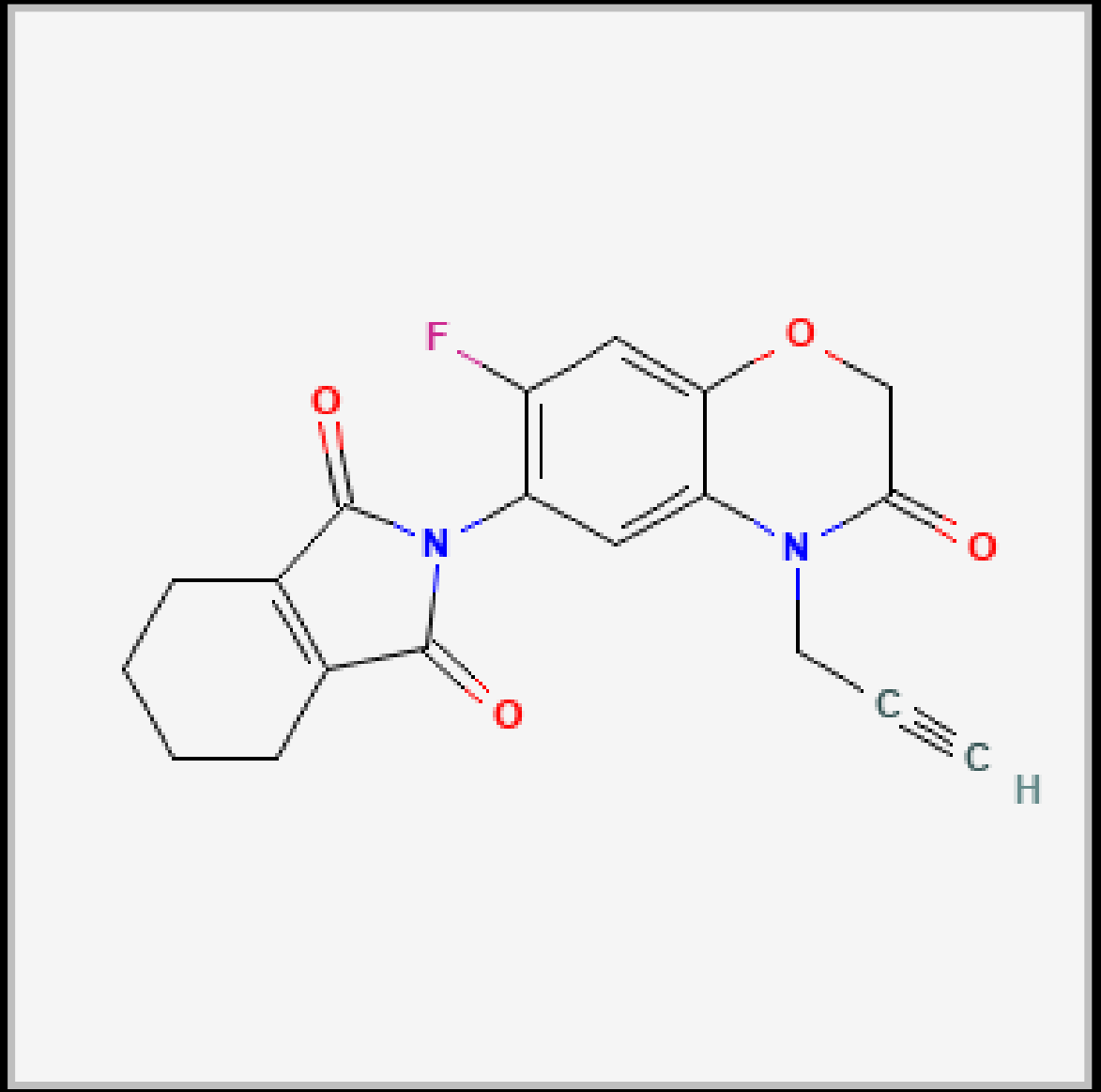
- Preemergent activity
- Grass and Broadleaf activity
- Photosystem 2 inhibitor
- Good residual activity
- Only in established stands
- US- labeled colder climates (And Arizona)
- Applied during dormancy



Courtesy of Pub Chem

Flumioxazin (Pre)

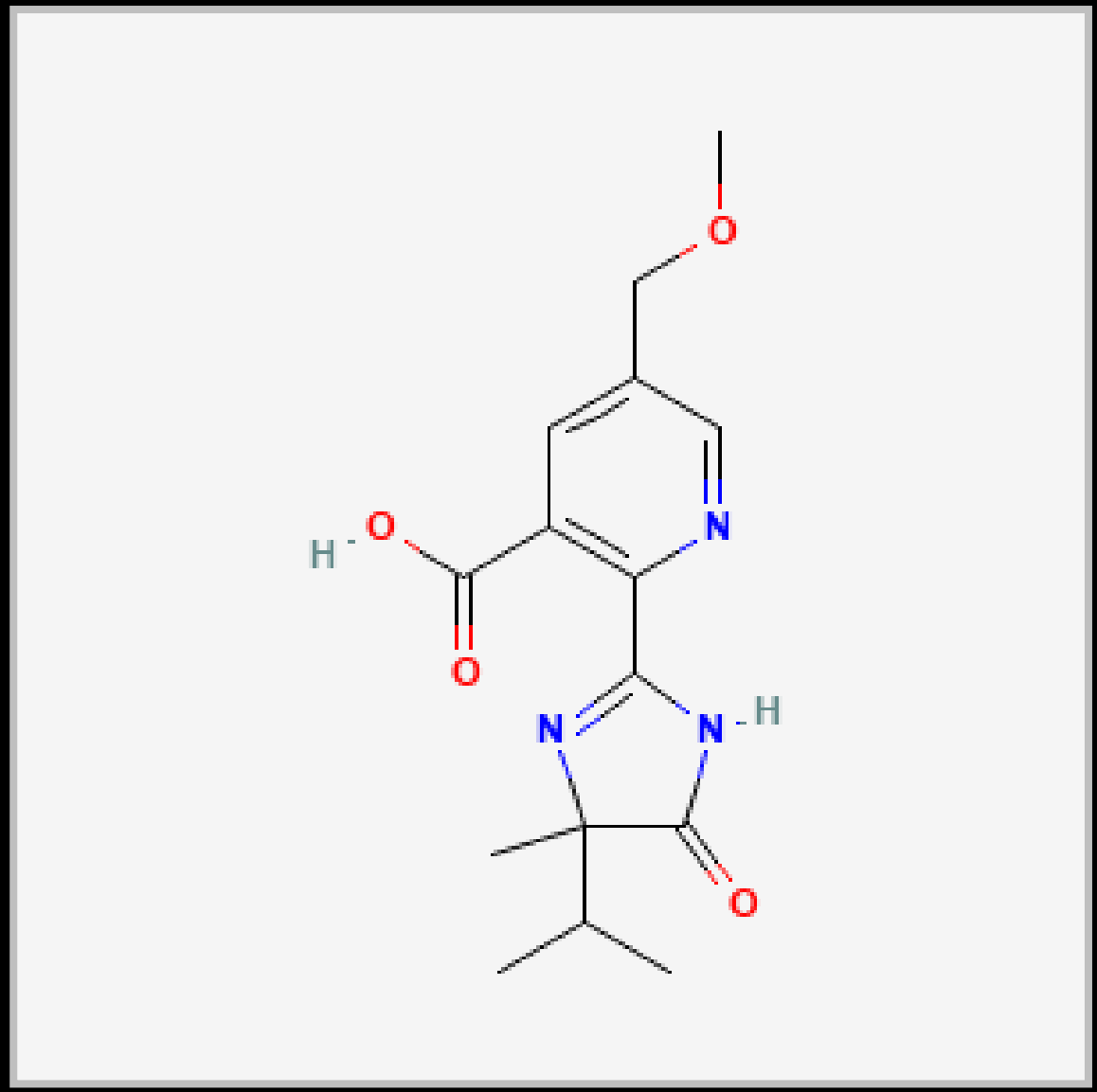
- Preemergent activity
  - Grasses and Broadleaf
- PPO inhibitor
- Applied semi dormant crop
  - Before weeds germinate
  - Summer dormancy in desert



