

# Austin County

## 5 Hr. CEU Conference



Vole



Mole



Pocket Gopher



**Four County Auction Center**

**Industry, Texas**

**December 9, 2022**

**TEXAS A&M**  
**AGRI LIFE**  
**EXTENSION**

**5 HR CEU Conference**

*Friday, December 9, 2022*

*Four County Auction Center, Industry*

*Registration 12:30 p.m. - 1:00 p.m.*

*Program 1:00 p.m. - 6:30 p.m.*

**Speakers & Topics:**

- |                 |   |
|-----------------|---|
| 1:00pm - 1:10pm | <b>Welcome and Introductions</b><br><i>Bradley Rinn, Chairman, Austin County Beef &amp; Forage Committee</i>  |
| 1:10pm - 2:05pm | <b>Management of Pastures During &amp; Following Drought - GENERAL</b><br><i>Dr. Larry Redmon, Professor &amp; Associate Department Head &amp; Extension Program Leader</i> |
| 2:05pm - 3:00pm | <b>Improving Herbicide Application- GENERAL</b><br><i>Dr. Mark Matocha, Texas A&amp;M AgriLife Extension, Ag &amp; Environmental Specialist</i>                             |
| 3:00pm - 3:20pm | <b>Break</b>  |
| 3:20pm - 4:15pm | <b>Picolinic Acid Chemistry Training (PACT)- LAWS &amp; REGULATIONS</b><br><i>Dr. Megan Clayton, Texas A&amp;M AgriLife Extension, Range Specialist</i>                     |
| 4:15pm - 5:10pm | <b>Gopher &amp; Mole Control Methods- IPM</b><br><i>B.R. Koehler, local specialist &amp; Bluebonnet Master Gardener</i><br><i>Joe Jimenez, Bluebonnet Master Gardener</i>   |
| 5:10pm - 5:30pm | <b>Break</b>  |
| 5:30pm - 6:25pm | <b>Pesticide Laws and Regulations Update- LAWS &amp; REGULATIONS</b><br><i>Cammie Johnson, TDA Inspector-Pesticides</i>   |
| 6:25pm - 6:35pm | <b>Wrap Up and Evaluation</b><br><i>Bradley Rinn, Chairman, Austin County Beef &amp; Forage Committee</i>   |

# **AUSTIN COUNTY BEEF AND FORAGE COMMITTEE**

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Steve Blezinger

Don Dryer

Richard Fry

Charles Goeke

Alfred Hall

Ricky Huff

William S. Jackson

Allen Kaminski

Jo Ed Lynn

Douglas Marek

Reid Richardson

Bradley Rinn

Gregg Schubert

Dave Schulz

Gary Shupak

Ronny Woodley



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**Soil & Water**  
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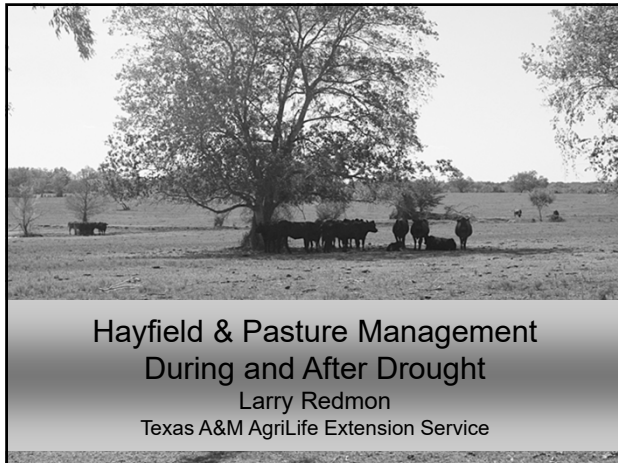
**Texas Farm Credit**



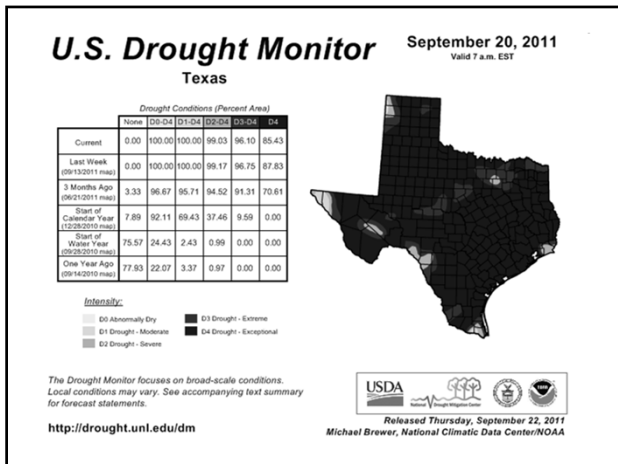
**TEXAS  
FARM  
BUREAU**



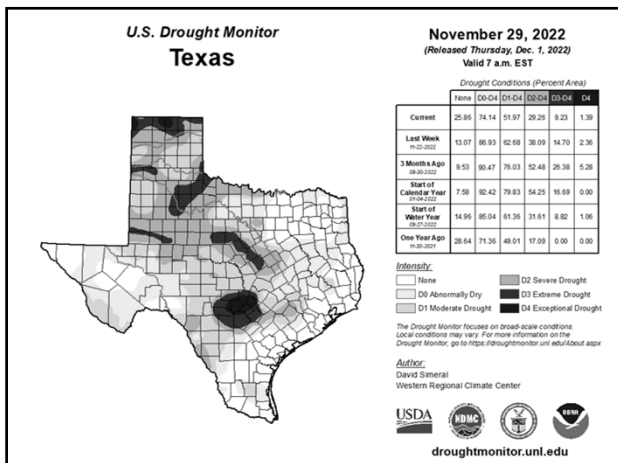




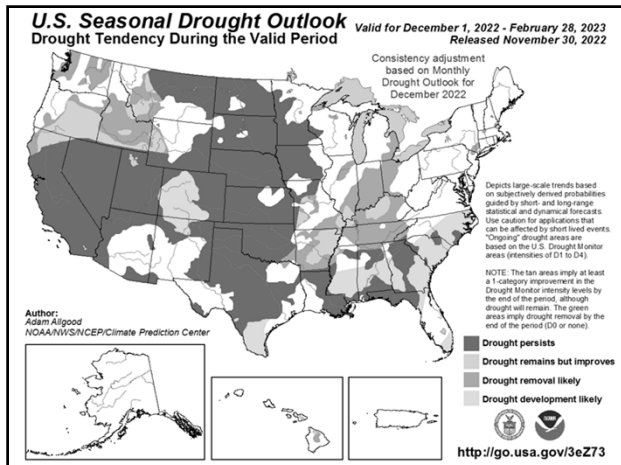
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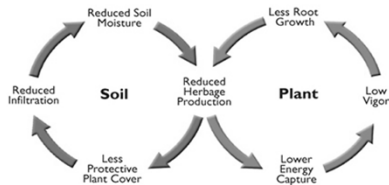


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**NOTE: Root systems are devastated due to drought...recovery involves rebuilding the root system.**



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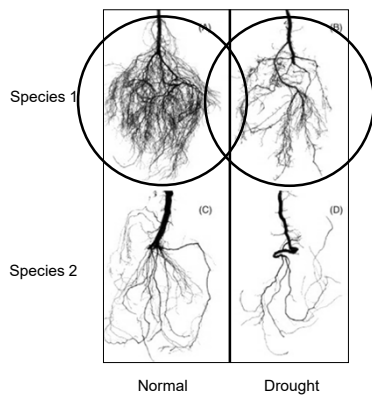
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**Three Aspects for Pasture Recovery**

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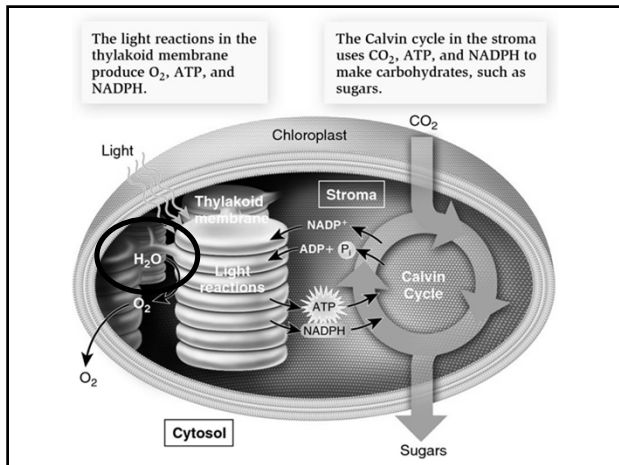
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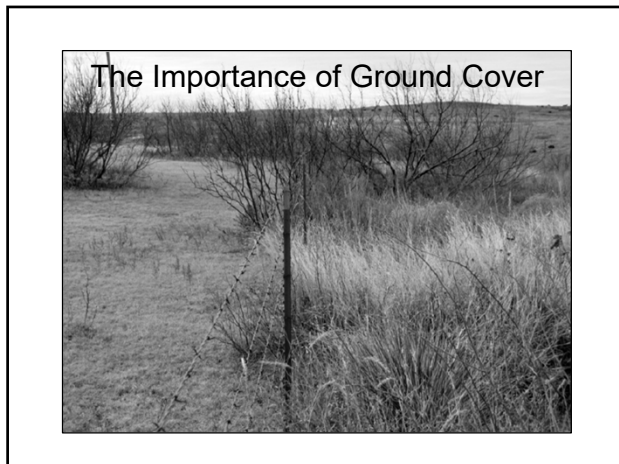
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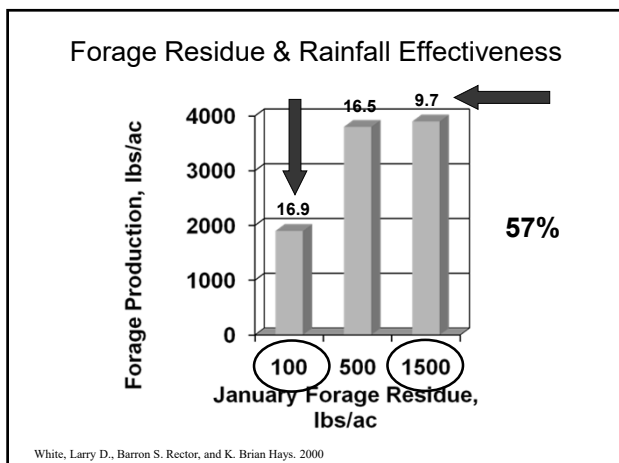
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### Recent Fertilizer Prices

