

Fall Forage Seminar
&
Austin County Hay Show



Austin County Fairgrounds
Bellville, TX
Friday, October 6, 2023



Fall Forage Seminar & Hay Show

Friday, October 6, 2023
Austin County Fair Grounds, Bellville
Registration - 8:30 am – 9:00 am
Program - 9:00 am – 12:00 pm

Speakers and Topics:

- | | |
|----------------------------|---|
| 9:00 am – 9:05 am | Welcome and Introductions
<i>Bradley Rinn</i>
<i>Chairman, Austin County Beef & Forage Committee</i> |
| 9:05 am – 10:00 am | What Does The Terminology on The Label Mean
<i>Greg Baker</i>
<i>Matagorda Ag & Natural Resources Agent, Texas A&M AgriLife Extension</i> |
| 10:00 am – 10:55am | What is This & How Do I Get Rid of it?
<i>Dr. Stacy Hines</i>
<i>Texas A&M AgriLife Extension, Assistant Professor and Extension Rangeland Habitat Management Specialist</i> |
| 10:55 am – 11:10 am | Break |
| 11:10 am – 12:00 am | What to Feed Your Pasture and What Will it Cost?
<i>Dr. Tony Provin</i>
<i>Texas A&M AgriLife Extension, Soil & Crop Sciences</i> |
| 12:00 pm | Wrap Up and Evaluation
<i>Bradley Rinn</i>
<i>Chairman, Austin County Beef & Forage Committee</i> |
| 12:10 pm | Lunch and Hay Show Judging Results
<i>Dr. Bobby Lane</i>
<i>Professor & Former Department Chair, Sam Houston State University</i> |

Program Organizers

Austin County Beef & Forage Committee

Individuals with disabilities who require an auxiliary aid, service, or accommodation in order to participate in this activity are encouraged to contact the Extension Office in Austin County at least eight days prior to the program for assistance. The members of Texas A&M AgriLife will provide equal opportunities in programs and activities, education, and employment to all persons regardless of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, or gender identity and will strive to achieve full and equal employment opportunity throughout Texas A&M AgriLife.

AUSTIN COUNTY BEEF AND FORAGE COMMITTEE

Steve Blezinger

Curtis Brenner

Don Dryer

Richard Fry

Charles Goeke

Alfred Hall

Ricky Huff

William S. Jackson

Allen Kaminski

Jo Ed Lynn

Sarah Richardson

Bradley Rinn

Gregg Schubert

Dave Schulz

Gary Shupak

Ronny Woodley

2023 Sponsors of the Hay Show

ABC Nutrition Service

ASCO Equipment

Austin County Farm Bureau

Austin County Farmers Mutual

Austin County Livestock Association

Austin County Soil & Water Conservation District#347

Austin County State Bank

Bellville Abstract

Bellville Farm & Ranch

Bernardo Farm & Ranch Supply

Bill Johnson Real Estate

Capital Farm Credit

Cattleman's Brenham Livestock Auction

Cattleman's Supply

Citizens State Bank

Columbus Livestock Company

Corteva Agriscience

First National Bank of Bellville

2023 Sponsors of the Hay Show

Four County Auction Center

Frank Monk Real Estate

G.E. Huebner Concrete, Inc

Giddings Livestock

Hobson's Choice Ranch

H.R. Ueckert Company, INC.

Industry State Bank of Columbus, Industry, & New Ulm

International Paper

Kaminski Farms

Krenek's Tractor, Inc.

Lindemann Store

Linseisen's Feed & Supply

LKL Insurance

Mill Creek Land & Cattle

Postive Feed

San Bernard Electric Co-op, Inc.

Schovajsa Catering

Schrader Construction Co., Inc

2023 Sponsors of the Hay Show

Schubert Farm Service's

SCS Construction

Sealy Parts Inc./NAPA

Simplot Growers Solution

Sorenson's Sandy Creek Ranch

Steinhauser's Inc.

Tegeler Chevrolet

Texas Farm Credit

Washington County Animal Clinic

Washington County Tractor

Thank you for Sponsoring this year's,

Austin County Hay Show!

We could not have it without your

support!

Texas Department of Agriculture Laws & Regulations

Greg Baker
County Extension Agent- Matagorda County
greg.baker@ag.tamu.edu
Office 979-245-4100
Cell (979) 943-1973

1

Melissa Barton
TDA CELL
(713) 927-7291

2



3



4



5



6

MOTHER NATURE FOR THE WIN EVERYTIME!!!!

7

Recent Issues/Conversations

- Next few slides will discuss topics of concern by the administration
- Every administration will have issues they want to focus on

8

Endangered Species and EPA

- When registering a pesticide or reassessing the potential ecological risks from use of a currently registered pesticide, EPA evaluates extensive environmental fate and toxicity data to determine how a pesticide will move through and break down in the environment and whether potential exposure to the pesticide will result in adverse effects to wildlife and vegetation.

9

Endangered Species and EPA

- The result of an assessment to determine potential effects of a pesticide's registration to a listed species will result in one of two determinations:
- The pesticide's registered use will have "no effect" on the species or designated critical habitat,
- The pesticide's registered use "may affect" the species or designated critical habitat.

10

Endangered Species and EPA

- If EPA determines the pesticide "may affect" the species it refines its assessment to determine whether the pesticide's use:
- "may affect, but is **not likely** to adversely affect" the species or designated critical habitat; or
- "may affect and **is likely** to adversely affect" the species or designated critical habitat.

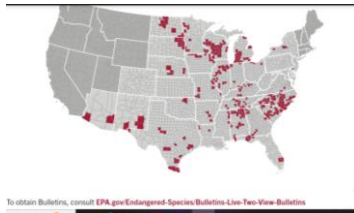
11

Endangered Species and EPA

- The list of endangered species is really being looked at when it comes to pesticides being used in those areas.
- Just a heads up for those applicators with land in Endangered Species areas.

12

Endangered Species Map



13

Endangered Species Map-All credit to Bayer Company for information provided about ESA maps and counties

Counties in Texas

Cameron	Coke	El Paso	Fort Bend
Harris	Hays	Hidalgo	Jim Wells
Kleberg	Medina	Mitchell	Nueces
Refugio	Robertson	Runnels	Starr
Uvalde	Willacy		

14

EPA Pollinator Protection

- **Importance of Pollinators**
- Many types of plants, including fruit and vegetable crops, depend on animals for pollination. In addition to honey bees, many other types of animals pollinate crops and wildflowers, including:
- Wild bees.
- Ants.
- Beetles.
- Wasps.
- Lizards.
- Birds.
- Bats.
- Butterflies.



15

EPA Pollinator Protection-Not this one !!!

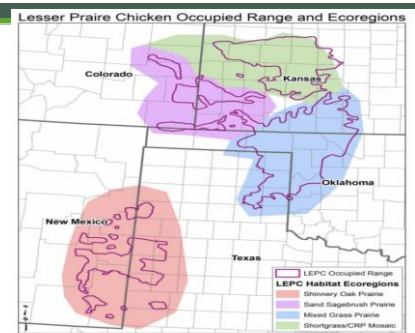


16

LESSER PRAIRIE CHICKEN HABITAT



17



18



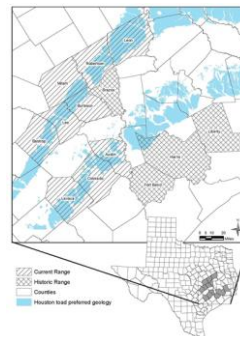
19



20



21



Currently found in Leon, Robertson, Brazos, Milam, Lee, Bastrop, Austin, Colorado, Lavaca counties

Historic range- Fort Bend, Harris and Liberty Counties

22



What is it?