Courtesy of Pub Chem

Imazamox (pre/post)

- Pre/Post Activity
- ALS inhibitor
- Selective
  - Grass and Broadleaf activity
  - Small weeds
- MSO- increase activity
- Works better when warm
- Plant back restrictions
- Between Cuttings/Dormant



Courtesy of Pub Chem

Imazethapyr (pre/post)

- Pre/Post Activity
- ALS inhibitor
- Selective
  - Grass and Broadleaf activity
  - Small weeds
- MSO- increase activity
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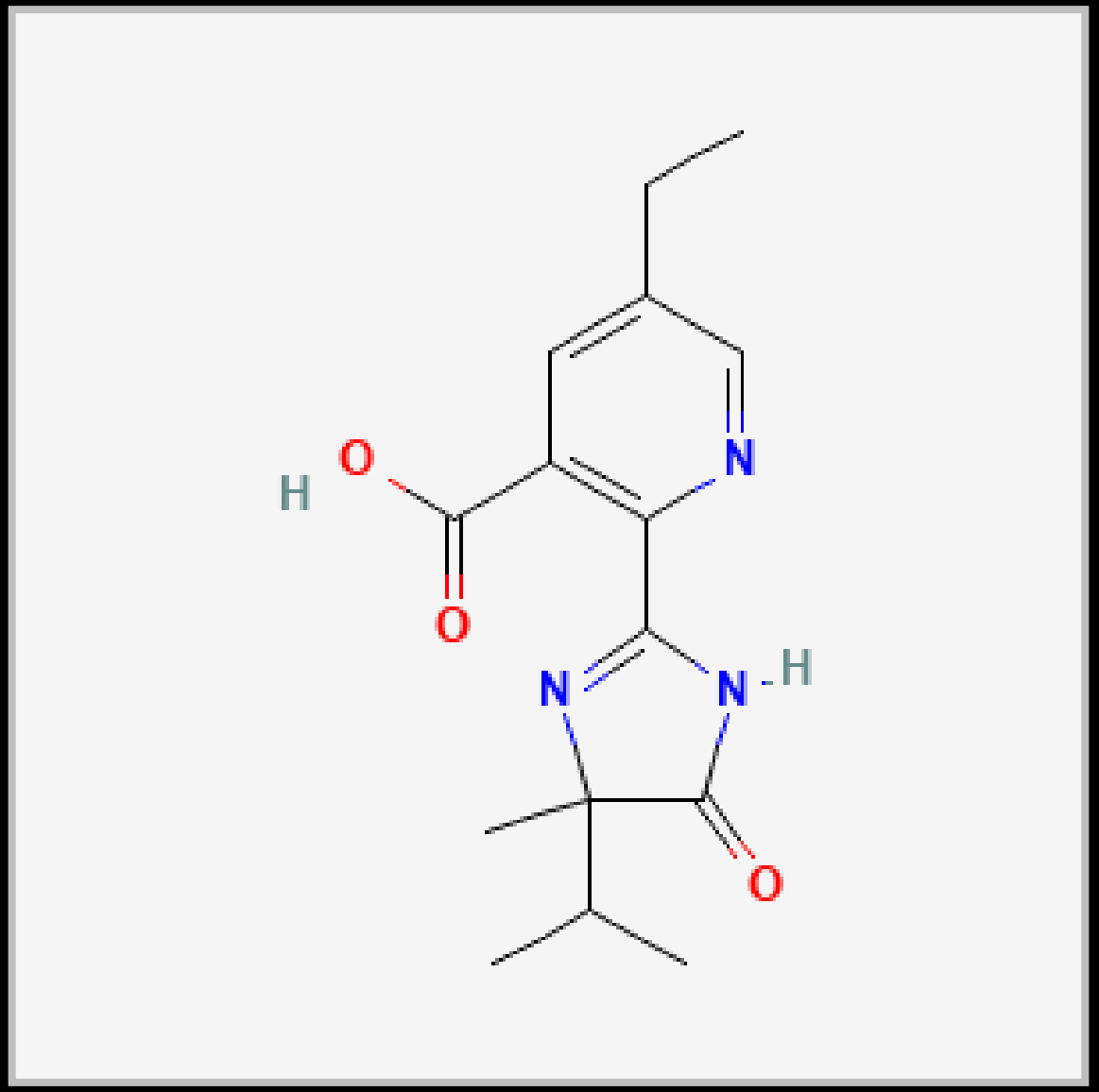