- Ammonium Nitrate (34-0-0) \$780.00/ton
- Urea (46-0-0) \$810.00/ton
- DAP (18-46-0) \$1,080.00/ton
- Potassium (potash, 0-0-60) \$865.00/ton
- Ammonium Sulfate (21-0-0-24) \$670.00
- Urea ammonium nitrate (32-0-0) \$635/ton
- KMAG \$670/ton
- 21-8-17 w/Mg \$837.00/ton
- 21-7-14 w/Mg \$810.00/ton
- 17-17-17 w/Mg \$869.00/ton

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### Actual N Cost/lb

Nitrogen Source	Analysis	%N	lbs N/ton	\$/ton	\$/lb
Anhydrous Ammonia	82-0-0	82	1640	1022	\$0.62
Urea	46-0-0	46	920	810	\$0.88
Ammonium Nitrate	34-0-0	34	680	780	\$1.15
Urea Ammonium Nitrate	32-0-0	32	640	635	\$0.99
Ammonium Sulfate	21-0-0-24	21	420	670	\$1.60
Broiler Litter	3-3-2	3	60	50	\$0.83
Class A Biosolid	6-3-0	6	120	55	\$0.46

<sup>1</sup> 2022 US Prices

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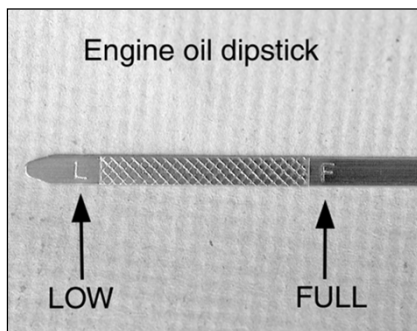
Can we do anything about the high cost of fertilizer?

But, we can do something about how efficiently we use fertilizer.

No

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The simple, yet profound, dipstick



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## Use the soil “dip stick” ...

- Soil Test!
  - Fertilizer needs to be out before the rain...
- Without soil testing you:
  - Over-apply expensive nutrients,
  - Under-apply needed nutrients,
  - Never apply the correct amount.



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## Fertilizer Strategy After Drought

- SOIL TEST
- Minimum Requirement
  - Drought-stressed forage should be treated as newly established until recovery is complete.
  - P = Root growth & development, energy metabolism
  - K = Drought tolerance, disease resistance, cold tolerance
  - Previously applied nutrients will still be available if not removed via harvesting.

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## Consider your forage base

- Bahiagrass, dallisgrass, kleingrass, native forages, others...
  - Persistent under low-input management
  - Will not support the stocking rate as well-managed bermudagrass
  - With hay harvest, all species must be fertilized based on soil-test recommendation; might as well keep bermudagrass for hay



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## Protection

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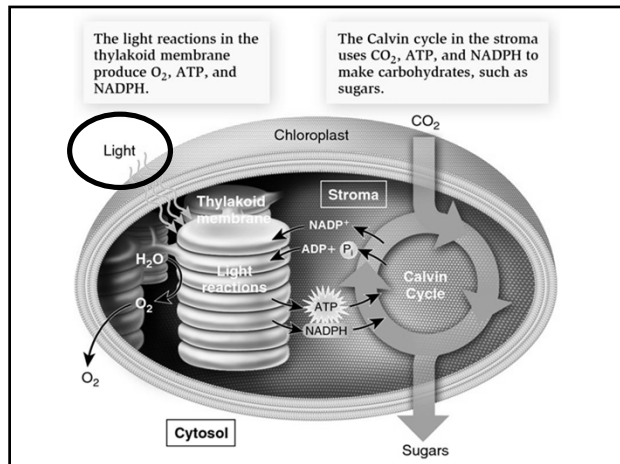
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## Protection from Weeds

- Heavy weed pressure:
  - Inhibits photosynthesis, which requires sunlight and green leaf tissue.
  - Reduces **recovery** potential due to competition for sunlight, moisture, nutrients...
  - With good growing conditions, use herbicides; otherwise mow.



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## Weed Management During Drought

- Drought-stressed weeds may be more difficult to control due to:
  - Development of thicker, waxy cuticle
  - Impact on spray droplet performance
  - Difference in leaf angle to spray
  - Herbicide is only partially translocated or not translocated at all.
  - Probably need to shred...(did I say that?)

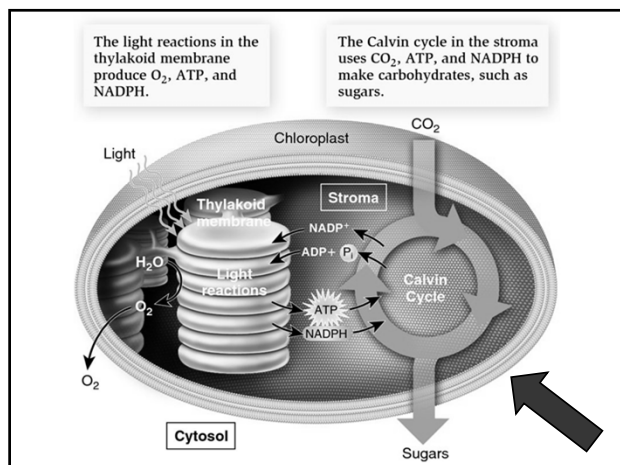
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## Protection from Winter Pasture

- Failure to remove
  - Inhibits photosynthesis.
  - Can slow emergence.
  - Can destroy warm-season grass.
- **Remove** winter pasture before greenup!
  - Bermudagrass begins active growth when nighttime temperatures are consistently 60°F.
  - Graze or bale.



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## Protection from Grasshoppers

- Dimilin
  - Applied to young hoppers
  - Has ~30-day residual
  - 1-day haying restriction, no grazing restriction
- Malathion + Sevin XLR
  - 4 oz of each product/ac
  - **14-day** grazing or haying restriction
  - Only apply **2X** per year
- Mustang
  - No grazing or haying restriction
- Tombstone
  - No grazing or haying restriction
  - Pyrethroid
- Lambda-Cy
  - No grazing restrictions; 7-day haying restriction



**Vantacor** – FMC – no grazing or haying restrictions.

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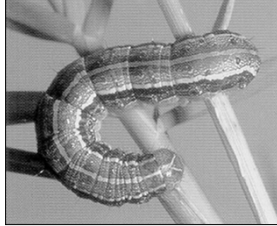
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## Protection from Fall Armyworms

- Grizzly
  - Pyrethroid
  - No grazing restriction, 7-day haying restriction
- Malathion + Sevin XLR
  - 4 oz of each product/ac
  - **14-day** grazing or haying restriction
  - Only apply **2X** per year
- Mustang
  - No grazing or haying restriction
- Tombstone
  - No grazing or haying restriction
  - Pyrethroid product
- Lambda-Cy
  - No grazing restrictions; 7-day haying restriction



**Vantacor** – FMC – no grazing or haying restrictions.

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## Protection from Livestock

- **Remain destocked, maintain the reduced stocking rate, or consider further reductions.**
  - Consider drought management as part of the overall strategy.



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## A Tale of Two Grazing Philosophies

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Be slow to  
increase  
stocking...

We are not out of  
the drought, yet...

Plants need time to  
re-establish  
adequate root  
systems.

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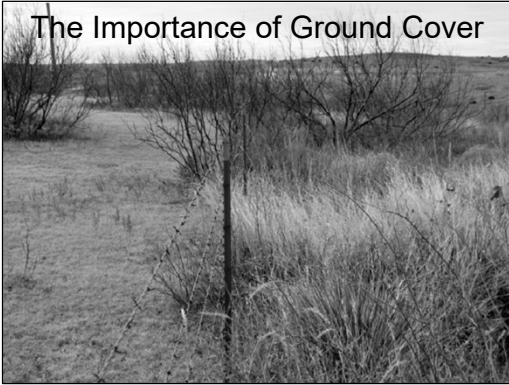
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### The Importance of Ground Cover



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### Finally...protect the soil.

- Without adequate ground cover besides losing water, you **lose**:
  - **Topsoil**
    - Hundreds to > 1,000 years to create 1"
  - **Fertilizer nutrients**
    - Money *literally* goes down the creek
  - **Organic matter**
  - **Bacteria**
    - Primary source of waterbody impairment in Texas

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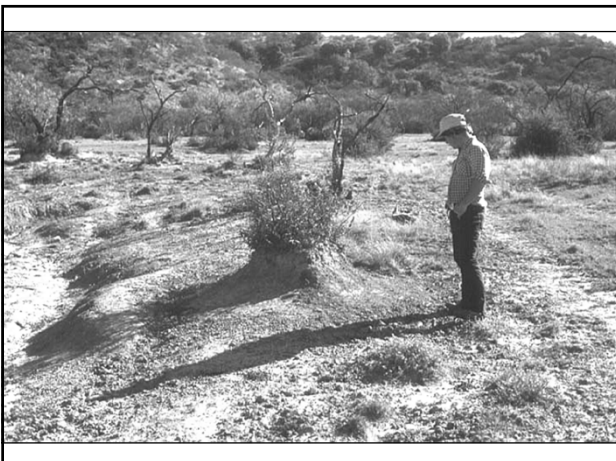
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## And...protect the environment...

- Without adequate ground cover besides losing water, you **lose**:
  - **Topsoil**
    - Hundreds to > 1,000 years to create 1"
  - **Fertilizer nutrients**
    - Money *literally* goes down the creek
  - **Organic matter**
    - Water holding, nutrient storing
  - **Bacteria**
    - Primary source of waterbody impairment in Texas

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## Re-establishment???

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## Consider/Reconsider Goals for the Property

- Is livestock production still of interest?
- Is there a desire to change enterprises?
  - Different livestock species?
  - Move to hay production?
  - Transition to wildlife management?
- Is there a desire to change forage base?