GIANT
CANE
TOAD-
AUSTRALIA

23



24

Dicamba issues

- **2020**
 - 9 complaints of dicamba being sprayed on cotton and drifting
 - Drift affected 5 properties (trees affected), 1 field of organic crops, 1 garden, 1 vineyard and 1 properties vegetation (non specific)=9 complaints
- **2021**
 - 12 complaints of dicamba being sprayed on cotton and drifting
 - Drift affected 7 vineyards, 2 gardens, 2 residential properties, 1 conventional cotton field=12 complaints
- **2022**
 - 5 complaints of dicamba being sprayed on cotton and drifting
 - 2 vineyards, 2 non-resistant cotton crops and 1 residential property=5 complaints

Today's Topics

Licensing

Continuing
Education
Units

Recordkeeping

Complaints

Direct
Supervision

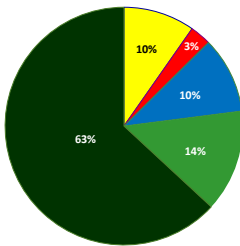
Pesticide Waste
Disposal

25

26

Ag Pesticide Applicators Currently Licensed:

- 45,206 Total Applicators**
- Commercial - 4,392
 - Noncommercial - 1,291
 - Noncommercial Political - 4,701
 - Certified Private - 6,291
 - Private - 28,531



27

Pesticide Applicator Change of Information

PA-406

Please submit any changes within **30** days

28

Licensing

29

Ag Pest License Types

- Private-\$100/5 years
- Commercial-\$200/Year
- Noncommercial-\$140/Year
- Noncommercial Political-\$75/Year



30

**License needed for
buying
and
applying
RUP, SLU
AND RH pesticides**



31

**STATE LIMITED USE
PESTICIDES**



32

(a) State-Limited-Use Pesticides Defined by Active Ingredient

(1) Except as provided by paragraphs (3) - (4) of this subsection and because of their high potential to cause adverse effects to non-target sites a pesticide product containing an active ingredient in the following list is classified as a state-limited-use pesticide and subject to the restrictions listed in paragraph (5) of this subsection, as well as all other provisions of law generally applicable to state-limited-use pesticides.

- (A) 2,4-Dichlorophenoxyacetic acid **(2,4-D)**; including acid, amine, choline, ester and salt formulations;
(B) 2,4-Dichlorophenoxy butyric acid **(2,4-DB)**;
(C) 2,4-Dichlorophenoxy propionic acid **(2,4-DP)**;
(D) 2-Methyl-4-Chlorophenoxyacetic acid **(MCPA)**;
(E) 3,6-Dichloro-o-anisic acid **(dicamba)**; including dimethylamine salt (DMA), sodium salt, diglycoamine salt (DGA), isopropylamine salts (IPA), N, N-Bis-(3-aminopropyl) methylamine (BAPMA), and potassium salt;

STATE LIMITED USE PESTICIDES



- (F) 3,4-Dichloropropionanilide **(propanil)**;
(G) 5-bromo-3-sec-butyl-6-methyluracil **(bromacil)**;
(H) 2,4-bis(isopropylamino)-6-methoxy-s-triazine **(prometon)**;
(I) 3,7-dichloro-8-quinolinecarboxylic acid **(quinclorac)**;
(J) Sodium flouoroacetate **(Compound 1080)**; and
(K) Sodium cyanide **(M44)**.

33

REGULATED HERBICIDES

Regulated Herbicides (Regulated Counties 54 in Texas)

- (A) 2,4-dichlorophenoxyacetic acid **(2,4-D)**; including acid, amine, choline, ester and salt formulations;
(B) 2-methyl-4-chlorophenoxyacetic acid **(MCPA)**;
(C) 3,6-dichloro-o-anisic acid **(dicamba)**; including dimethylamine salt (DMA), sodium salt, diglycoamine salt (DGA), Isopropylamine salts (IPA), N, N-Bis-(3-aminopropyl) methylamine (BAPMA), and potassium salt; and
(D) 3,7-dichloro-8-quinolinecarboxylic acid **(quinclorac)**.

34

REGULATED HERBICIDES

Regulated Herbicides (Regulated Counties 54 in Texas)

The following counties shall be subject to the provisions of the Act, Subchapter G, unless specifically excepted by provisions of §7.53 of this title (relating to County Special Provisions): Aransas, Austin, Bailey, Baylor, Brazoria, Brazos, Briscoe, Burleson, Childress, Cochran, Collin, Collingsworth, Culberson, Dallas, Dawson, Deaf Smith, Delta, Dickens, Donley, El Paso, Falls, Foard, Fort Bend, Gaines, Galveston, Hall, Harris, Hardeman, Haskell, Hudspeth, Hunt, Jackson, King, Knox, Lamar, Lamb, Loving, McLennan, Martin, Matagorda, Midland, Milam, Moore, Motley, Parmer, Refugio, Robertson, Rockwall, Runnels, San Patricio, Waller, Ward, Wharton and Wilbarger.

35

Pesticide Applicator Change of Classification

Form PA-407, Texas Department of Agriculture, Division of Pesticide Application, Change of Classification. The form includes sections for: 1. APPLICATOR INFORMATION, 2. CURRENT CLASSIFICATION, 3. NEW CLASSIFICATION, 4. EXPIRATION DATE, 5. SIGNATURES, and 6. NOTES. It also includes a table for listing pesticides and their classifications.

36

Flying to El Paso



37

Continuing Education Units

38

CEU Exemptions **AND 2021/2022 EXTENSION:** COVID-19

AGRICULTURE LICENSES ONLY!!

- Applicants with licenses expiring through 12-31-2022 may renew their license before CEU requirements met
 - CEUs must be made up for each licensing period, not exempt
- **For Licenses expiring in 2021 AND 2022, WE ARE EXTENDING THE EXEMPTION:**
 - Commercial, Noncommercial, & Noncommercial Political applicants may take online or correspondence courses for 2-3 years consecutively **NOW DUE TO THE EXTENSION**
 - Private Applicants may take **all their 15 CEUs** thru online or correspondence courses

39

There will be no extension into 2023 of the Covid policy

Business as usual, stay safe

If there is someone to speak with live, then it is a live meeting just like you were in person

Correspondence is when you watch a video and no one is there to speak with.

40



41



Record Keeping

42

Record Keeping Requirements:

- Commercial and noncommercial applicators must maintain records of all pesticide applications - this includes general use products
- Private applicators must maintain records of all regulated herbicides, state-limited-use pesticides, and restricted-use pesticide applications
- All records must be maintained for 2 years

Record Keeping Form

TDA Q527
7-15

Texas Department of Agriculture
Pesticide Applicator Record

Business/Applicator Name: _____ Address: _____

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

43

44

Record Keeping

- Date of application
- Time application was started
- Name of person or entity for whom the application was made
- Name and license number of the applicator responsible for the application and, if different, the name of the person actually making the application
- Total acres or volume of area treated (e.g., acre, square feet, number of head, etc.)



45

Record Keeping



- Site treated (name of crop)

46

Record Keeping

- Location of land where application was made stated in a manner that that would permit inspection by an authorized party
 - FSA #1234 plus map showing farm location
 - 123 County Road, Anytown, TX 78123
 - At the SW corner of intersection FM 1604 and Milam Rd, Anytown, TX 78123

47

Record Keeping

- Application method or type of equipment used to make the application



48

- Wind direction
- velocity (except for those applications made indoors or otherwise within a structure)
- Air temperature

- Product name
- Product EPA registration number
- Rate of product per unit

- Total volume of spray mix, dust, granules, or other materials applied per unit

- The FAA "N" number for aerial application equipment

- The spray permit number for regulated herbicides applied in a regulated county
- Documentation to verify training of persons working under the supervision of a licensed pesticide applicator

Training for unlicensed pesticide applicators may be documented by one of the following:



Find out who is in the area, ask questions, do I need to worry?