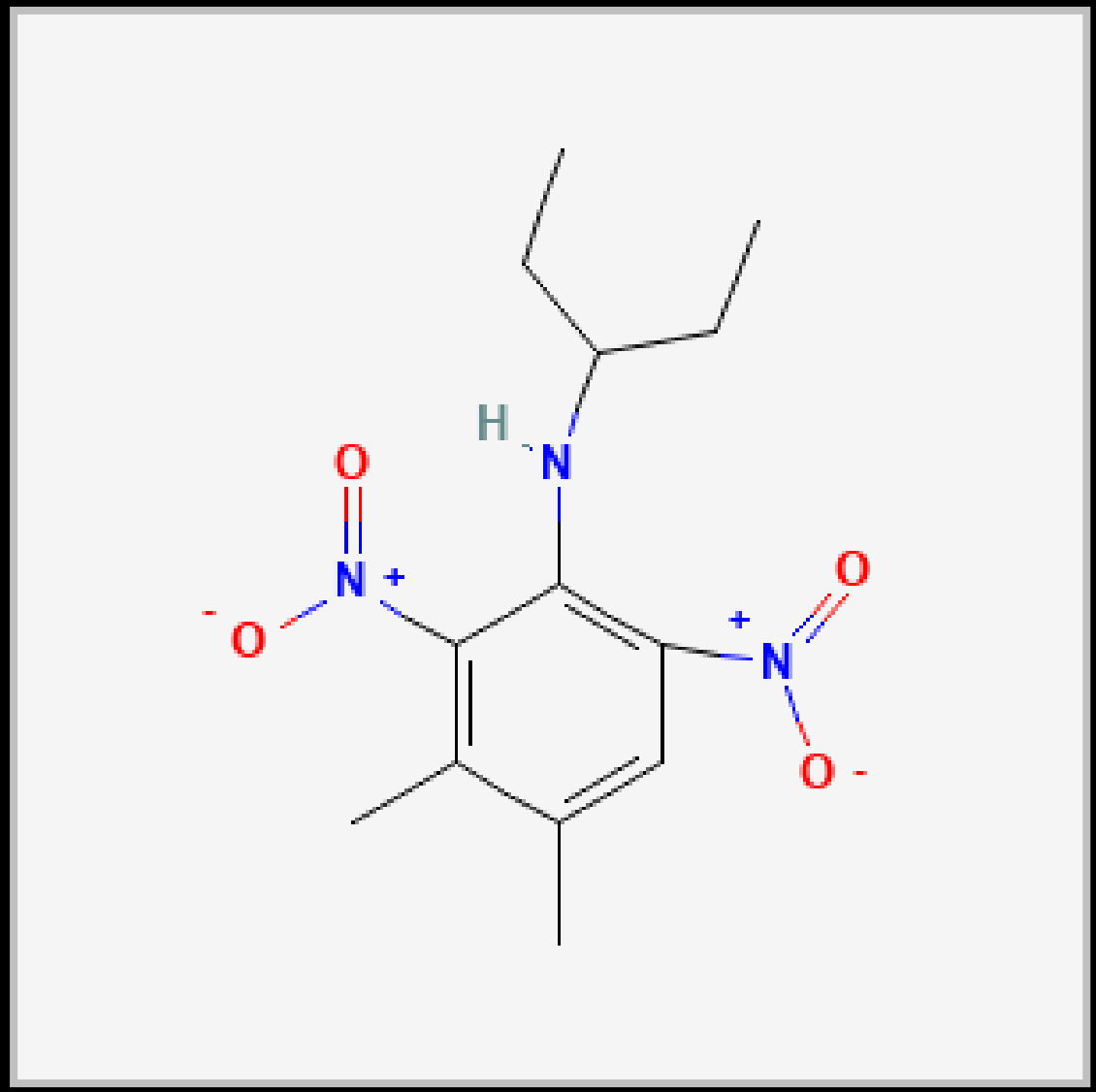
Courtesy of Pub Chem

Summer Annuals

- Germinate when warmer
  - Multiple flushes
  - Break through residuals
  - Warm/wet=herbicide breakdown
  - Between cuttings residua/burndown applications if needed

Pendimethalin (Pre)

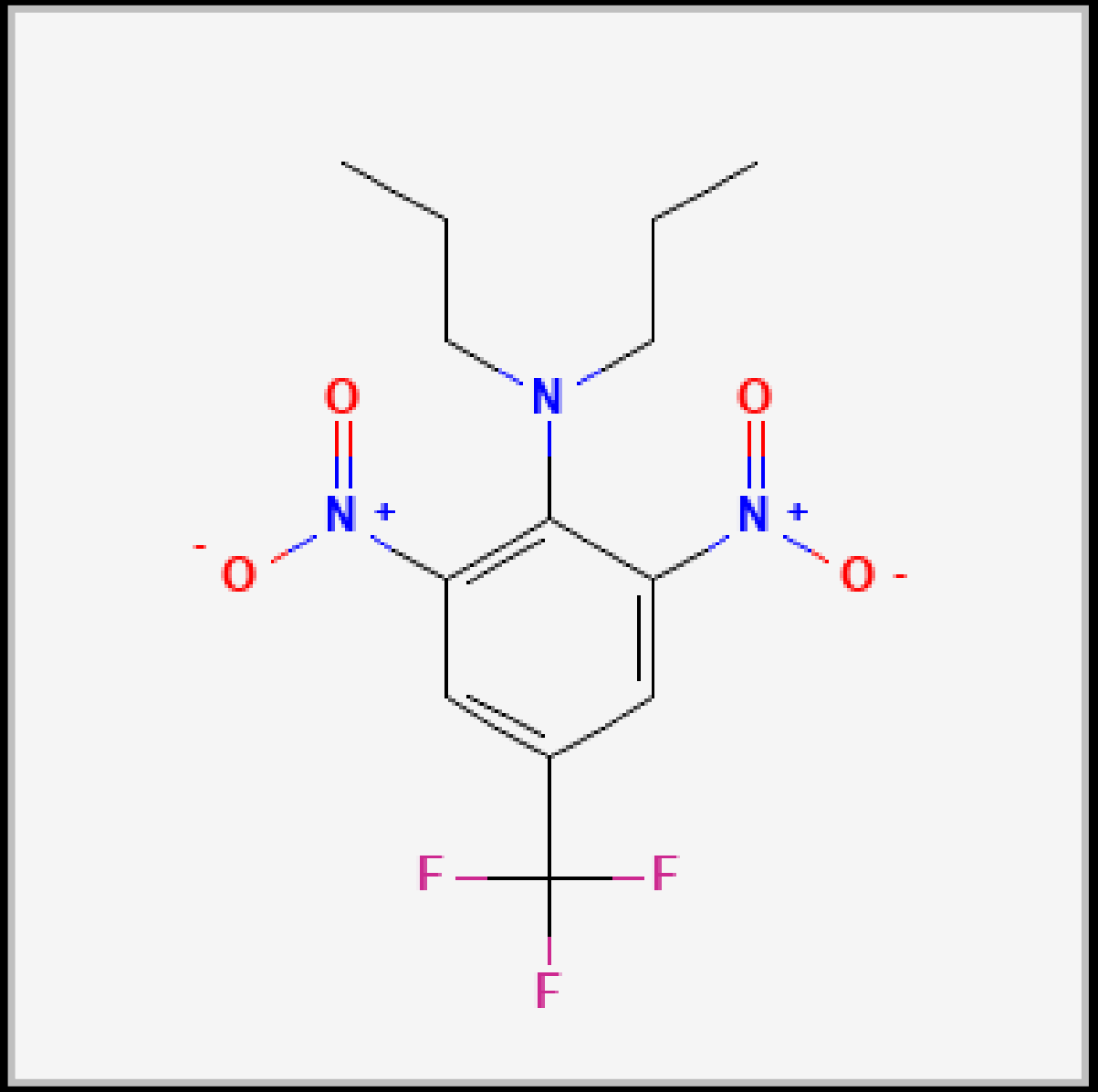
- Pre only
- Mitosis Inhibitor
- Control many grasses and some broadleafs
- High use rates
  - 2-4 quarts/acre
  - 4.4-8.8 liters/ha
- Good control of dodder
- Can be applied dormant or between cuttings