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## Assess the Damage

- How extensive is the damage?
- Has adequate precipitation occurred or is occurring at the location?
- What is the potential for recovery?
  - Has the stocking rate been adjusted appropriately?
  - What is the forage base? Variety?
  - Resources available to the producer?

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## Establishment/Re-establishment

- Species
- Timing
- Seedbed Preparation
- Pre-plant Fertilizer
- Planting Depth
- Planting Rate
- Post-plant Fertilizer
- Post-plant Management
  - Grazing/harvest/weeds/insects



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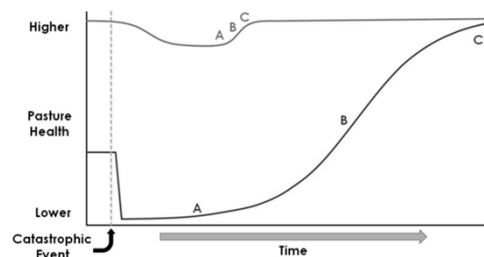
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## A Tale of Two Pastures: Pasture Response to Catastrophic Events<sup>1</sup>



<sup>1</sup> Justin Morris and Linda Poole, Producers Voice, April 2022

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## Summary

- Adequate moisture
- Fertility
- Protection
  - From grazing livestock, weeds, winter pasture, insects
  - Soil protection
- Re-establishment may be necessary

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## Summary

- Short term
  - Soil test to determine nutrient requirements
  - If you harvest hay, do so at the appropriate stage of maturity
  - Consider bale size when buying/selling
  - Store hay appropriately to minimize loss
  - Use appropriate hay ring to minimize loss
- Long Term
  - Consider your forage base

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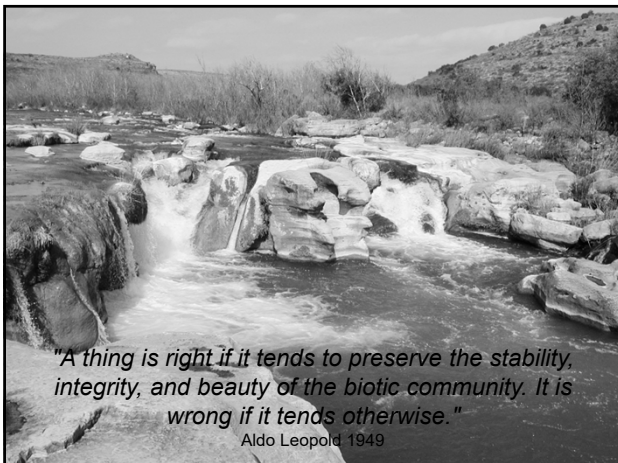
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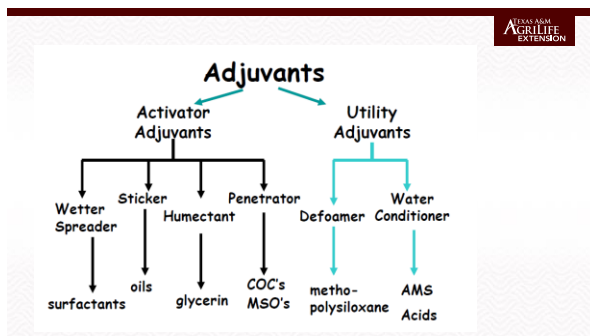
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### Surfactant History

First record of soaps - Babylon 2800 BC


Galen – Greek physician and philosopher; 200 AD  
First authentic mention of soaps as cleansing agents (fat, ash lye, lime)



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### Barriers of Entry

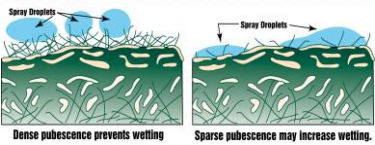
Leaf angle



Common sense, but often overlooked.  
Grasses are smaller target versus broadleaves.

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### Barriers of Entry

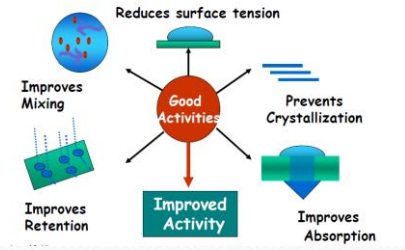


**Dense pubescence prevents wetting**      **Sparse pubescence may increase wetting.**

Leaf hairs (pubescence)  
Absorption dependent on good leaf-to-spray contact.  
Some weeds are very hairy...microscopically.

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### Activities of a Good Adjuvant



Reduces surface tension

Prevents Crystallization

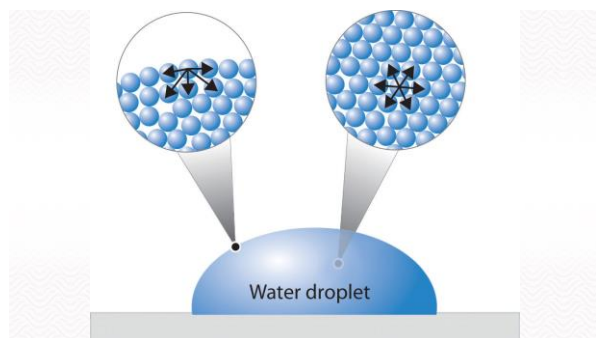
Improves Absorption

Improved Activity

Improves Retention

Improves Mixing

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### Left to Right: 0, 0.01, 0.1% Non-Ionic Surfactant



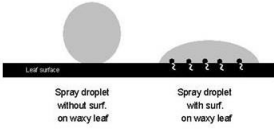
Cabbage Leaf

Courtesy: Bukovac - Michigan State University

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### How Surfactants Work


Droplet spread on waxy leaf surface due to surfactant



Leaf surface

Spray droplet without surf. on waxy leaf

Spray droplet with surf. on waxy leaf



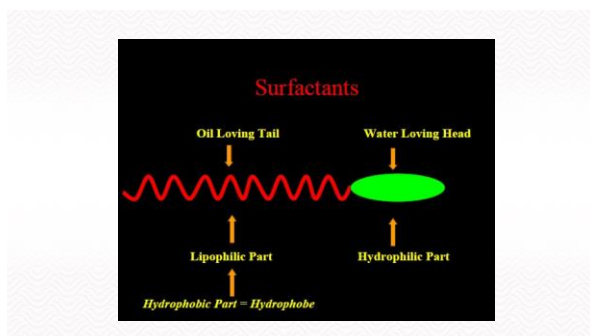
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### Mode of Action

- **Nonionic surfactants affect**
  - spray solution
  - the surface of plant tissue
  - the cuticle surface
  - the cuticle layers

Facilitates wetting, more uniform spreading, dispersing, solubilizing, and emulsifying for enhanced herbicide uptake.

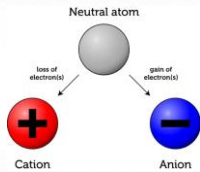
Decreases surface tension, slows drying time, increases penetration.



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### Mode of Action

- **Cationic surfactants**
  - Positively charged
  - Usually phytotoxic
- **Anionic surfactants**
  - Negatively charged
  - Enhance foaming
  - Common in shampoo



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### Mode of Action

- **Crop oil concentrates**
  - petroleum based with surfactants/emulsifiers
  - 80/20 or 83/17 (COC + surfactants/emulsifiers)

*Both the oil and type of surfactants enhance activity.*

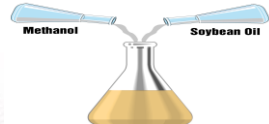
- oil facilitates the penetration of the cuticle
- emulsifier/surfactant allows oil to mix with water & assist in uptake of herbicide
- commonly used when stress conditions exist

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### Mode of Action

- **Methylated Seed Oils**
  - free fatty acids derived from soybean, corn, sunflower oils then reacted with methanol yielding methyl esters

*The most active activator adjuvants.*



performs very well on large or drought stressed weeds

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Without adjuvant

With adjuvant

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**Note:** Grazon P+D does not mix readily with oil. Use of a non-ionic agricultural surfactant, such as Ortho X-77, Triton AG-98, or Trionic, is recommended for all applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre.

Herbicidal effects of Grazon P+D occur primarily from uptake by plant foliage and translocation throughout the plant, however, secondary herbicidal activity may occur from soil uptake of picloram. Very small amounts can kill or damage broadleaf plants. To prevent damage to crops and other desirable plants, carefully follow all directions and precautions.

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#### SPRAY ADJUVANTS

Unless otherwise directed, applications of Pastor® Herbicide must include a surfactant. In addition, ammonium nitrogen fertilizer and/or antifoaming agents can be used unless specifically prohibited by tank mix partner labeling. Consult local BAYER CROPS SCIENCE LP fact sheets, technical bulletins, and service policies prior to using other adjuvant systems. If another herbicide is tank mixed with Pastor® Herbicide, select adjuvants authorized for use with both products. Products must contain only EPA-exempt ingredients.

##### Nonionic Surfactant (NIS)

- NIS is the preferred surfactant under most conditions.
- Apply at 0.25% v/v (1 quart per 100 gallons spray solution) or 0.5% under arid conditions.
- Surfactant products must contain at least 60% nonionic surfactant with a hydrophilic-lipophilic balance (HLB) greater than 12.

##### Crop Oil Concentrate (COC)

- Use of COC may increase the potential for bermudagrass injury.
- Apply at 1% v/v (1 gallon per 100 gallons spray solution) or 2% under arid conditions.
- Oil adjuvants must contain at least 80% high quality petroleum (mineral) with at least 15% surfactant emulsifiers.

##### Ammonium Nitrogen Fertilizer

- Use 2 quarts/acre of a high-quality urea ammonium nitrate (UAN), such as 28%N or 32%N, or 2 pounds/acre of a spray grade ammonium sulfate (AMS). Use 4 quarts/acre UAN or 4 pounds/acre AMS under arid conditions.
- Do not use low rates of liquid fertilizer as a substitute for surfactant.
- See "Tank Mixtures with Liquid Solution Fertilizer" for instructions on using fertilizer as a carrier in place of water.