55

Complaints

56

Pesticide Complaints in Texas

- TDA's responsibility to investigate complaints of alleged pesticide misuse
- Enforcement actions may include:
 - Warnings
 - Fines
 - Suspending or revoking applicator license
 - Rereferral to other appropriate agency for further action
- Complainants do not receive compensation in TDA investigations

57



Pesticide Complaints in Texas

58



Pesticide Complaints in Texas

59



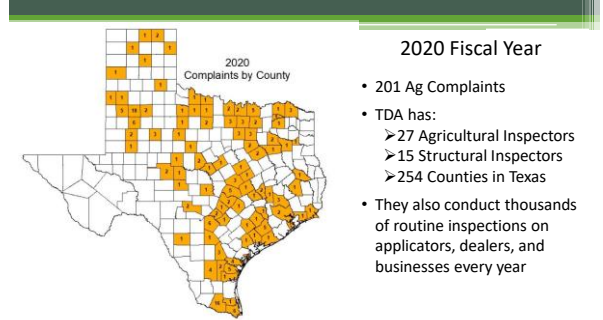
Pesticide Complaints in Texas

60

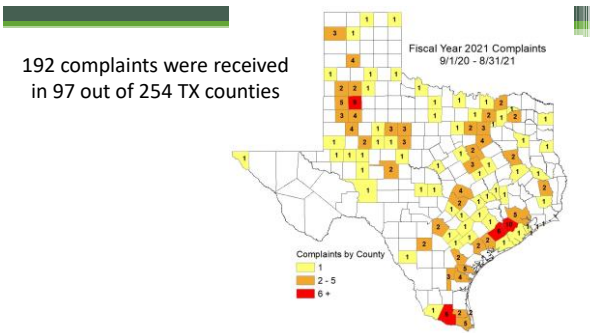


Pesticide Complaints in Texas

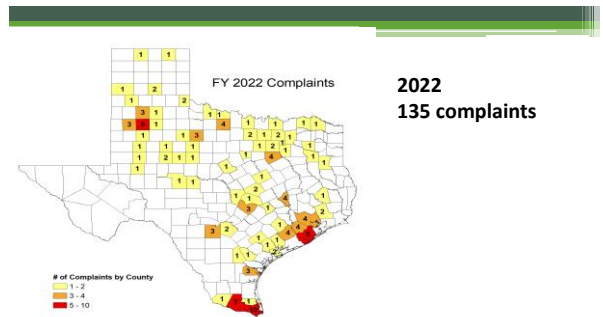
61



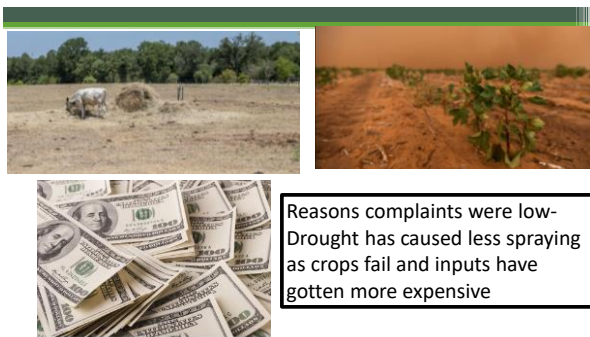
62



63



64



65

- 2022 AERIAL COMPLAINTS 14 OF 135 What's percentage?**
1. Drift onto pecan trees
 2. HE turning over the home
 3. Stopped at 2 FM roads
 4. Saw planes now has drift damage

66

2022 AERIAL COMPLAINTS

5. Drifted onto yard, land previously CRP now a crop
6. Defoliation, usually not close to home but this time flying over barn
7. Drift onto hay field, hay bales and cattle have loose movements
8. Defoliation, affected pear trees, tomatoes, mesquite, figs, olives and hackberry trees.

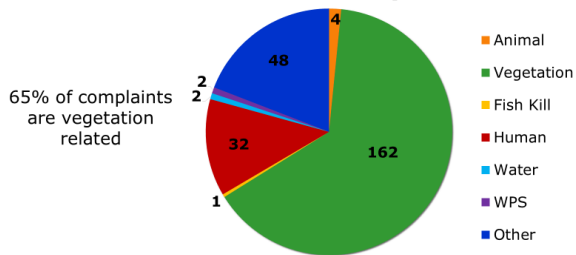
67

2022 AERIAL COMPLAINTS

9. Kid drifted on by gate leaving for school
10. Drift but got kids inside before exposed, livestock and vegetation exposed.
11. Plane flew over home but not exposed, but why did he need to fly over home?
12. Drift, heard application, went outside, felt droplets on face
13. Drift damage to trees
14. Drift vegetation damage

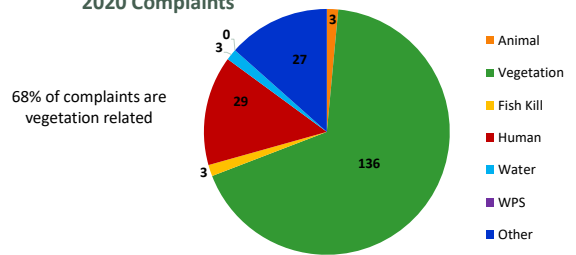
68

2019 Fiscal Year Complaints



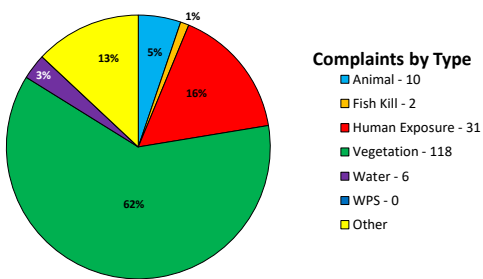
69

2020 Complaints



70

2021 Complaints

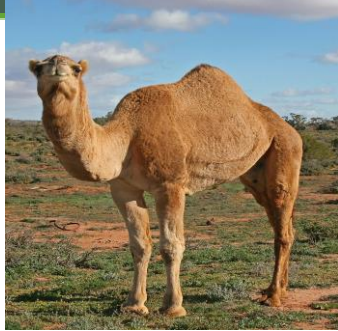


71



72

CAMELS



73

ZEBRAS



74

BUFFALO



75



Missing labels, no problem, that's the 2,4 D container right? Go ahead and use it, that's why the next slide is so important to us all!!

76



**IF GOLF IS A SPORT
THEN THIS IS AN
ATHLETE**

77

Golfers - do not lick your balls, the greens have been sprayed. -The management

78

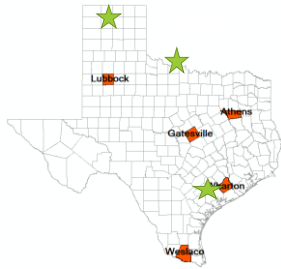
WHY STORAGE,
PROPER ORDERING AND
WASTE DISPOSAL EVENTS ARE
IMPORTANT

79

Pesticide Waste Disposal

80

Pesticide Waste Disposal



- TDA held first state-funded pesticide waste disposal event in ~ 8 years in November 2018
- Free & anonymous
- Events have been held in:
 - Wharton
 - Gatesville
 - Weslaco
 - Lubbock
 - Athens
 - Added Victoria, Wichita Falls and Dumas **DONE**

81

Looking at Hondo area in spring

And El Paso in the early summer 2023

82

A total of 531,740 lbs. of waste has been collected between the 4 events



83

Program has successfully held 4 Pesticide Collection Events in 2022. Since TDA began hosting the events in 2018, we have collected approximately 900,000 lbs. of waste with 618 participants

84



85



86

- 331 participant trucks between the 4 events
- Average waste per truck: ~ 1,600 lbs.