Courtesy of Pub Chem

Trifluralin (Pre)

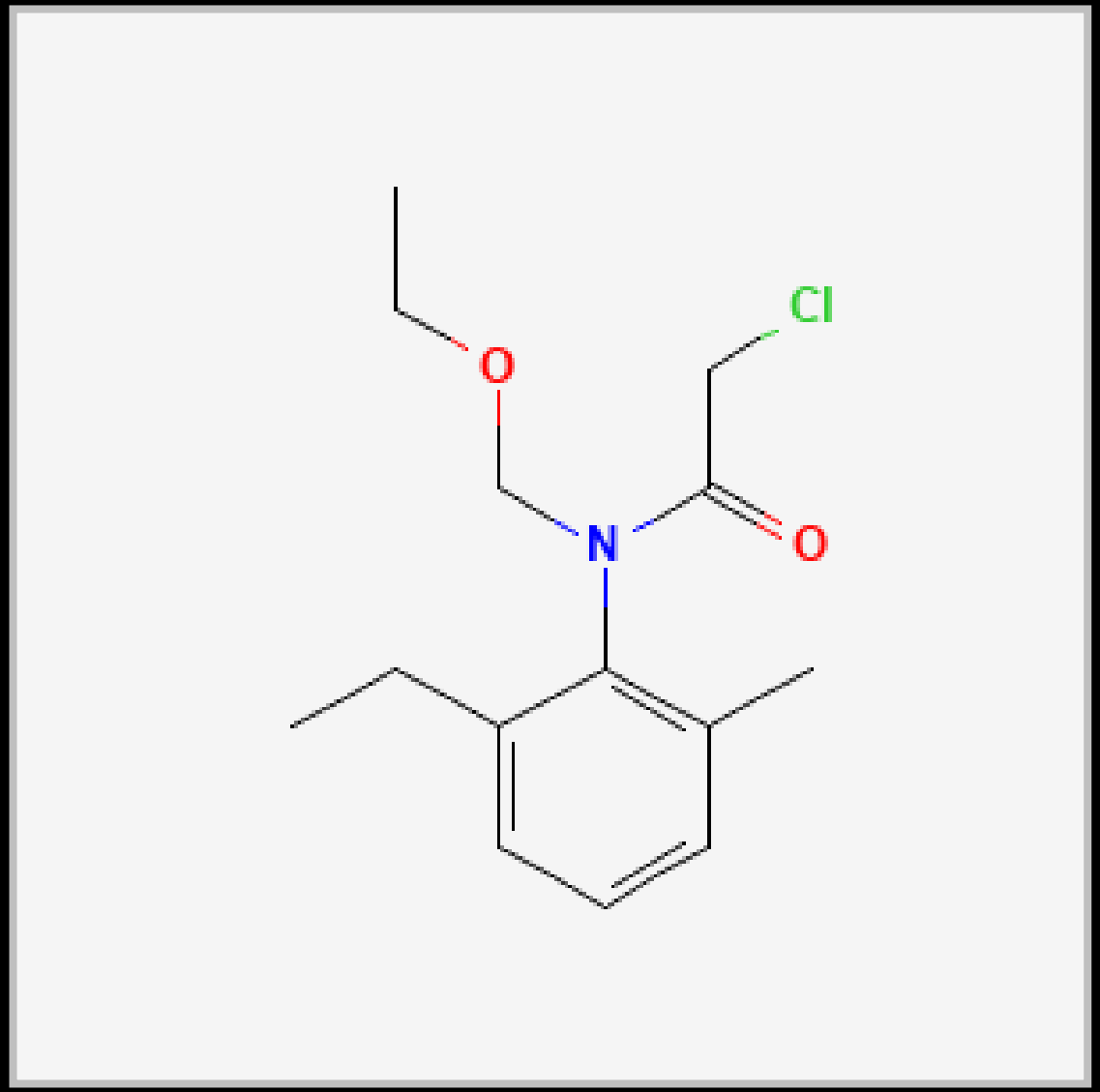
- Pre only
- Mitosis Inhibitor
- Control many grasses and some broadleafs
- High use rates
  - 20 lbs/acre
  - 22 kg/ha
- Good control of dodder
- Can be applied dormant or between cuttings



Courtesy of Pub Chem

Acetochlor (Pre)