##### Special Adjuvant Types

- Combination adjuvant products may be used at doses that provide the required amount of NIS, COC, and/or ammonium nitrogen fertilizer. Consult product literature for use rates and restrictions. Use of combination adjuvant products may increase the potential for bermudagrass injury.

In addition to the adjuvants specified above, other adjuvant types may be used if they provide

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#### The chemistry of a nonionic surfactant ?

- Each surfactant has a hydrophilic group and a lipophilic group
- The hydrophilic group is usually a polyhydric alcohol or ethylene oxide
- The lipophilic group is usually a fatty acid or a fatty alcohol



- The lower the HLB value the more lipophilic or oil soluble the surfactant is
- The higher the HLB value the more water soluble or hydrophilic the surfactant is
- HLB Value range is between 1 - 20

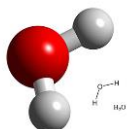
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#### Spray Water

Water is primary carrier for pesticides

Water usually makes up 98% of solution

The chemistry of the water can affect herbicide/pesticide solutions



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#### Water pH

Water pH is a measure of H<sup>+</sup> ion concentration in water

As water pH decreases, it becomes more acidic and number of H<sup>+</sup> ions increases

Weak acids dissociate less under acid conditions

Ideally, spray water pH should be low so herbicides don't dissociate

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## Water pH

There are exceptions to wanting acid spray tank water

Sulfonylurea herbicides actually need neutral – alkaline spray water

Ally/Cimarron, Accent, Envoke, Permit, Pastora, Harmony Extra, Amber, Glean, Peak



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## Aquatic herbicide - Clipper

### APPLICATION AND SPRAYER INFORMATION

#### Mixing Instructions

- Mix with water having pH of 5 to 7. If pH is higher than 7, use an appropriate buffer to reduce pH to desirable range.
- Fill clean spray tank 1/2 full of desired level with water and add buffering agent if necessary.
- Add the required amount of *Clipper* Herbicide to the spray tank while agitating.
- Fill spray tank to desired level with water. Ensure that *Clipper* Herbicide is thoroughly mixed before making applications. Agitation should continue until spray solution has been applied.
- Mix only the amount of spray solution that can be applied the day of mixing. Apply *Clipper* Herbicide within 12 hours of mixing.

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Common Name	Trade Name	Half-life* at Different pH Values**
2,4-D amine	Weedar 64	stable at pH 4.5-7
acephate	Orthene	pH 5 = 40 days, pH 7 = 46 days, pH 9 = 16 days
azinphos-methyl	Guthion	pH 5 = 17 days, pH 7 = 10 days, pH 9 = 12 hours
bendiocarb	Turcam	pH 5 = 48 days, pH 7 = 3 days, pH 9 = 45 minutes
benomyl	Benlate	pH 5 = 80 hours, pH 6 = 7 hours, pH 7 = 1 hour
captan	Orthocide	pH 5 = 32 hours, pH 7 = 8 hours, pH 8 = 10 minutes
carbaryl	Sevin	pH 7 = 24 days, pH 8 = 2.5 days, pH 9 = 1 day
carbofuran	Furadan	pH 6 = 8 days, pH 9 = 78 hours
chlorothalonil	Bravo, Daconil 2787	stable over wide range of pH
chlorpyrifos	Dursban, Lorsban	pH 5 = 63 days, pH 7 = 35 days, pH 8 = 1.5 days
diazinon	Knox-Out, D.Z.N.	pH 5 = 14 days, pH 7 = 70 days, pH 9 = 29 days
dicamba	Banvel	stable at pH 5-6
dimethoate	Cygon, Dimate	pH 4 = 20 hours, pH 6 = 12 hours, pH 9 = 48 minutes
disulfoton	Di-syston	pH 5 = 60 hours, pH 6 = 32 hours, pH 9 = 7.2 hours
flazifot-P-butyl	Fusilade	pH 4.5 = 455 days, pH 7 = 147 days, pH 9 = 17 days
malathion	Cythion, Fyfanon	pH 6 = 8 days, pH 7 = 3 days, pH 8 = 19 hours
maneb	Dirthane Manzate	pH 5 = 20 days, pH 7 = 17 hours, pH 9 = 34 hours
methomyl	Lannate	stable in pH below 7
paraquat	Gramoxone Extra	not stable in pH above 7
pendimethalin	Provil	stable over a wide range of pH
phosmet	Imidan	pH 4.5 = 13 days, pH 7 = 12 hours, pH 8 = 4 hours
propargite	Omite, 6E & 30W	effectiveness reduced in pH above 7
simazine	Princep	pH 4.5 = 20 days, pH 5 = 96 days, pH 9 = 24 days
trichlorfon	Dylox	pH 6 = 3.7 days, pH 7 = 6.5 hours, pH 8 = 63 minutes
trifluralin	Treflan	very stable over a wide range pH

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## Herbicide Additives Buffers

maintain or reduce pH  
prevent alkaline hydrolysis (> 7 pH)  
Buffer P.S, Penetrator Plus

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## Hard Water

Hard water contains high levels of Ca, Mg, Na, or Fe cations (positively charged)

These cations attach to negatively charged herbicides rendering them ineffective

High pH and hard water can reduce effectiveness

High pH causes dissociation while hardness deactivates herbicide

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## Hard Water

How hard is too hard?

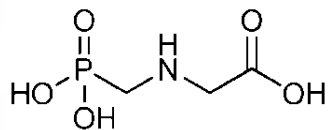
If total concentration of Ca, Mg, Na, and Fe exceeds 400 ppm, you may have a problem

CaCO<sub>3</sub> – calcium carbonate can cause problems for herbicides containing 2,4-D



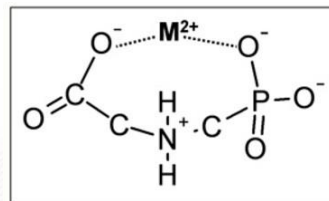
30

## Glyphosate



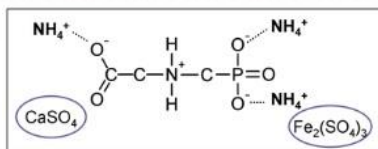
31

## Glyphosate + hard water



32

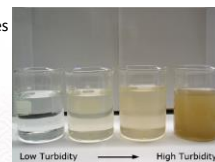
## Ammonium Sulfate



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## Turbidity

Turbid water contains suspended solids or organic water  
May affect some pesticides  
Glyphosate and paraquat will bind to particles  
Dicamba will be relatively unaffected



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## What is the shelf life of pesticides?

It depends.....  
Shelf life rapidly declines after opening  
Re-seal container



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## Are you storing DF or WDG?



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## Are you storing liquids?



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## Two types of changes can occur

Active ingredient changes chemically

Formulation can break down and precipitate  
Sludges, flakes, crystals  
Some increase in acidity affecting container

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## Inert Ingredients

Improve activity  
Ease of application  
Assist dilution  
Product stability

### Specialty Herbicide

\*Trademark of Dow AgroSciences LLC

For the control of broadleaf annual and perennial weeds, and certain woody plants and vines on CRP, rangeland and permanent grass pastures

Active Ingredients:	
picloram: 4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid	
trisopropanolamine salt	10.2%
2,4-D: (2,4-dichlorophenoxy) acetic acid,	
trisopropanolamine salt	39.6%
Other Ingredients	50.2%
Total	100.0%

Acid equivalents:  
picloram: 4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid - 5.7% -  
0.54 lb/gal  
(2,4-dichlorophenoxy) acetic acid - 21.2% - 2 lb/gal

EPA Reg. No. 62719-182

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## Separate Volatile Chemicals

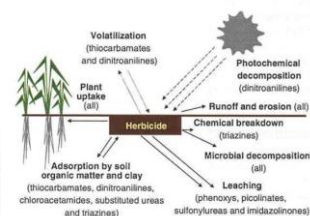
- Highly volatile pesticides can contaminate other products when stored in close proximity



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## Environmental Conditions

- Temperature
- Moisture
- Sunlight



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## GUIDELINES FOR SPECIFYING AND MANAGING SHELF LIFE AND EXPIRY DATE OF CROP PROTECTION PRODUCTS

By CropLife International  
the Specifications Experts Group (CLI-SEG)  
with the support of the Product Integrity Team (CLI-PIT)

It is already common practice that a CPP which was not applied during the current growing season can be used in the following season, i.e. before the product is 2 years old. Nevertheless, from a quality point of view, many products remain fit for use much longer and can thus be still applied in subsequent seasons.

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## Questions?


Contact:  
[mmatocha@ag.tamu.edu](mailto:mmatocha@ag.tamu.edu)



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## Invora Herbicide

### Picolinic Acid Chemistry Training

Dr. Megan Clayton  
Extension Range Specialist



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### Introduction to Picolinic Acid Chemistry Training

- Picolinic Acid Chemistry Training is required to....
  - Increase applicator awareness of some picolinic acid herbicide characteristics
  - Educate applicators on appropriate uses of Invora™ herbicide.
  - Inform applicators of Invora™ herbicide risks associated with its persistent properties, applications to non-approved sites or to or in the root zones of non-target desirable vegetation, and its off-site movement (e.g. drift)

Required to comply with the label requirements AND it is a stewardship opportunity for your business and associated industries

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## Herbicide Options

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## Herbicide Treatment Options on Brush or Weeds

### Individual Plant Treatments (IPT)

- Cut Stump
- Stem (Basal)
- Leaf (Foliar)

### Broadcast Treatments

- Leaf (Foliar)

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## Cut Stump



Any Time of  
Year



No Need to  
Look at the  
"Skeleton"



Very little  
chemical mix  
needed



No limitation  
on size of tree



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### Stem (Basal) Spray

Any time of year

Skeletons remain for at least 1 year

Up to a 4-6" trunk diameter

Best on smooth bark & trees with less than 3  
stems

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## Leaf (Foliar)

Timing is Key!