87



88



89

Questions?

Perry Cervantes
 Director for Environmental and Biosecurity Programs
Perry.Cervantes@TexasAgriculture.gov
 Office 512-463-7692
 Cell 512-955-9336

90



**What's this & How
do I get Rid of it?**

**Herbicide
Brush & Weed
Control in TX**



**Dr. Stacy L. Hines
Extension Rangeland Habitat
Management Specialist**

1. What causes brush & weed encroachment?

**Question
Session
Time**



The Causes Behind Brush & Weed Encroachment



Disturbed Sites

- Overgrazing
- Mechanical Disturbance



Drought

- Viable seeds produced during drought
 - Increase in brush & weeds the year following drought



Seeds Spread by Animals

- BRUSH: Source of Food



Improved Pastures (Bermudagrass)

- Low Fertility Conditions



Factors Causing Encroachment



Prevent Controllable Factors that Cause Encroachment

- Proper Stocking Rate
- Soil Nutrient Testing



During Drought

- Reserve Pastures
- Supplemental Feeding
- Destocking
- Keeping Livestock out of Overgrazed Pastures with Brush Seed Pods

Keep
Good
Records
for Your
Property
&
Pastures.



October 2008, 4460 lb/ac



October 2009, 2646 lb/ac



October 2011, 1764 lb/ac



October 2012, 988 lb/ac

Critical Times in south TX to Adjust Stocking Rate

Jan. - May	June	August – Sept.	October
Winter/spring Rainfall	Target date for cattle stocking rate adjustment based on spring rainfall.	Summer/fall Rainfall	Target date for cattle stocking rate adjustment based on summer/fall rainfall.

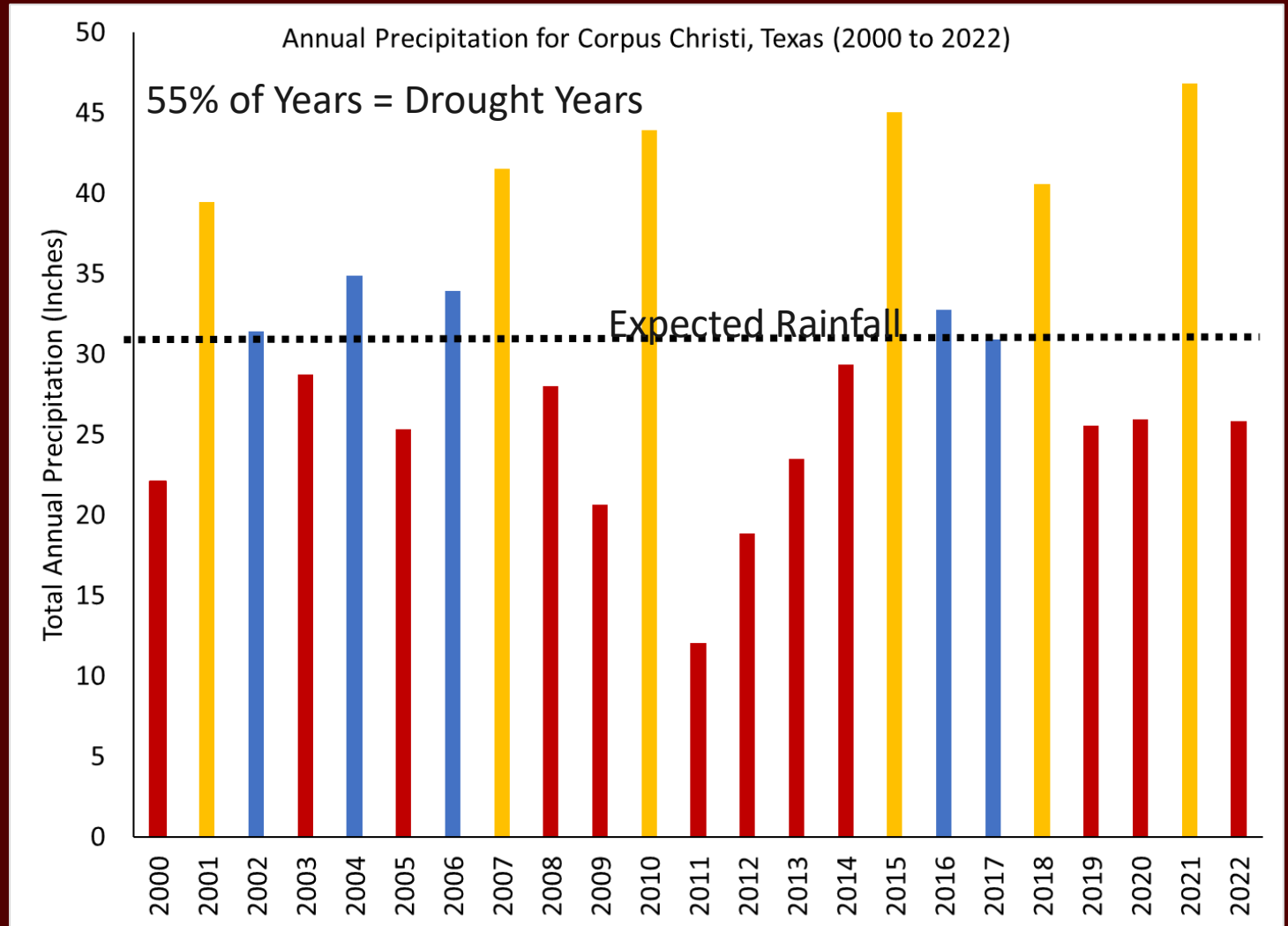
Guidelines to Adjust Stocking Rate

	% Median Rainfall*	Cut SR by %
Moderate Drought	55-86	25
Severe Drought	39-55	50
Extreme Drought	< 39	100