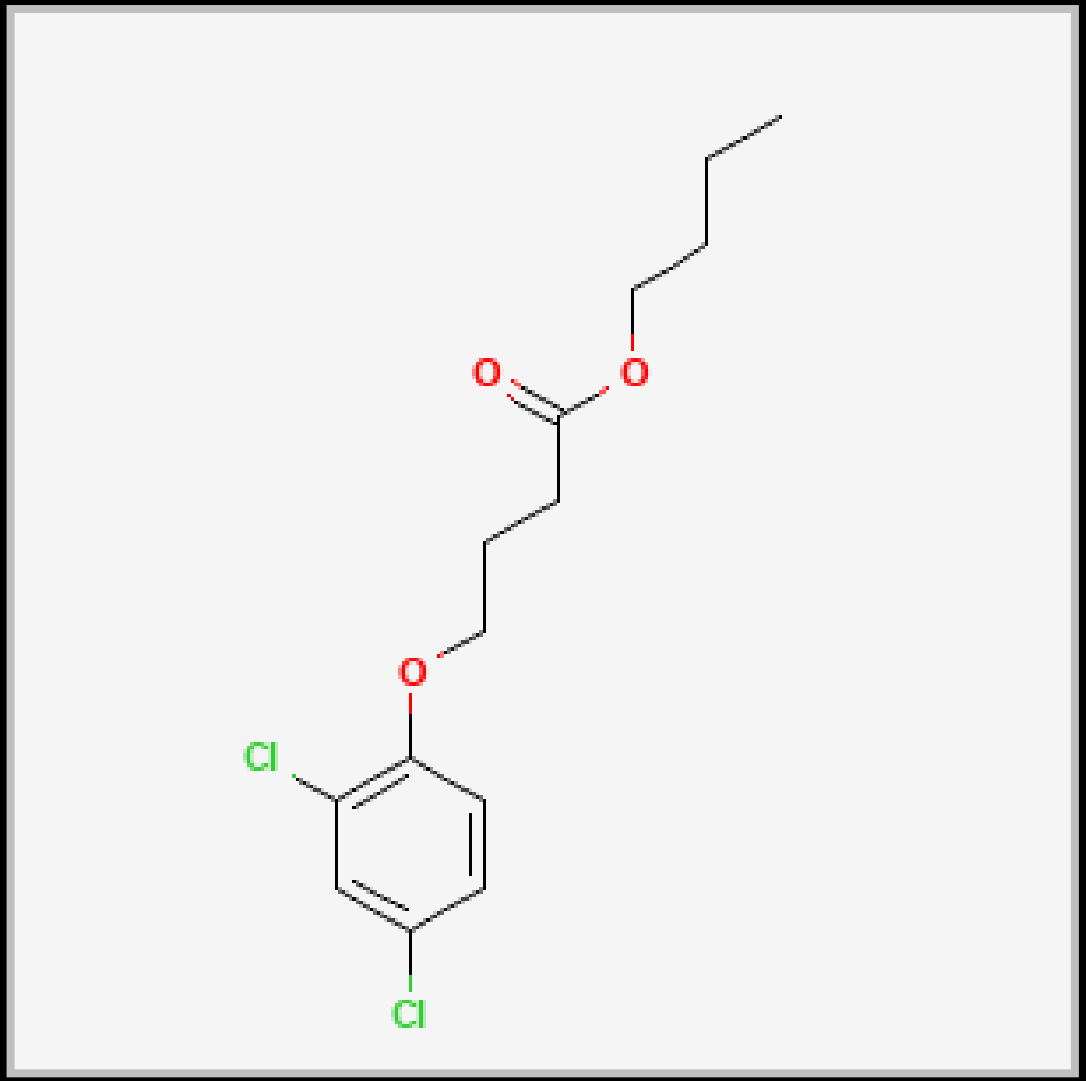
- Pre only
- Mitosis Inhibitor
  - Different subgroup pendimethalin
- Grasses and broadleafs
- Applied dormant and between cuttings
- Newer registration for Alfalfa US
  - Not in California



Courtesy of Pub Chem

2,4-DB (Post)

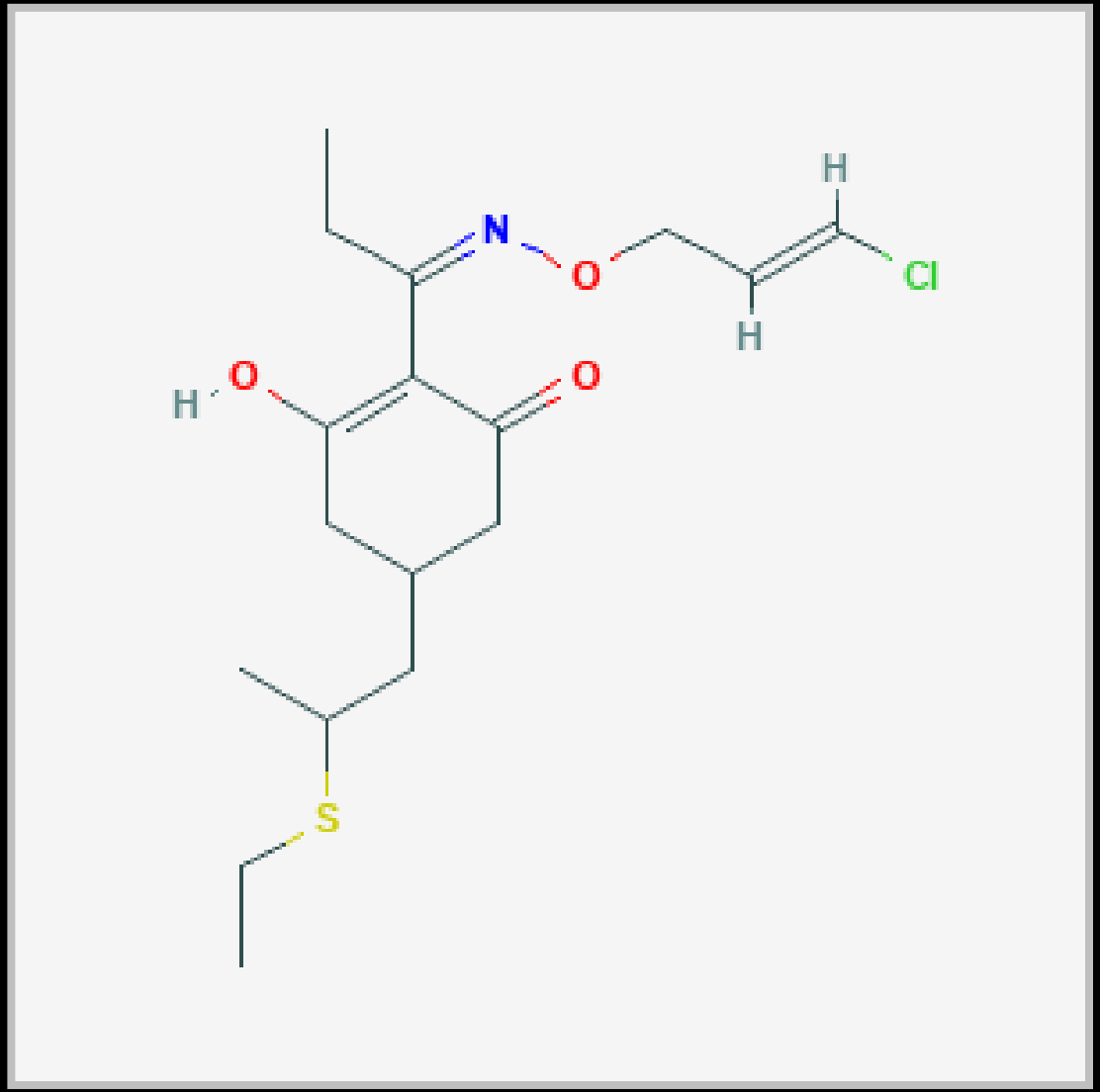
- Control of Broadleafs post emergent
- Auxinic herbicide
- Smaller weeds
- Can control some perennials
- Crop injury- more in established
  - Rain/irrigation shouldn’t occur