- Carbohydrate translocation
- Leaf condition
- Soil temperature
- Flowering/beaning

Chemical & rate specific to tree

Skeletons remain for at least 1 year

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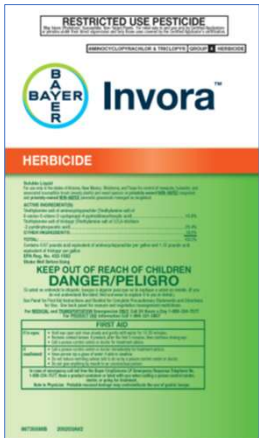
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**Why were we looking forward to it?**

- Long-term control of Huisache & Mesquite
- IPT leaf application for many other difficult species
  - TX Mountain Laurel
  - Whitebrush
  - Lotebush
  - Coyotillo
  - Agarito
  - TX Persimmon
  - Yaupon
- Stem & Cut Stump treatments in water
- Residue Control of many broadleaf weeds

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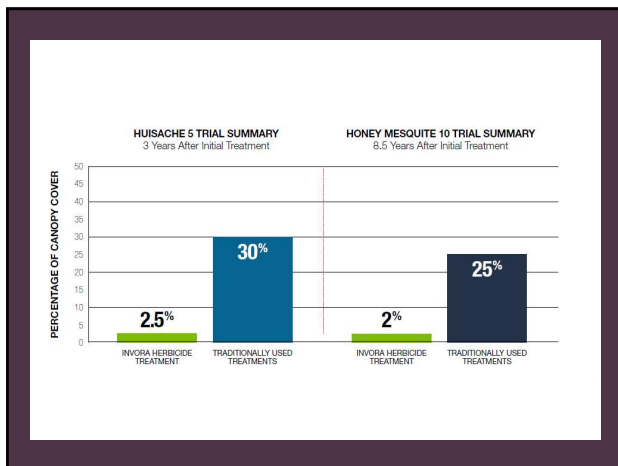
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## The Details...

- Active Ingredients: Aminocyclopyrachlor + triclopyr amine
- EPA issued grazing label early 2020; Restricted herbicide
- TDA approved Texas registration
- Available in 30-gallon drums and 1-gallon jugs

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## Note: Required Picolinic Acid Training

- This is in ADDITION to the TDA Pesticide Applicator Training and Continuing Education (Invora is Restricted Use)
- Prior to application on rangeland, all applicators must complete picolinic acid training every two years
- Training completed through:
  - State authorized provider or
  - Registrant or registrant approved provider
  - <https://agrilifelearn.tamu.edu/product?catalog=AGCH-003>
- Certified applicator must:
  - Keep record of training for 3 years (Date, Provider, Proof)
  - Records must be made available to State Pesticide Regulatory Officials and EPA upon request

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## What is Picolinic Acid Chemistry?

A sub-family of growth regulator herbicides

### Active Ingredients:

- Aminocyclopyrachlor
- Triclopyr
- Aminopyralid
- Clopyralid
- Picloram
- Fluroxypyr

### Formulated Products:

- Invora™ herbicide
- Remedy® Ultra
- Sonora®
- Sendero®
- Tordon® 22K
- Surmount®
- MezaVue™
- GrazonNext® HL
- Grazon® P+D
- Chaparral™
- And others including generic products

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## Introduction to Picolinic Acid Chemistry

### Most Picolinic Acid Herbicide-Containing Products:

- Are active on many woody and herbaceous plant species including desirable trees and crops
- Have relatively long soil residual activity (half (½) lives of weeks to several months)
- Are highly active even at trace concentrations on non-target plants (many garden plants, crops some trees and shrubs, legumes, etc.)
- Exhibit continued, residual activity in and/or on vegetation, even after desiccation (e.g. haying)
- Exhibit persistent activity in livestock manure and urine following ingestion and excretion



No Composting

**These properties pose compost contamination concerns**

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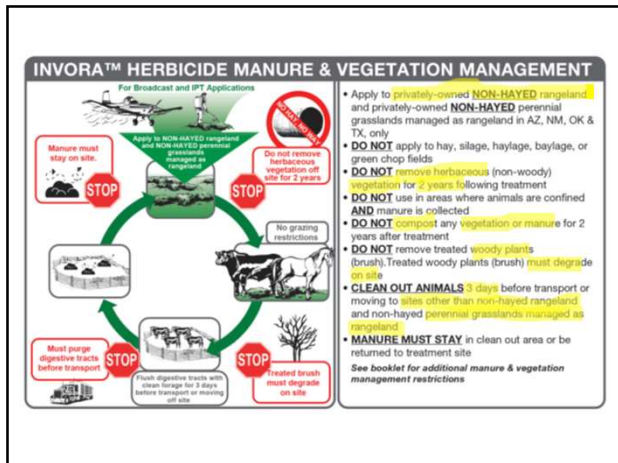
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**Additional Information**

**Buffers:**

- Property lines, Free-flowing water, or water not flowing but shared with neighbor
  - Aerial & ground broadcast: 100 feet
  - IPT: fenceline and up to water's edge (coordinate with neighbor!)
- Water not flowing and totally on treatment site
  - Can spray broadcast or IPT up to water's edge

**Additional No's:**

- No drifting into water
- No root zone of or directly to desirable vegetation
- No movement off site

**The Label is the Law!**

**Invora.com**

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**Range & Pasture Herbicide Label Broadcast Downwind Adjustments**

Active ingredient(s)	Trade Name(s)	Downwind Adjustment, ft (sensitive structures, water, non-target species)
2,4-D + aminopyralid	GrazonNext HL	250
2,4-D + picloram	Grazon P+D, Graslan L, Gunslinger	250
2,4-D	Various	250
Aminopyralid + Rinskor	Duracor	½ swath
Aminopyralid + MSM	Chaparral/Opensight	50
Aminopyralid + picloram + fluroxypyr	MezaVue	50
Aminopyralid + clopyralid	Sendero	50
Picloram	Tordon 22K, Picloram 22K	Adjust for potential drift
Picloram + fluroxypyr	Sumount	Adjust for potential drift

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### Invora™ Herbicide: Use Restrictions & Precautionary Information

#### Compost Awareness, Grazing Allowance and Slaughter Restriction

INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT	INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT
	<p><b>To address composting concern:</b></p> <ul style="list-style-type: none"> <li>• <b>DO NOT</b> use in areas where animals are confined <b>AND</b> manure is collected</li> </ul> <p><b>No Grazing Restrictions</b></p> <p><b>Slaughter Restriction:</b> Within 12 months of an Invora Herbicide application, remove livestock from grazing treated site at least 3 days before slaughter</p> <ul style="list-style-type: none"> <li>• A restriction on triclopyr-containing products</li> </ul>

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### Invora™ Herbicide: Use Restrictions & Precautionary Information

#### Composting Awareness - Treated Brush

INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT	INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT
	<p><b>To address composting concern:</b></p> <ul style="list-style-type: none"> <li>• <b>DO NOT</b> remove treated woody plants (brush). Treated woody plants (brush) must degrade on site</li> </ul>

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### Invora™ Herbicide: Use Restrictions & Precautionary Information

#### Composting Awareness - Livestock clean out

INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT	INVORA™ HERBICIDE MANURE & VEGETATION MANAGEMENT
	<p><b>Livestock Clean-out Before Transport for 2 years following application</b></p> <p>Suggestions: Plan Before Application</p> <ol style="list-style-type: none"> <li>1. Leave portion of rangeland treatment-free             <ul style="list-style-type: none"> <li>• Move animals to treatment-free rangeland for 3 days prior to moving</li> </ul> </li> <li>OR</li> <li>2. Confine animals on site             <ul style="list-style-type: none"> <li>• For 3 days feed diet free of treated forage</li> </ul> </li> </ol> <p>• <b>CLEAN OUT ANIMALS</b> 3 days before transport or moving to sites other than non-hayed rangeland and non-hayed perennial grasslands managed as rangeland</p>

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### Inyora™ Herbicide: Use Restrictions & Precautionary Information

#### Potential Impact on Non-target, Desirable Vegetation (e.g. trees and crops)

##### Species sensitivity statement from the label:

Certain species may, in particular, be sensitive to low levels of INVORA™ HERBICIDE including but not limited to **conifers** (such as Douglas fir, Norway spruce, ponderosa pine and white pine), **deciduous trees** (such as aspen, Chinese tallow, cottonwood, honey locust, magnolia, poplar species, **redbud**, silver maple, and willow species), and **ornamental shrubs** (such as arbovitae, burning bush, crape myrtle, forsythia, hydrangea, ice plant, magnolia, purple plum and yew).

- Do not drift on, spray, or apply in the root zone of desirable species. Note: tree root zones may extend well beyond their drip lines.
- Broadleaf crops or trees and annually planted grass crops (wheat, barley, oats, etc.) are Inyora™ Herbicide-sensitive

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What is it?

- Data repository
- Texas A&M Herbicide Use Committee reviews and approves all packet submissions before they are added
- Updated electronically, so more frequently
- Used as USDA technical guide
- Available at [agrilifebookstore.org](http://agrilifebookstore.org) or [SouthTexasRangelands.tamu.edu](http://SouthTexasRangelands.tamu.edu)

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## Specimen Label

### RESTRICTED USE PESTICIDE

See Your State Pesticide Regulations for Full Label Terms. For full label terms, visit [www.dowagro.com](http://www.dowagro.com). For additional information, contact your local Dow AgroSciences representative. This product is for use only for the uses and conditions of use specified on the label. It is not to be used for any other purpose. It is not to be used in a manner that would cause injury to humans, animals, or the environment. It is not to be used in a manner that would cause injury to crops, plants, or animals. It is not to be used in a manner that would cause injury to the environment. It is not to be used in a manner that would cause injury to the user or others. It is not to be used in a manner that would cause injury to the property or other interests of the user or others.

**Dow AgroSciences**

### Specialty Herbicide

(Contains 2,4-Dichlorophenoxyacetic acid)

For control of susceptible broadleaf weeds, woody plants and vines on irrigated and non-irrigated pastures, pastures, fallow cropland, Conventional Rowcrops, Poultry and Cattle areas, vine areas including vine pruning area, treated to control weeds and vines. It may be used on electrical power lines, transmission lines, pipelines, waterlines, railroads, and utility right-of-ways in forest and non-forest areas.