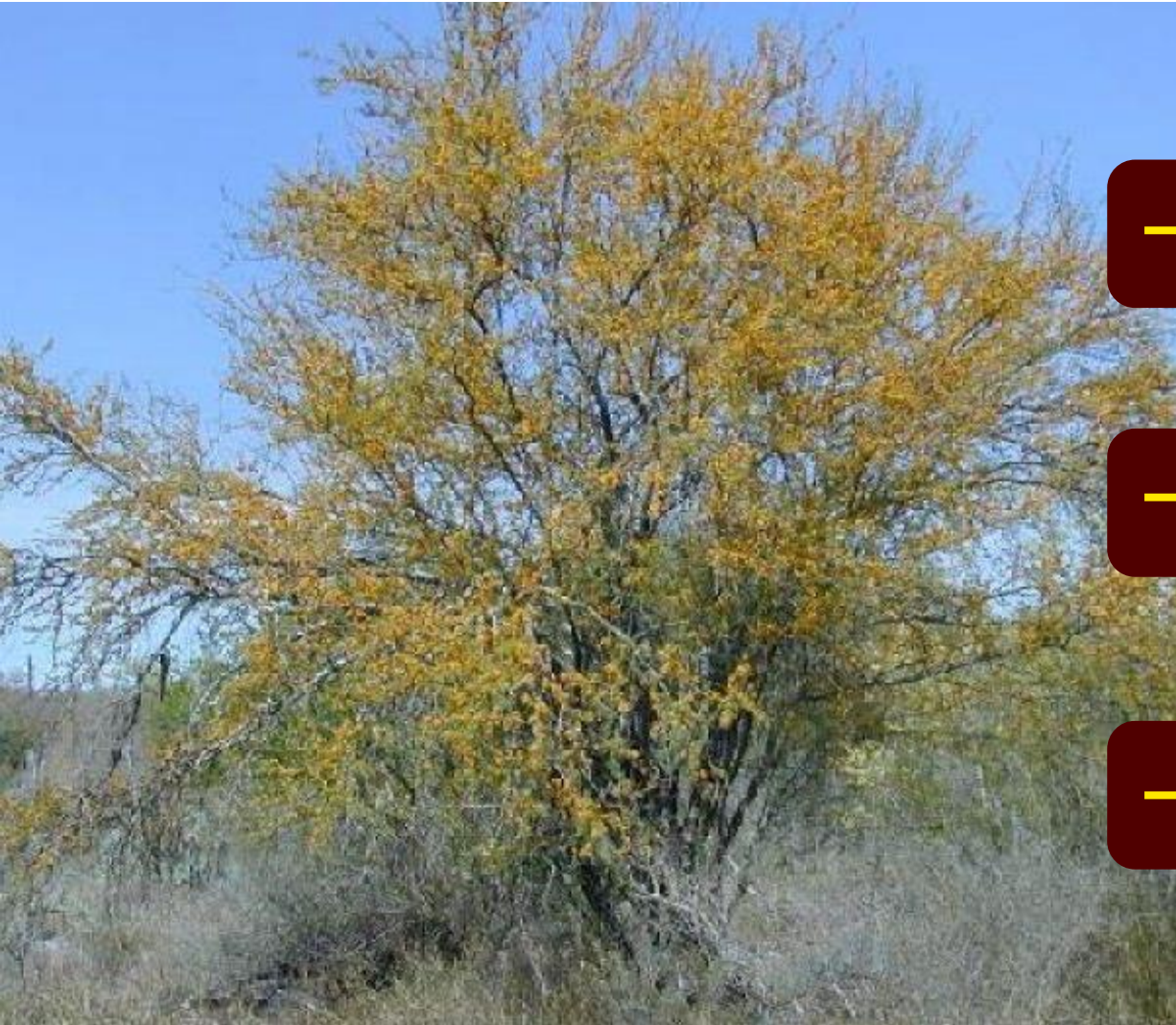
* % median rainfall from January to May and August and September

Managing Brush & Weed Encroachment

**When You've
Done
Everything
Right ...**



The Basics of Brush & Weed Management



Plant Identification

- ID Species to Apply Right Treatment



Plant Phenology

- Correct Time to Apply Treatment

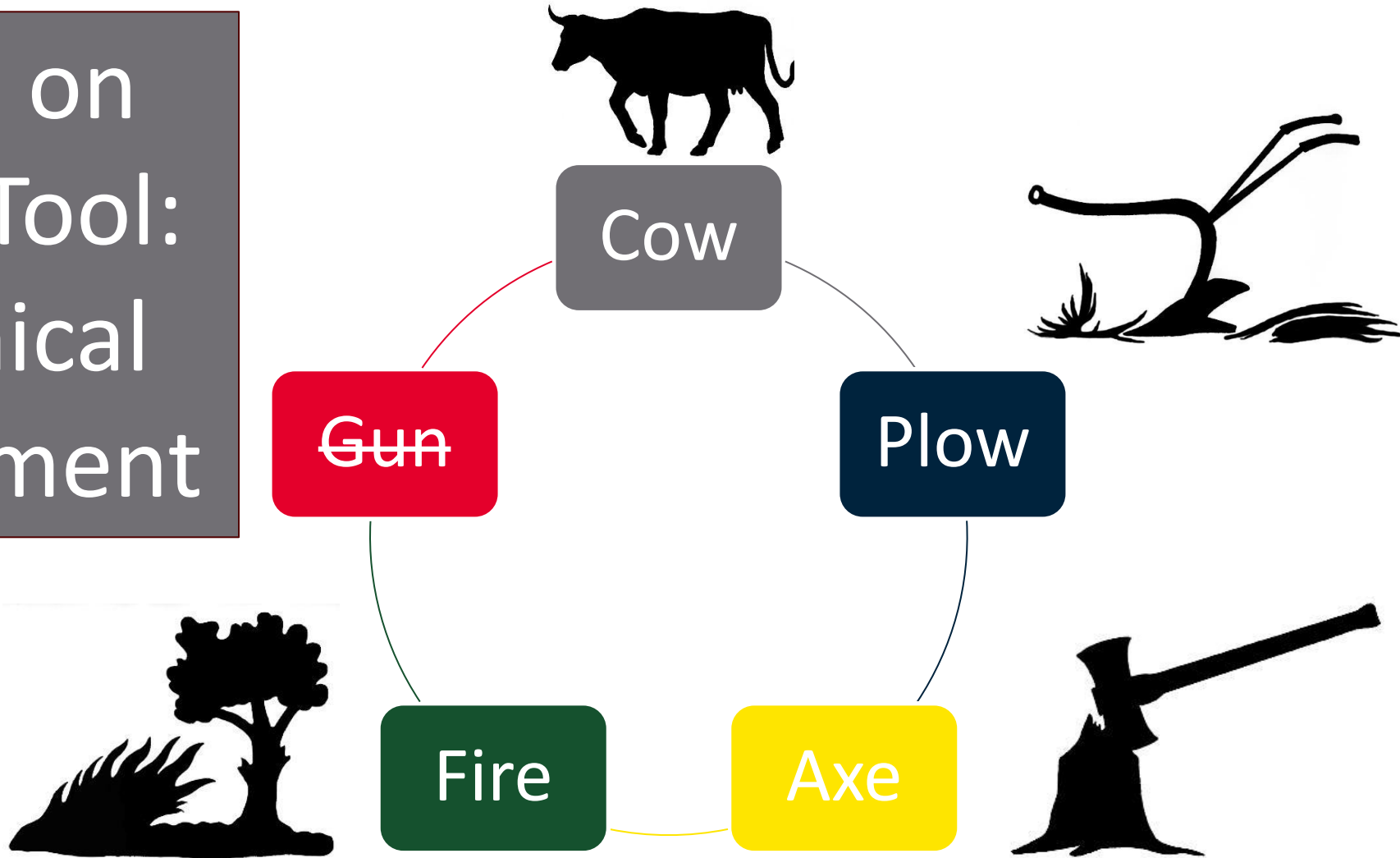


Management Options

- Know all Options & Pros & Cons of Each

Fourth Mistake to Avoid: Not Understanding Management Options

Focus on
New Tool:
Chemical
Treatment



Chemical Treatments



PROS ...

- Flexibility
 - Can do leaf, stem, or cut stump treatments
 - Indiv. Plants or Broadcast
- Fairly economical
- Great as a retreatment/ follow up
- Can use in combination with fire, grazing, or mechanical treatments

CONS ...

- Some chemicals require special license to purchase or apply
- Leaf sprays need to be timely
- Aversion to the use of chemicals

Read & Follow the Label

Label is the Law →

Read it, Follow it ...

- “It is a violation of Federal law to use this product in a manner inconsistent with its labeling.”

- (i) proper rate and timing
- (ii) list of susceptible species
- (iii) clean up and disposal after use
- (iv) much, much more

*Label recommendations result of many field trials

*Even used herbicide for many years, re-read label as information/directions may change

PPE

The Best Fashion Statement!