Courtesy of Pub Chem

Clethodim (Post)

- Grass Killer
- Post emergent application
- ACCASE inhibitor
- Works best when warm/active growth
  - Irrigate/moisture key
- Applied over the top of crop
- MSO/COC helps



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Sethoxydim (Post)

- Grass Killer
- Post emergent application
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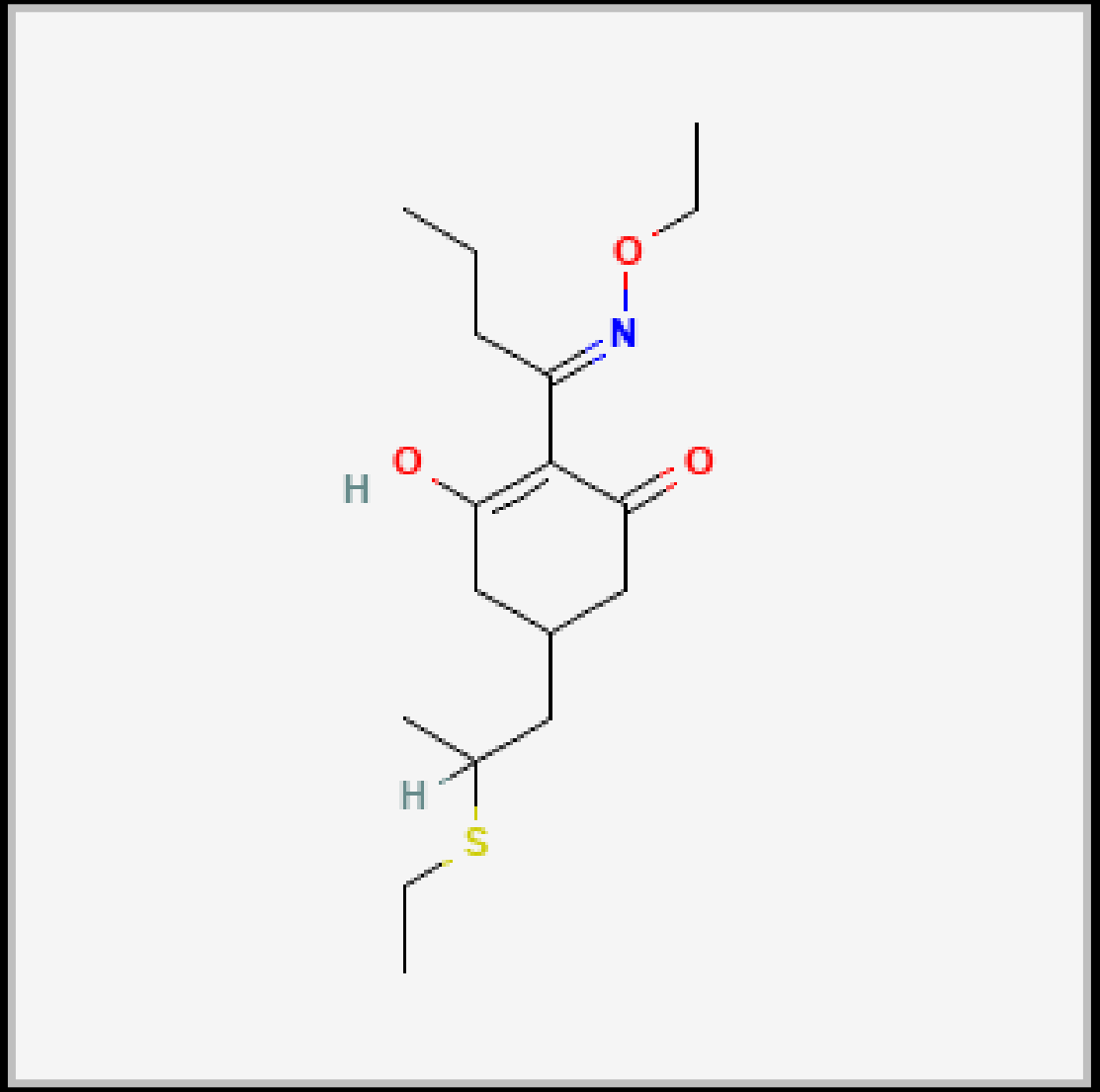