#### Active ingredient

active ingredient 2,4-dichlorophenoxyacetic acid (2,4-D) 22.0% w/w

#### Formulation

Emulsifiable concentrate

#### Net Weight

100 lbs (45.4 kg)

#### Net Content

22.0 lbs (10.0 kg)

#### Application

active ingredient 2,4-dichlorophenoxyacetic acid - 21.1% - 2.1gal

#### Use Rate

2.1gal/ha, wet area

#### Keep Out of Reach of Children.

#### CAUTION

See Safety Data Sheet for details. Do not use in a manner that would cause injury to humans, animals, or the environment. It is not to be used in a manner that would cause injury to crops, plants, or animals. It is not to be used in a manner that would cause injury to the environment. It is not to be used in a manner that would cause injury to the user or others. It is not to be used in a manner that would cause injury to the property or other interests of the user or others.

## PRECAUTION

### Precautionary Statements

Hazards to Humans and Domestic Animals

#### Caution: Irritation to Skin

avoid contact with eyes or clothing. Prolonged or frequent contact with clothing may cause irritation. Wash thoroughly with soap and water after use. Wash hands thoroughly with soap and water after use. Wash clothes thoroughly with soap and water after use.

#### Personal Protection of Equipment (PPE)

Application and other handlers must wear:

1. Long-sleeved shirt and long pants

2. Shoes with socks

3. Chemical-resistant gloves

4. Head protection (hard hat)

5. Eye protection (goggles or safety glasses)

6. Respiratory protection (NIOSH approved respirator)

7. Protective clothing for dermal protection (e.g., suit and boots)

8. Protective clothing for respiratory protection (e.g., respirator)

#### Active ingredient:

active ingredient 2,4-dichlorophenoxyacetic acid (2,4-D) 22.0% w/w

#### Inert Ingredients

inert ingredients 78.0% w/w

#### Total ingredients

total ingredients 100.0% w/w

#### acid equivalent

acid equivalent 2,4-dichlorophenoxyacetic acid - 21.1% - 2.1gal

#### EPA Reg. No. 62715-6

#### Environmental Statements

See Safety Data Sheet for details. Do not use in a manner that would cause injury to humans, animals, or the environment. It is not to be used in a manner that would cause injury to crops, plants, or animals. It is not to be used in a manner that would cause injury to the environment. It is not to be used in a manner that would cause injury to the user or others. It is not to be used in a manner that would cause injury to the property or other interests of the user or others.

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**M**illions of acres of Texas rangelands support an extensive cattle or cowboy plant industry. These plants are important sources of food and fiber for humans, horses, game animals, and many other species. These rangeland plants also provide habitat for numerous birds, mammals, reptiles, amphibians, and insects. The plants also play a role in soil conservation, water quality, and carbon sequestration. However, rangeland plants are often threatened by various factors, including overgrazing, drought, fire, and disease. This document provides information about the threats to rangeland plants and offers recommendations for their management.

Rangeland plants are often threatened by overgrazing, which occurs when too many animals graze on the same area of land. Overgrazing can lead to the depletion of vegetation, soil erosion, and the loss of biodiversity. Drought is another major threat to rangeland plants, as it can cause them to become stressed and more susceptible to disease and insect damage. Fire is also a common threat, as it can destroy large areas of rangeland vegetation. Disease and insect infestations can also threaten rangeland plants, leading to significant losses if not managed properly.

There are several strategies that can be used to manage rangeland plants and reduce the risk of threats. One strategy is to implement sustainable grazing practices, such as rotating pastures and controlling stocking rates. Another strategy is to monitor rangeland health regularly and take action when signs of stress or damage are detected. Prescribed burning can also be used to reduce the risk of wildfire and promote healthy vegetation growth. Finally, integrated pest management techniques can be used to control diseases and insects effectively.

By understanding the threats to rangeland plants and implementing effective management strategies, we can ensure the long-term sustainability of these vital ecosystems. Rangeland plants are essential components of our environment, and their protection is crucial for maintaining the ecological balance and supporting the livelihoods of those who depend on them.

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Back to Index					
Brush controlled	Herbicide (common and chemical names, Table 2)	Herbicide quantity (active ingredient use in parenthesis) Broadcast rate per acre Individual plant treatment*	Spew volume (per acre for broadcast, as described for individual plants)	Time to apply	Remarks
Mesquite (any type)	ametryn/glyphosate herbicide premix (1:1)	— SH 8 to 16 lb per acre in water carrier (% MESD = 0)	Thoroughly spray the cut surface as well as the back from the cut to prevent back flow for 1 to 2 points of spray. Add (% MESD = 0) regardless how sufficient to water carrier spray mix.	Anytime, except when the water present is very low. This is a brush herbicide, can spray application method. Apply with a backpack or knapsack sprayer using low pressure and an ultra-fine nozzle. Do not spray on KX. Hydraulic chains equipped with a large orifice nozzle can be a hazard to cut which is not to be used.	Ametryn/glyphosate herbicide premix requires specific, careful and chemical safety and coordination before use. See leaflet for additional site use information and restrictions.
Mesquite (continued on next page)	ametryn/glyphosate herbicide premix (1:1)	SH 28-38 lb (or 25-43.58 lb)	1.5%	For aerial applications, use at least 1000 gal per acre. For ground broadcast applications, use 1000 gal/acre. Use 4 to 6 in. MESD in MESD (0) regardless how sufficient spray application.	Ametryn/glyphosate herbicide premix requires specific, careful and chemical safety and coordination before use. See leaflet for additional site use information and restrictions.



\*Note: Table is missing information.  
†Treatment cannot damage 10% - very high - high to - high to - low

Table 2: Activities for controlled use on mesquite

26

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## Invora™ Herbicide: The Application

### General Rate Structure and Application Methods

#### Broadcast applications through aerial or ground equipment

- 12 to 48 fl oz/A + adjuvant\* - single use rate based on target species

#### Spot and Individual Plant Treatment (IPT) Applications

- Spot application (targeting weeds) – 0.25 to 0.5% v/v solution + adjuvant
- Foliar IPT (targeting brush) – 1.5% v/v solution + adjuvant
- Cut stump – 6% to 10% v/v in **water carrier** + adjuvant – spray after cutting
- Basal stem spray – 15% v/v in **water carrier** + adjuvant – spray ground line to 14" height

#### Maximum use rates

- 48 fl oz/A - maximum use rate in a single application
- 54 fl oz/A – maximum use rate per year over combined applications
  - Two applications are allowed per year with 14 days between applications

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## Invora™ Herbicide: The Application

### Mix a 1 gallon mix of a 15% v/v spray solution with 1% v/v adjuvant

#### Fluid ounces of Invora™ herbicide needed in 1 gallon of 15% v/v solution

- Know that 1 gallon = 128 fluid ounces
- Express 15% as a decimal;  $15\% \div 100 = 0.15$
- Multiply total spray volume by this value;  $128 \times 0.15 = 19.2 \text{ fl. oz. Invora™ herbicide}$

#### Fluid ounces of MSO-OS\* (1% v/v) needed in 1 gallon of solution

- Know that 1 gallon = 128 fluid ounces
- Express 1% as a decimal;  $1\% \div 100 = 0.01$
- Multiply total spray volume by this value;  $128 \times 0.01 = 1.28 \text{ fl. oz. MSO-OS}$

#### Fluid ounces of water needed in 1 gallon of spray solution

- Know that 1 gallon = 128 fluid ounces
- Subtract herbicide and adjuvant volumes;  $128 - 19.2 - 1.28 = 107.5 \text{ fl. oz. water}$

\*A methylated seed oil + organo-silicone surfactant (MSO-OS) as a spray adjuvant is recommended unless otherwise specified on the label; see CROP SPECIES PRECAUTIONS section of the label.

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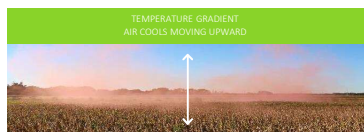
## Invora™ Herbicide: The Application

### Avoid Temperature Inversions – Use smoke as indicator

#### OPTIMAL CONDITIONS

##### Vertical Mixing of Air

- 2 - 10 mph winds
- Avoid gusty conditions
- Avoid windless conditions



#### TEMPERATURE INVERSION CHARACTERISTICS

##### Inversion Layer Near Surface

- Poor vertical air mixing
- Mist or fog present
- Light to no wind - typical characteristic

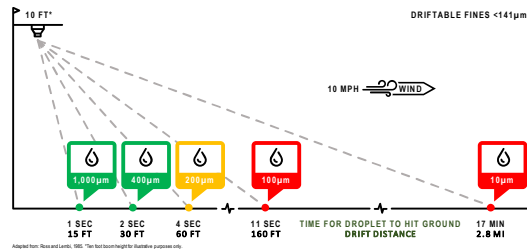


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## Invora™ Herbicide: The Application

### Avoid Off-target Physical Drift

#### Effect of droplet size over fall of 10 feet



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## Invora™ Herbicide: The Application

### Droplet size, carrier volume, and tank-mix partners

#### Droplet size specifications

- Use nozzles that deliver **coarse to very coarse droplets (350 to 500 microns)** as defined by ASABE S572 standard. Using smaller droplets than specified **will not** improve herbicide performance but **will** increase the risk of offsite movement through drift. Using larger droplets than specified will most likely result in reduced herbicide performance.