Common South Texas Brush & Weeds



Huisache



**Annual
Broadleaf
Weed Control**



**Perennial
Broadleaf
Weed Control**

Plant Identification, Plant Phenology,
Chemical Control Methods

Huisache

(Vachellia farnesiana)



HUISACHE

Plant Identification

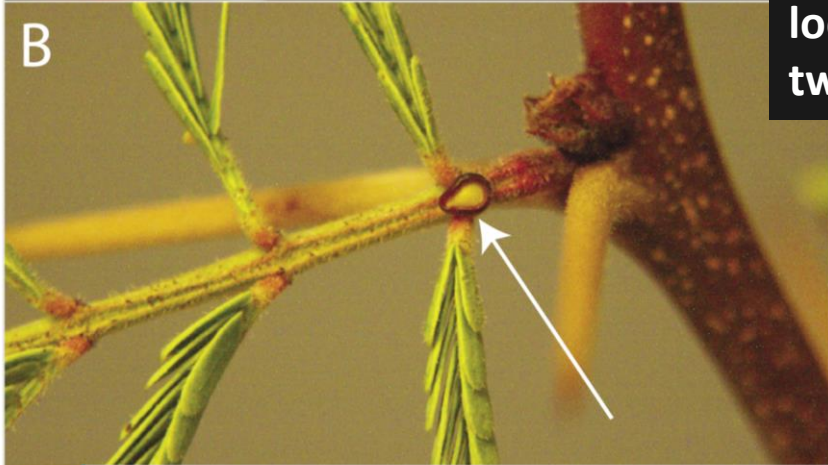


Figure 6. (a) Huisache petiolar gland below the bottom pair of leaflets and (b) twisted acacia petiolar gland between the bottom pair of leaflets.

Look-a-Like is Twisted
Acacia- Petiolar Gland
location distinguishes the
two species



Shrub

- Multi-woody stems
- Paired, pin-like spines

Leaves

- Compound, many divisions
- Leaflets: 10-20 pairs, small & fern-like
- Gland is absent or centrally located on leaf stem (petiole)



Flowers & Fruits

- Flowers: Fragrant, yellow-orange fluff ball
- Fruits: 1.5-3" long, bean pods

HUISACHE

Plant Phenology



Underground Buds

- Re-sprout with top removal
- Alternative to Herbicides:
 - Mechanically uproot



Flower/Fruit

- After Rain
- Spring
 - Fall, Winter



Leaves

- New growth- light green
- Mature – dark green (Fall)

HUISACHE

Chemical Treatment 76-100% Kill Rate



LEAF Spray Method ...

- Many stems
- Less than 6 feet tall
- Good canopy of Mature leaves
- September-November
 - Stop when soil temperature drops below 75°F (1-foot deep)

STEM Spray Method ...

- 3 or fewer stems
- Young seedlings or Older, undisturbed trees
- Apply anytime, best results during growing season

HUISACHE: Leaf Spray Method



RWFM-PU-112 10/2021



HOW TO BEAT HUISACHE: Individual Plant Treatment Leaf and Stem Applications

Robert K. Lyons and Megan K. Clayton*

Conejet 5500 X-6 or X-8 Nozzle

**Sendero- No Grazing/Hay Restrictions
Invora- No Hay, No Way!**

Keep These Points in Mind:

- ▶ Follow herbicide label directions.
- ▶ For best results, do not spray when:
 - Rains have stimulated new growth at the end of the stems
 - Leaves are wet from rain or dew
 - Foliage shows damage from hail, insects, or disease
 - Working upwind of desirable trees, shrubs, or crops
- ▶ The cost of treatment rises rapidly as the brush becomes bigger and denser. Download the Brush Busters Cost Calculator app to easily estimate treatment costs.
- ▶ Controlling huisache is not a one-time job. You will need to monitor your land every year to check for new plants.

RECOMMENDED LEAF SPRAY HERBICIDE MIX OPTIONS*

	Ingredient	Concentration in Spray Solution	Tank Size			
			1 gal	3 gal	14 gal	25 gal
Option A	Grazon P+D, Gunslinger, Picloram+D, or Sendero	1%	1.28 oz	3.84 oz	18 oz	32 oz
Option B**	Invora**	1.5%	1.92 oz	5.76 oz	27 oz	48 oz
Option C	Graslan L	0.63%	0.8 oz	2.4 oz	11 oz	20 oz
Add to option A, B, and C	Non-ionic surfactant	0.25%	0.32 oz	1 oz	3 oz	8 oz
	Hi-Light™ blue dye	0.25 to 0.5%	0.32–0.64 oz	1–2 oz	3–6 oz	8–16 oz

*All leaf spray solutions are mixed in water.

**Invora is labeled for privately owned rangelands only (*excludes hayfields*) and requires Picolinic Acid Chemistry Training for all applicators.

HUISACHE: Stem Spray Method

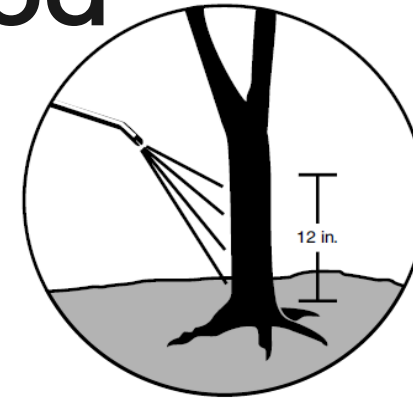


RWFM-PU-112 10/2021



HOW TO BEAT HUISACHE: Individual Plant Treatment Leaf and Stem Applications

Robert K. Lyons and Megan K. Clayton*



Conejet 5500 X-1 or X-2 Nozzle

Huisache Type and Stem Diameter	% Triclopyr	Herbicide/ Gallon	Herbicide Carrier/Gallon
Smooth bark, stems up to 4 inches in diameter	25%	32 oz	96 oz diesel or basal bark oil
Add Hi-Light™ blue dye (optional)		0.32–0.64 oz	

Trade Names for Triclopyr Ester:

Remedy Ultra, Pathfinder II, Triclopyr 4E

Grazing Restriction: Lactating Dairy Animals Only- Next season

Hay Harvest Restriction: 14-days

Rainfast Interval: 6-hours: No Pesticide Applicators License Required

Keep These Points in Mind:

- ▶ Follow the herbicide label directions.
- ▶ The cost of treatment escalates rapidly as brush becomes denser or the number of basal stems per plant increases. Download the Brush Busters Cost Calculator app to easily estimate treatment costs.
- ▶ Multi-stemmed or rough-barked plants are more difficult to control with this method.
- ▶ Do not spray when the basal stems are wet.
- ▶ After mixing the herbicide with diesel, shake or agitate the solution vigorously.
- ▶ This method is more difficult to apply if there is dense grass around the basal stems.

HUISACHE: Cut Stump Method



RWFM-PU-063 11/2021



HOW TO AVOID LUMPS WHEN TREATING CUT STUMPS: Individual Plant Treatment Cut Stump Applications

Robert K. Lyons and Megan K. Clayton*

Keep These Points in Mind:

- ▶ Follow herbicide label directions.
- ▶ This method is best for plants with a single stem or a few stems growing from the base (redberry juniper never has single basal stems).
- ▶ Do not spray when basal stems are wet.
- ▶ After mixing the herbicide into the carrier (diesel or water), shake or agitate the solution vigorously.
- ▶ Cost of treatment rises rapidly as the number of woody plants and stems per acre increases. Download the Brush Busters Cost Calculator app to easily estimate treatment costs.