Courtesy of Pub Chem

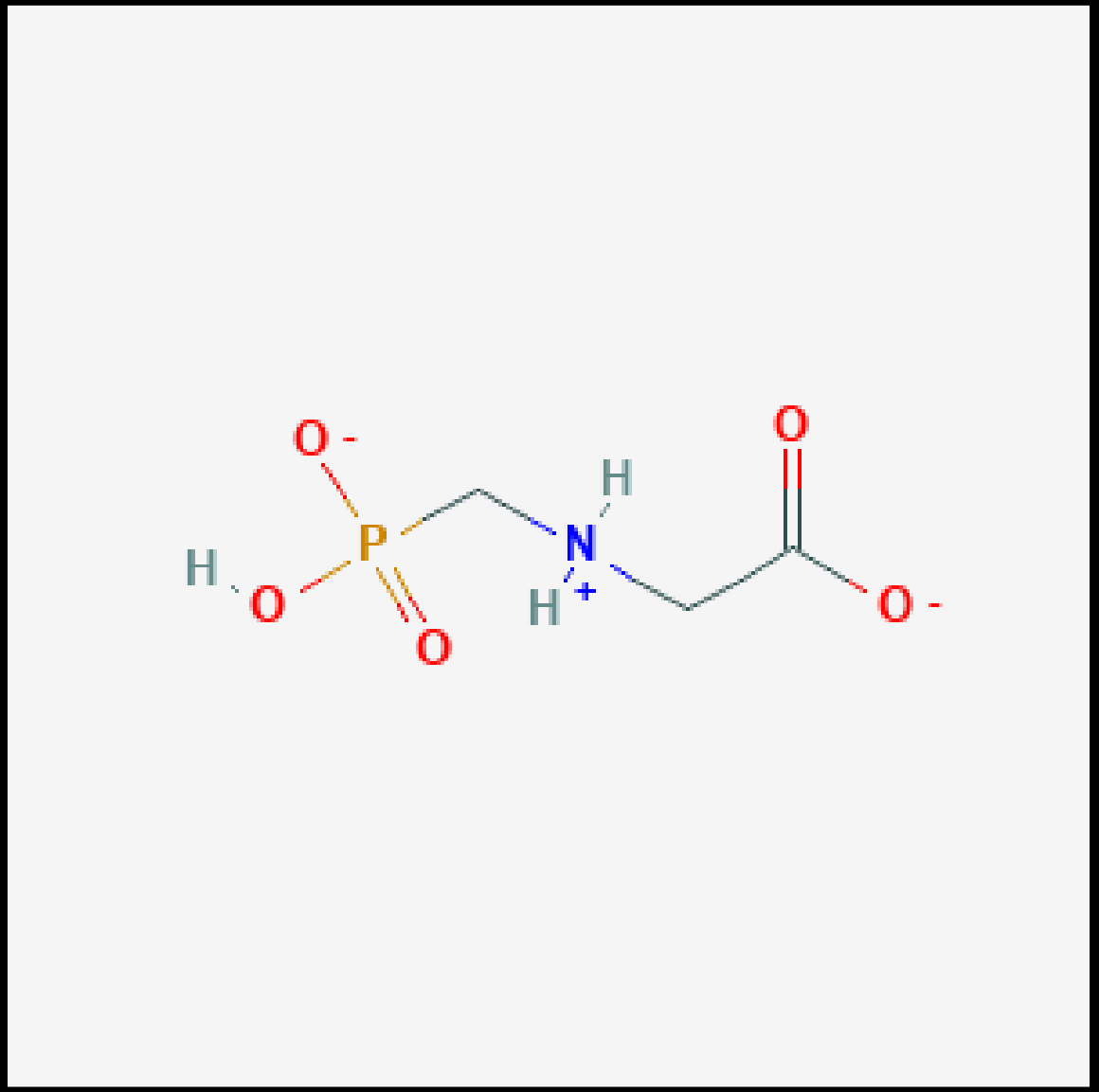
Perennial Weeds

- Roots!
  - Difficult to control…
  - Crop rotation
- Grasses- ACCase inhibitors
- Nutsedge- Halosulfuron
- Certain Perennials (Dock) 2,4-DB
- Roundup ready Alfalfa


CAUTION
PESTICIDE
CAUTION
PESTICIDE

Glyphosate

- Only RR alfalfa
- ESPS inhibitor
- Broad-spectrum
  - Good perennial control
  - Good Annual control
- Flexibility in application timing
- Cold weather Issues-



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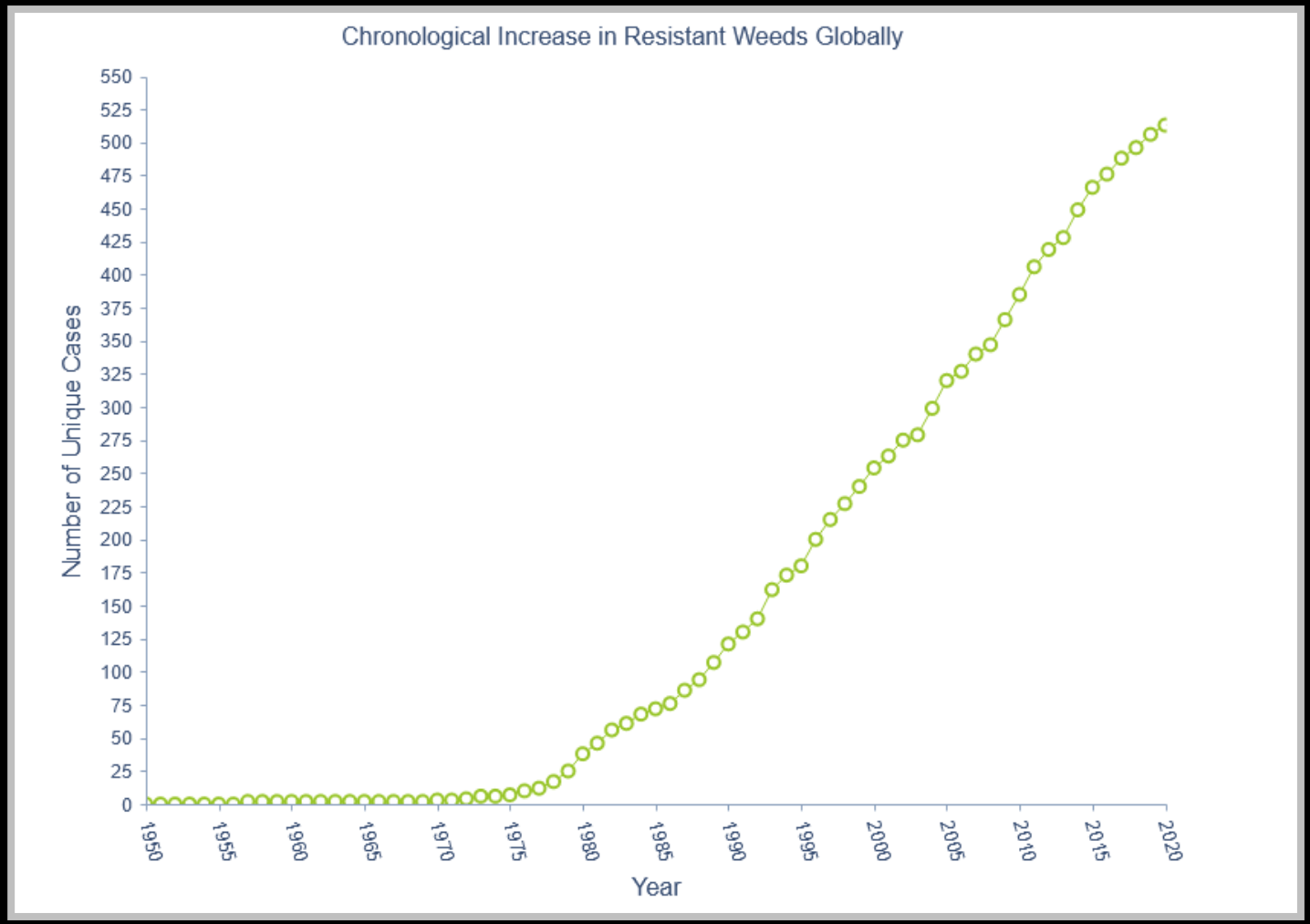
Herbicide Resistance!