#### Carrier volume

- 4 to 10 GPA by aerial equipment and 10 to 20 GPA by ground equipment

**Drift retardants** – allowed but volume mean diameter (VMD) droplet size must meet above specifications.

**Tank-mix partners** – Care should be taken if any tank mix partners are included (e.g. volatility of ester formulations)

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## Invora Spray Adjuvants

*unless otherwise noted*

- Broadcast Applications on Brush** – MSO-OS
- Broadcast Applications on herbaceous** (non-woody) vegetation – MSO-OS or NIS 80% active (or more)
- IPT Leaf Applications** - MSO-OS or NIS 80% active (or more)
- Cut Stump or Stem (Basal) Applications** – 1% MSO-OS in WATER

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## Invora™ Herbicide: The Application

### Personal protective equipment (PPE)

#### PRECAUTIONARY STATEMENTS

##### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

###### DANGER

**Danger signal word – Eye Hazard**

Corrosive. Causes irreversible eye damage. Do not get in eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

FIRST AID	
If in eyes:	<ul style="list-style-type: none"> <li>Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>Call a poison control center or doctor for treatment advice.</li> </ul>
If swallowed:	<ul style="list-style-type: none"> <li>Call a poison control center or doctor immediately for treatment advice.</li> <li>Have person sip a glass of water if able to swallow.</li> <li>Do not induce vomiting unless told to do so by a poison control center or doctor.</li> <li>Do not give anything by mouth to an unconscious person.</li> </ul>
<p>In case of emergency call toll free the Bayer CropScience LP Emergency Response Telephone No. 1-800-334-7577. Have a product container or label with you when calling a poison control center, doctor, or going for treatment.</p> <p>Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.</p>	

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## Other Points to Consider:

- Applicators and other handlers must wear:
  - Long sleeved shirt and long pants
  - Shoes plus socks
  - Protective eyewear
  - Wash in detergent and hot water separate from other laundry
- Invora spray solution should be applied within 24 hours of mixing to avoid product degradation
- Danger label – irreversible eye damage
- No grazing restrictions, but might be a good idea to allow plants to recover that have been shaded out
- Label is for TX, AZ, NM, OK

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**QUICK REFERENCE FOR COMMON RANGELAND AND PASTURE HERBICIDES**

*Julian Meling, Vanessa Corbett Olson, Megan Clayton, and Robert Lyman*

ACTIVE INGREDIENTS	TRADE NAME(S)	GRAZING RESTRICTIONS	HAY HARVEST RESTRICTIONS	HARVEST INTERVAL	HERBICIDE APPLICATION LICENSE REQUIREMENT
2,4-D + aminopyralid	Grasshopper/HL	None <sup>a</sup>	7 days <sup>(1)</sup>	2 hours	Yes
2,4-D + aminopyralid	PastorAll HL	None <sup>a</sup>	7 days <sup>(1)</sup>	2 to 4 hours <sup>2</sup>	Yes
2,4-D + dicamba	Electrocast, Range Star, Range Star <sup>2</sup>	None, except for lactating animals (7 days)	7 days	4 hours	Yes
2,4-D + picloram	Grassland L, Grassland P-H, SunStopper	None, except for lactating dairy animals (7 days)	30 days	2 to 4 hours <sup>2</sup>	Yes
2,4-D + triclopyr	Crossbow, Crosser	None, except for lactating dairy animals (90 days grazing season)	None, unless feeding to lactating dairy animals (1-4 days)	4 hours <sup>2</sup>	Yes
2,4-D	2,4-D Amine I (labeled)	0 to 7 days (varies by manufacturer)	7 days	6 hours	Yes
2,4-D	2,4-D (labeled)	0 to 7 days (varies by manufacturer)	7 to 30 days (varies by manufacturer)	1 hour	Yes
2,4-D	2,4-D (labeled)	0 to 7 days (varies by manufacturer)	7 days	1 hour	Yes
Aminocyclopyrachlor + triclopyr	Imvicta	None <sup>a</sup>	Not labeled for hay production	1 hour	Yes <sup>3</sup>
Aminopyralid	Blonoxone	None <sup>a</sup>	None <sup>(1)</sup>	2 to 4 hours <sup>2</sup>	No
Aminopyralid + clopyralid	Sandfire	None <sup>a</sup>	None <sup>(1)</sup>	4 hours <sup>2</sup>	No
Aminopyralid + florasulfuron	DuraCor	None <sup>a</sup>	14 days to allow maximum herbicide activity <sup>(1)</sup>	2 hours	No
Aminopyralid + metsulfuron-methyl	Chaparral/Opentight	None <sup>a</sup>	None <sup>(1)</sup>	2 to 4 hours <sup>2</sup>	No
Aminopyralid + picloram + triclopyr	Micavue	None <sup>a</sup> , except for lactating dairy animals (14 days)	7 days to allow maximum herbicide activity <sup>(1)</sup>	4 hours <sup>2</sup>	Yes
Clopyralid	Clear State, Clopyralid 3, Pyramid	None	None	2 hours	No
Dicamba (DMA salt)	Clearity	7 days (1 pAI), 21 days (2 pAI), 60 days (4 pAI)	37 days (1 pAI), 51 days (2 pAI), 70 days (4 pAI)	4 hours	Yes
Dicamba (DMA salt)	Barrel	0 days	7 days	4 to 6 hours <sup>2</sup>	Yes
Dicamba + haloxyfop-methyl	Napalm	None	37 days	3 hours	Yes
Glyphosate	Glyphosate products (labeled)	0 to 8 weeks (varies by manufacturer)	0 to 8 weeks (varies by manufacturer)	4 to 6 hours	No
Florasulfuron	Pronto Prime/Prairie	None (500 pellets/A, 60 days) 500 to 5,000 pellets/A, 1 year (1-5,000 pellets/A)	None (500 pellets/A, 60 days) 500 to 5,000 pellets/A, 1 year (1-5,000 pellets/A)	None	No

continued on next page

<sup>a</sup>Associate Professor and Extension Agronomist, Associate Professor and Extension Range Specialist, Associate Professor and Extension Range Specialist, and Professor and Extension Range Specialist

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## Generation Next: Our Turn to Ranch

- 12-week Online Course for new or reborn landowners
- Develop basic ag business plan
- Next course starts January 23, 2023



**GenerationNext.tamu.edu**

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**Invora.com**

Megan.Clayton@ag.tamu.edu  
SouthTexasRangelands.tamu.edu  
Facebook: Texas Range Extension

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# Mole and Pocket Gopher Control

**B. R. Koehler**  
**Joe Jimenez**



Bluebonnet Master Gardener Association



1

## Objectives

- ◉ Compare moles and gophers
- ◉ Review ineffective control tactics
- ◉ Learn how to trap moles and gophers – traps, where and how
- ◉ Examine the use of poisons
- ◉ Learn about gopher control in pastures



2

### Moles

- ◉ 7 Species
- ◉ 1 Local Species  
Eastern Mole

### Gophers

- ◉ 18 Species
- ◉ 3 Local Species  
Plains, Bairds, Attwater  
(Morphologically the same)

3

### Moles

- ◉ Insectivores
- ◉ Insects, white grubs, earthworms – 45 to 50 pounds per year
- ◉ Eat 70 - 100% of weight daily

### Gophers

- ◉ Herbivores
- ◉ Alfalfa, any garden plants, orchards, bermuda rhizomes
- ◉ Can eat electric lines and irrigation pipes

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### Moles

- ◉ Adult Length – 3 - 8 inches
- ◉ Adult Weight - 4 oz
- ◉ Color – Gray, Brown, Silver
- ◉ Eyes – None Visible
- ◉ Ears – Small Openings

### Gophers

- ◉ Adult Length – 6 - 13 inches
- ◉ Adult Weight - 4 – 16 oz
- ◉ Color – Light to Dark Brown
- ◉ Eyes – Visible
- ◉ Ears – External Ears

5



6





7

### Pocket Gopher



8

### Gopher with Stuffed Pocket



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### Moles

- ◉ Number of litters per year – one during March and April
- ◉ Litter Size – 3 to 5
- ◉ Life Span – 1 to 2 yrs.

### Gophers

- ◉ Number of litters per year – one or two during spring and fall
- ◉ Litter Size – 1 to 6  
Average – 2
- ◉ Life Span – 1 to 3 yrs.

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### Moles

- ◉ Visible surface tunnels
- ◉ Tunnel depth below surface – 1 or 2 inches
- ◉ Digging Speed – 18 fph
- ◉ Traveling Speed – 80 fpm
- ◉ Control – Trapping with spike trap, loop trap, poison bait or barriers

### Gophers

- ◉ Surface Mounds
- ◉ Tunnel depth below surface – 4 to 15 inches
- ◉ May create 300 mounds and move 4 tons of soil in a year.
- ◉ Control – Trapping with McAbee trap, poison bait or barriers

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## Natural Enemies

**Coyotes**  
**Skunks**  
**Hawks**  
**Owls**  
**Dogs and Cats**  
**Snakes**  
**Man**  
**Floods**

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 AGRILIFE  
 EXTENSION

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## Heidi, Gopher Dog



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AGRI LIFE  
EXTENSION

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## Scare Tactics Are Ineffective

- ⊙ Pickle Juice
- ⊙ Broken Glass
- ⊙ Red Pepper
- ⊙ Razor Blades
- ⊙ Bleach
- ⊙ Moth Balls
- ⊙ Rose Branches
- ⊙ Vibrators
- ⊙ Ultrasonic Devices
- ⊙ Castor Oil
- ⊙ Explosives
- ⊙ Human Hair
- ⊙ Chewing Gum

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## Positives

- ⊙ Aerates and turns the soil
- ⊙ Increases soil fertility – organic matter
- ⊙ Decreases soil compaction
- ⊙ Increases water infiltration
- ⊙ Decreases water runoff
- ⊙ Brings sub soils to surface
- ⊙ Part of wildlife food chain

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AGRI LIFE  
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# How to Trap Moles

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EXTENSION

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## Harpoon Type Mole Traps



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## Nash Loop Trap



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## Trapline Products



Mole Traps

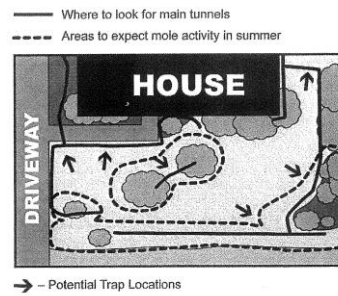
Gopher Traps



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## Finding Trap Locations



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## Mole Tunnel Runs



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Trap is set.

Wait for  
results.

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EXTENSION

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Got it !!



28

How long can a trap be left?



Until the vines grow?



Got One!