Conejet 5500 X-1 or X-2 Nozzle

RECOMMENDED CUT STUMP SPRAY MIX FOR HARDWOODS HERBICIDE MIX OPTION (IN DIESEL OR BASAL OIL)				
Ingredient	Concentration in Spray Solution	Tank Size		
		1 gal	5 gal	10 gal
Triclopyr ester herbicide	15%	19 oz	96 oz	1.5 gal
Hi-Light™ blue dye	1 oz/gal	1 oz	5 oz	10 oz

Trade Names for Triclopyr Ester:
Remedy Ultra, Pathfinder II, Triclopyr 4E

A. Spray Mix with Triclopyr Ester for Hardwoods

Works well on: Algerita (agarito), baccharis, blackbrush, bois d'arc, bumelia, catclaw acacia, catclaw mimosa, Chinese tallow tree, elm, hackberry, huisache, lotebush (bluethorn), mesquite, all oaks, pricklyash (Hercules' club), saltcedar, Texas persimmon, winged elm, and yaupon.

HUISACHE SUMMARY

Herbicide Application Mistakes to Avoid



In General

- Plant parts are dry before spray
- Following recommendations
 - includes surfactant & blue dye (good coverage)
- Larger, multi-stemmed trees, may need to start with mechanical and then follow-up with herbicide
- Waiting two-years between herbicide treatments
 - Leaving plant alone for two-years after spray
- Never one and done- monitor & follow-up

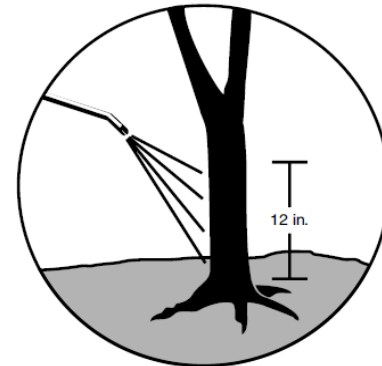


Leaf & Stem Spray:
Leave brush alone,
let stand, for
2 years!



Leaf Spray

- Between 3-6' tall
- Healthy leaves, no new growth & not flowering



Cut Stump

- Remove vegetation around stem
- Straight cut, close enough to mow over the stem
- Cover immediately- cut edge & all around outside stem to ground level



Stem Spray

- 3 or fewer Stems
- Remove vegetation around stem

Annual Broadleaf Weed Control



Annual Crotons (aka: Dove Weed & Goatweed), Annual Broomweed, Bitter Sneezeweed, Marshelder

Annual Crotons (Dove Weed or Goatweed)

Plant Identification



One-Seed



Woolly



Texas



20 Croton Species in TX

- 9 are annuals



Common Annuals

- One-Seed Croton
- Woolly Croton
- Texas Croton



Commonalities

- Star-shaped Hairs on Plant (leaves or stem)
- Annuals- complete life cycle in growing season

Annual Broadleaf Weeds

Plant Phenology (Timing)



Spray in Spring

- Good Soil Moisture



Size of Plant

- 4-6 " in Height

Annual Broadleaf Weeds (annual crotons, bitter sneezeweed, sunflower, etc.)

Individual Plant Treatment...

Herbicide	Notes	Herbicide Quantity (Active Ingredient)
2,4-D	<ul style="list-style-type: none">25" or more annual rainfall- use amine formulationDrier areas- use ester formulation	1% Mix (4 lb/gal product)
Picloram: 2,4-D (1:4)	Example Trade Name: Grazon P+D	0.63% Mix (3.8 lb/gal product)
Picloram: Fluroxypyr (1:1)	Example Trade Name: Surmount	1% Mix (1.34 lb/gal)



Chemical Treatment 76-100% Kill Rate

Broadcast Treatment...

Herbicide	Notes	Herbicide Quantity (Active Ingredient)
Dicamba: 2,4-D (1:3)	Example Trade Name: Outlaw	1-2 pints per acre (0.5-1 lb)
Aminopyralid: 2,4-D (1:8)	Example Trade Name: Grazon Next HL	24 oz per acre (0.7 lb)
Aminopyralid: Metsulfuron Methyl (1:6.2)	Example Trade Name: Chaparral <ul style="list-style-type: none">Not recommended on Bahiagrass Pastures	2-3.3 oz per acre (0.078-0.127 lb)

Annual Broadleaf Weeds SUMMARY

Herbicide Application Mistakes to Avoid

Other Common Annuals



Giant Ragweed Seedling

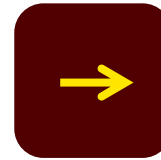


Snow on the Prairie (Mountain)

Also recommended treatment for perennial- Western Ragweed

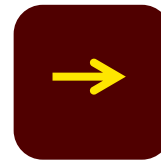


Western Ragweed



In General

- Plant parts are dry before spray
- Following recommendations
 - includes surfactant & blue dye (good coverage)
- Good leaf condition
- Good Soil Moisture



Spray Early

- Between 4-6" tall
 - While they are growing
- Before produce flowers or seeds



Annual Sandbur Control



Grassburs- indicate weak stand of forage
More tolerant of acidic, low fertility soils than many
warm season forages.

One of the best cultural control measures is to maintain
a healthy stand of forage with proper management.

Grassbur (*Cenchrus* species)



Grassbur can sometimes survive over the winter.

“burned” off by freezing temperatures in the fall or winter, sometimes these plants may survive and come back from the roots the following spring. These plants might be more diffi-



4 leaf grassbur with one tiller.



Early recognition: Key to Management

- Unsure- pull up- see the bur



Bermudagrass- winter & dormant

- Pre-emergent (winter & dormant)
 - Prowl H2O
- Post emergent- Pastora



Bermudagrass & Bahiagrass

- Pre-emergent
- Rezilon

[Joshua McGinty, Ph.D.](#)

**Associate Professor and Extension Agronomist
Texas A&M AgriLife Extension**

joshua.mcginity@ag.tamu.edu

Office: 361-265-9203; Direct: 361-698-7409

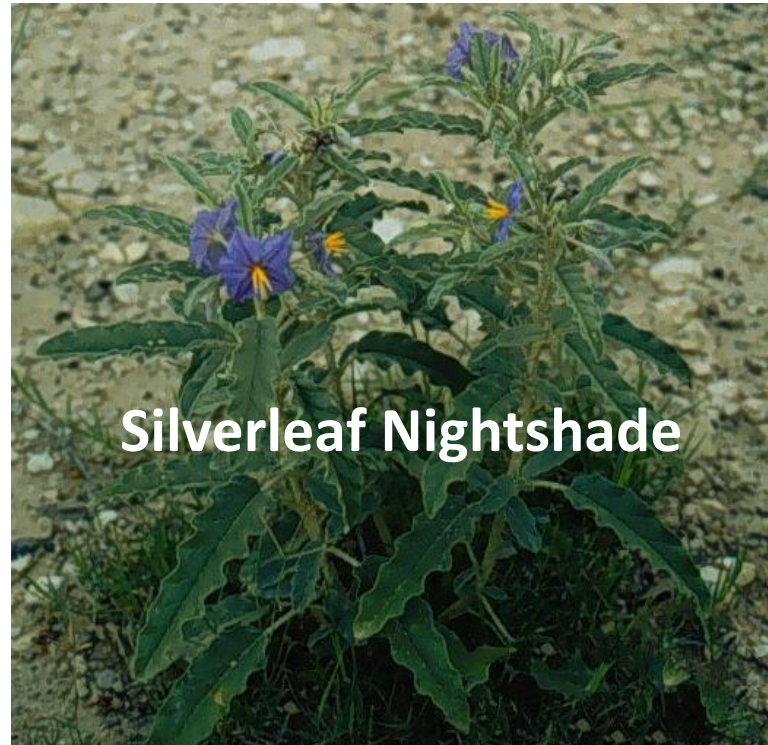
Perennial Broadleaf Weed Control



Silverleaf Nightshade, Carolina Horse
Nettle, Bullnettle, Western Horse Nettle

COMMON PERENNIALS

Plant Identification



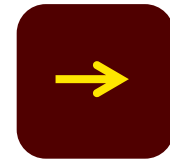
Silverleaf Nightshade



**Carolina
Horse
Nettle**

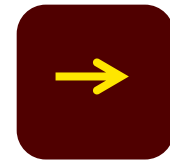


Western Horse Nettle



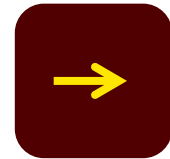
Silverleaf Nightshade

- Elongated, wavy margin leaves
- Purple star flower with yellow center (sometimes flowers are white)
- Usually prickly (spines)



Carolina Horse Nettle

- Broad, lobed leaves
- Spines on stem/leaves
- White star flower with yellow center



Western Horse Nettle

- Broad, oak-like leaves (spines on stem and leaves)
- Star flower (mostly light purple-blue, rarely white)
- Short plant (most often less than 2' tall, some grow up to 3' tall)

Perennial Broadleaf Weeds

(silverleaf nightshade, bull- & horse nettles)

Individual Plant Treatment...