- 10-11 mode of actions in alfalfa
- Certain weeds multiple resistance, more than one mode of action



https://www.weedscience.org

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WSSA 2019 Top 5 Weeds in Alfalfa

(32 survey respondents)

MOST COMMON	
1	pigweed spp. (19)*
2	mustard spp. (15)
3	Bromus spp. (10)
4	kochia (9)
4	dandelion (9)

MOST TROUBLESOME	
1	pigweed (19)*
2	Canada thistle (13)
3	Bromus spp. (11)
4	dandelion (9)
4	mustard spp. (9)

*** number of survey respondents who listed the weed species as one of their top 5 weeds in this crop.**

- pigweed spp. included redroot pigweed, spiny pigweed, waterhemp, and Palmer amaranth.
- mustard spp. included shepherd's-purse, flixweed, tansymustard spp., yellow rocket, and white mustard.
- Bromus spp. included downy brome (cheatgrass) and cheat.

USA

- Palmer Amaranth (*Amaranthus palmeri)*
  - 65 Cases of resistance
  - One population 5 modes of action (ALS, PPO, ESPS, MIctotubular-3 and 15)
- Red Root Pigweed (*Amaranthus retroflexus)*
  - 19 cases
  - One population 2 modes of action (ALS, PS2)
- Water hemlock (*Amaranthus tuberculatus)*
  - 52 cases
  - One population 5 modes of action (ALS, PS2, PPO, ESPS, Carotinoid)

https://www.weedscience.org

Top Photo from Michael Rethwisch- California

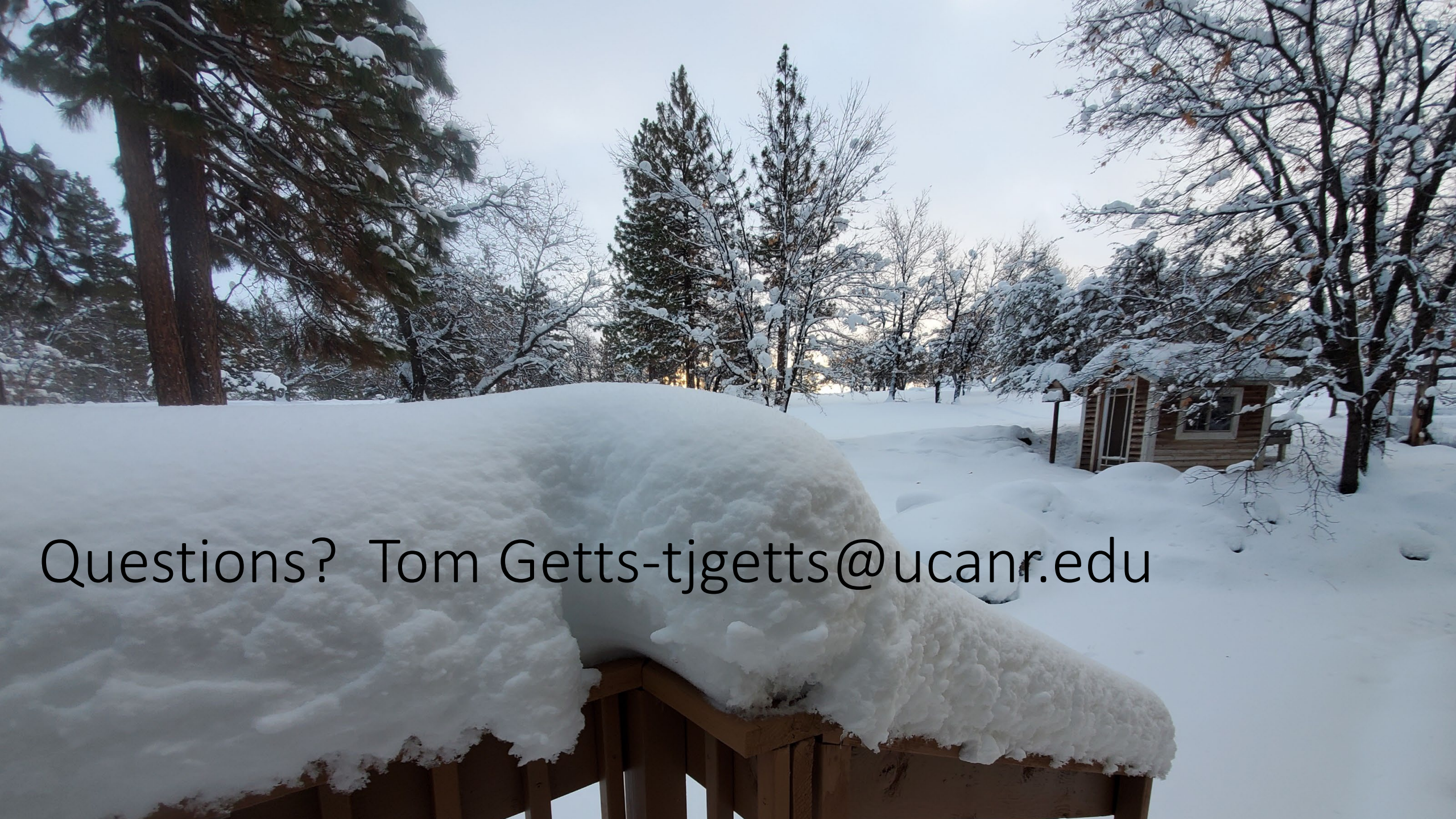
Bottom Photo from Bill McCloskey- Arizona

Managing Resistance

- Crop Rotation
- Physical control
- Multiple “Effective” modes of action
- Residual materials
- No treating every year
- Preventing seed production!

Recap

- Prevent reproduction
  - Cultural
  - Physical
  - Chemical
    - Resistance
- Best weed control is a healthy stand
- Alfalfa is competitive!


Questions? Tom Getts-tjgetts@ucanr.edu