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Intersecting Mole Tunnels



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## Trapped Mole

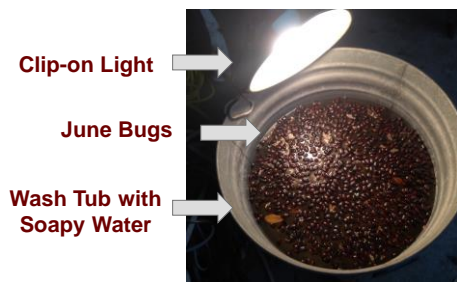


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## Eliminate Moles' Food Supply



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## How to Trap Gophers

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## Gopher Mound



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## Gopher Bait Applicator and Burrow Probe

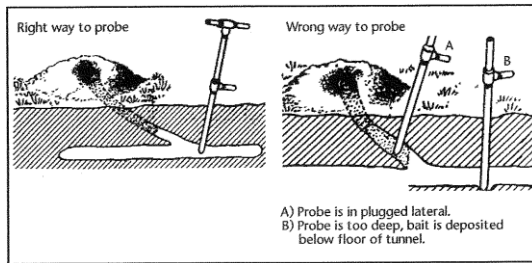


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## Probing for Tunnel

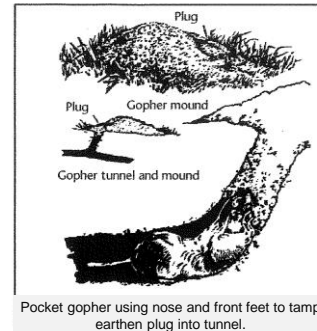


Right way and wrong way to probe.

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## Gopher Mound and Tunnel



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EXTENSION

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## Unfinished Gopher Mound



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EXTENSION

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## Gopher Traps and Tools



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Prepare gopher trap with wire harness and chain.



43

Set trap.



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Insert traps in tunnel openings.



45

Check traps.



46

Got it !!



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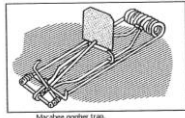


Pull out a very mad gopher!

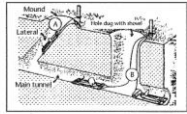
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## Macabee Gopher Trap



### Where to Set



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AGRI LIFE  
EXTENSION

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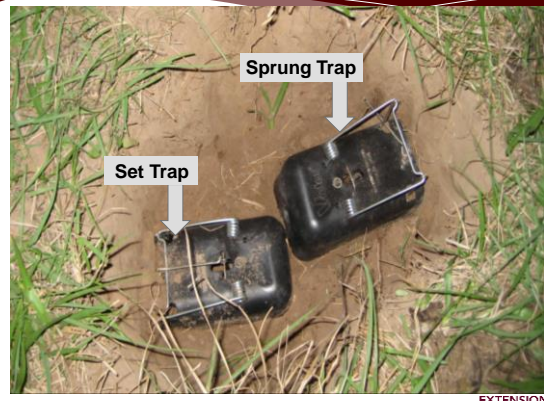
Multiple  
Mounds -  
indicating one  
gopher –  
heading in a  
straight line to  
the garden!

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AGRI LIFE  
EXTENSION

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EXTENSION

53

## Black Box Trap



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AGRI LIFE  
EXTENSION

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**A trap-wise gopher will backfill the hole to**

55



56



**Sometimes the cure is more disruptive than the gopher.**

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AGRI LIFE  
EXTENSION

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## Mole Trapping Tips

- ◉ Instinct is to remove obstacles from or to open tunnels.
- ◉ Multiple traps increase chance of success.
- ◉ Proper trap placement and making guide holes are important.
- ◉ Move traps every one or two days.
- ◉ Don't leave traps out in the yard through winter.
- ◉ Clean traps before putting them up.
- ◉ Keep trap spikes sharp.
- ◉ Oil moving parts.

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AGRI LIFE  
EXTENSION

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## Gopher Trapping Tips

- ◉ Instinct is to plug openings in tunnels.
- ◉ Attack freshest mounds first.
- ◉ Make sure traps fit in tunnels snugly but still function.
- ◉ Placing traps back in tunnels 8" – 12" improves chances of success.
- ◉ Make sure that no other tunnels intersect in front of traps.
- ◉ One pair of traps per burrow is usually enough.
- ◉ If no activity in two days, the burrow may be abandoned.
- ◉ Three to five burrows usually indicate one gopher.
- ◉ Clean traps before putting them up.

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AGRI LIFE  
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## Poisons? Yes or No?



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## Individual Mound Treatments

- ◉ Probe for the Tunnel
- ◉ Apply treated Grain to each tunnel
- ◉ Time Consuming and Labor intensive



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## Gopher Control in Pastures

Philip Shackelford  
County Extension Agent- AG/NR  
Austin County

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**AGRI**LIFE  
EXTENSION

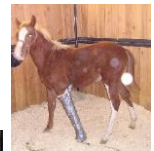
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## So What's the Problem?

- ◉ Hard on Hay Equipment
- ◉ Horse Injury
- ◉ Unsightly Appearance
- ◉ Reduction in Forage Yield



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**AGRI**LIFE  
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## Options for Pasture Control

- ◉ **Best Option: Burrow Builder**
- ◉ Trapping
- ◉ Fumigation
- ◉ Shooting
- ◉ Individual Mound Treatments
- ◉ Planting Grain Strips

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**AGRI**LIFE  
EXTENSION

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## Burrow Builder

- ◉ Uses treated grain
- ◉ Quick
- ◉ Effective
- ◉ Easy to apply with a tractor
- ◉ Can be rented
- ◉ Can be purchased
- ◉ Treated grain requires a license
- ◉ Follow label directions



Gopher Getter  
Elston Manufacturing

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**AGRI**LIFE  
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## Burrow Builder

Armstrong Ag  
Rodent Ridder

Brenham, Texas



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EXTENSION

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## Coulter Knife and Torpedo Tube



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## Grain Tube & Packing Wheels



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AGRI LIFE  
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## Hopper Box & Drive Mechanism



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AGRI LIFE  
EXTENSION

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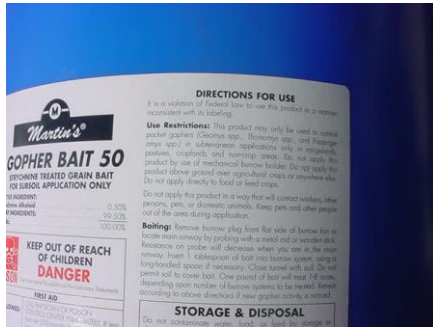
## Use Personal Protective Equipment



TEXAS A&M  
AGRI LIFE  
EXTENSION

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## Not Labeled for use with a Burrow Builder



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EXTENSION

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## Gopher Control Check List

- ⦿ Appropriate Product Selected
- ⦿ PPE Acquired
- ⦿ Minimum 35 Horsepower Tractor
- ⦿ Proper Soil Moisture
- ⦿ Burrow Builder Acquired

TEXAS A&M  
AGRI LIFE  
EXTENSION

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## Operating the Burrow Builder

- ⦿ Apply treated grain at a rate of 1-2 lbs per acre.
- ⦿ Burrows should be spaced 20-25 feet apart.



TEXAS A&M  
AGRI LIFE  
EXTENSION

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## Operate parallel to the ground at a depth that gophers are most active



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## Check tube periodically to ensure grain is being dispensed properly



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AGRI LIFE  
EXTENSION

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## Check packing wheels to insure proper furrow coverage



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AGRI LIFE  
EXTENSION

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## Precautions

- Keep away from livestock and horses
- Always wear proper PPE when handling chemical
- Store chemical in appropriate locations



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AGRI LIFE  
EXTENSION

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## What Not To Do.....



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EXTENSION

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# Questions ????

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EXTENSION

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**Texas Department of Agriculture  
Pesticide Applicator Record**



COMMISSIONER SID MILLER

**Business/Applicator Name** \_\_\_\_\_ **Address** \_\_\_\_\_

<b>Application Date</b>	<b>Time Started</b>	<b>Name of the person for whom the application was made</b>	<b>Location of Land Treated</b>		<b>Site Treated</b>	<b>Wind Direction</b>	<b>Wind Velocity</b>	<b>Air Temp</b>
<b>Product Trade Name</b>	<b>EPA Registration Number</b>	<b>Target Pest</b>	<b>Rate of Product Per Unit</b>	<b>Method or Type of Equipment Used To Make Application</b>	<b>FAA "N" Number for Aerial Application Equipment:</b>			
<b>Is Application Applied in Regulated County:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				<b>Regulated Herbicide Permit Number:</b>				
<b>Licensed Applicator's Name and License Number</b>		<b>Non-licensed Applicator's Name Working Under Licensee</b>		<b>Total Acres or Volume of Area Treated</b>	<b>Total Volume of Spray Mix, Dust, Granules or Other Materials Applied Per Unit</b>			
<b>Documentation used to verify training of non-licensed applicator (Mark Applicable Box)</b> <input type="checkbox"/> Direct Supervisor Affidavit <input type="checkbox"/> WPS Handler Card <input type="checkbox"/> Signed & Dated Label								

<b>Application Date</b>	<b>Time Started</b>	<b>Name of the person for whom the application was made</b>	<b>Location of Land Treated</b>		<b>Site Treated</b>	<b>Wind Direction</b>	<b>Wind Velocity</b>	<b>Air Temp</b>
<b>Product Trade Name</b>	<b>EPA Registration Number</b>	<b>Target Pest</b>	<b>Rate of Product Per Unit</b>	<b>Method or Type of Equipment Used To Make Application</b>	<b>FAA "N" Number for Aerial Application Equipment:</b>			
<b>Is Application Applied in Regulated County:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				<b>Regulated Herbicide Permit Number:</b>				
<b>Licensed Applicator's Name and License Number</b>		<b>Non-licensed Applicator's Name Working Under Licensee</b>		<b>Total Acres or Volume of Area Treated</b>	<b>Total Volume of Spray Mix, Dust, Granules or Other Materials Applied Per Unit</b>			
<b>Documentation used to verify training of non-licensed applicator (Mark Applicable Box)</b> <input type="checkbox"/> Direct Supervisor Affidavit <input type="checkbox"/> WPS Handler Card <input type="checkbox"/> Signed & Dated Label								

## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.