Herbicide	Notes	Herbicide Quantity (Active Ingredient)
Picloram: 2,4-D (1:4)	Example Trade Name: Grazon P+D	0.63% Mix (3.8 lb/gal product)
Picloram: Fluroxypyr (1:1)	Example Trade Name: Surmount	1% Mix (1.34 lb/gal)
*Same Recommendation as Annual Weeds Discussed Previously *Timing of Application – May be Different		

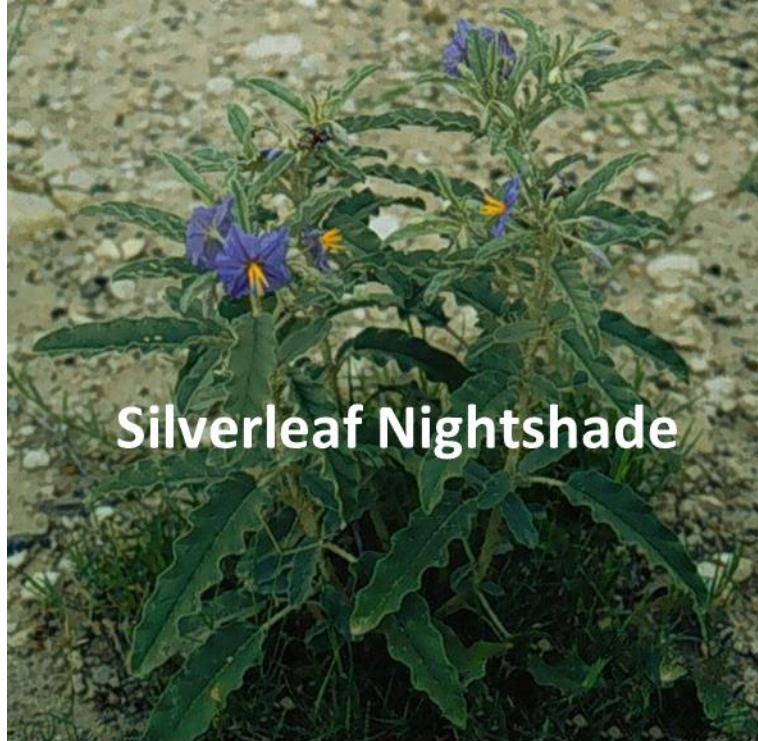
Chemical Treatment 76-100% Kill Rate

Broadcast Treatment...

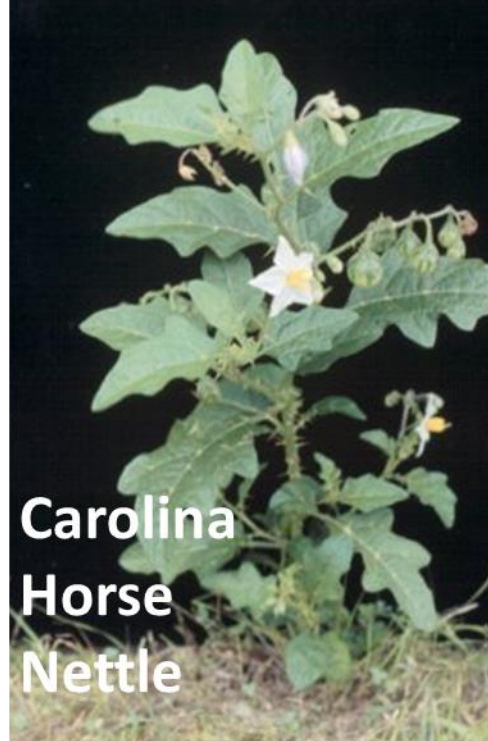
Herbicide	Notes	Herbicide Quantity (Active Ingredient)
Dicamba: 2,4-D (1:3)	Example Trade Name: Outlaw	32 oz per acre (1 lb)
Aminopyralid: Metsulfuron Methyl (1:6.2)	Example Trade Name: Chaparral <ul style="list-style-type: none">Not recommended on Bahiagrass Pastures	2-3.3 oz per acre (0.078-0.127 lb)
* Outlaw- upper end of recommendation made for annuals discussed previously *Chaparral- same recommendation as annual weeds discussed previously		

Perennial Broadleaf Weeds SUMMARY

Herbicide Application Mistakes to Avoid



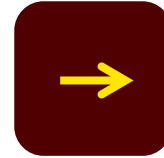
Silverleaf Nightshade



Carolina
Horse
Nettle

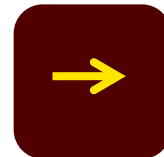


Western Horse Nettle



In General

- Plant parts are dry before spray
- Following recommendations
 - includes surfactant & blue dye (good coverage)
- Good leaf condition
- Good Soil Moisture

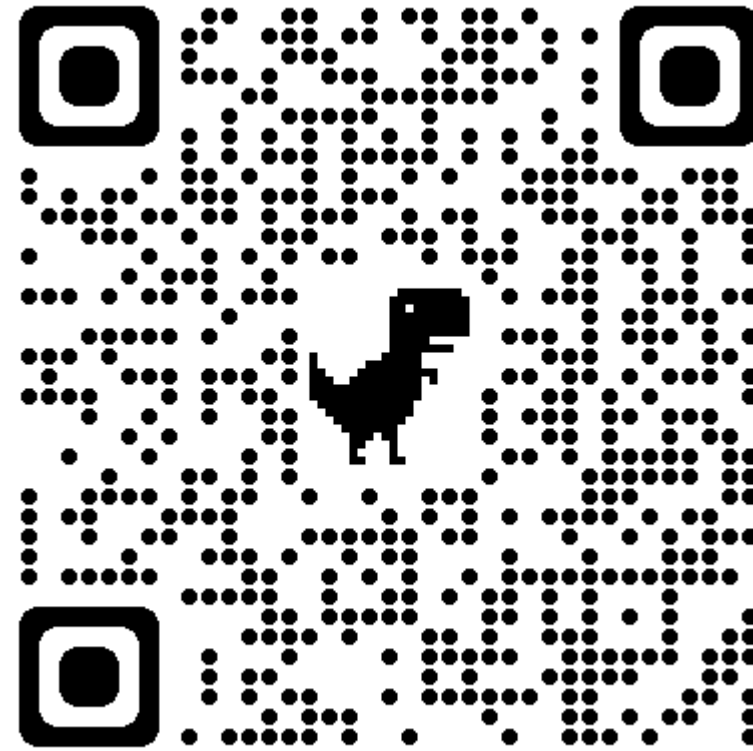


These Perennials

- Spray in Spring
- When Plants are FLOWERING



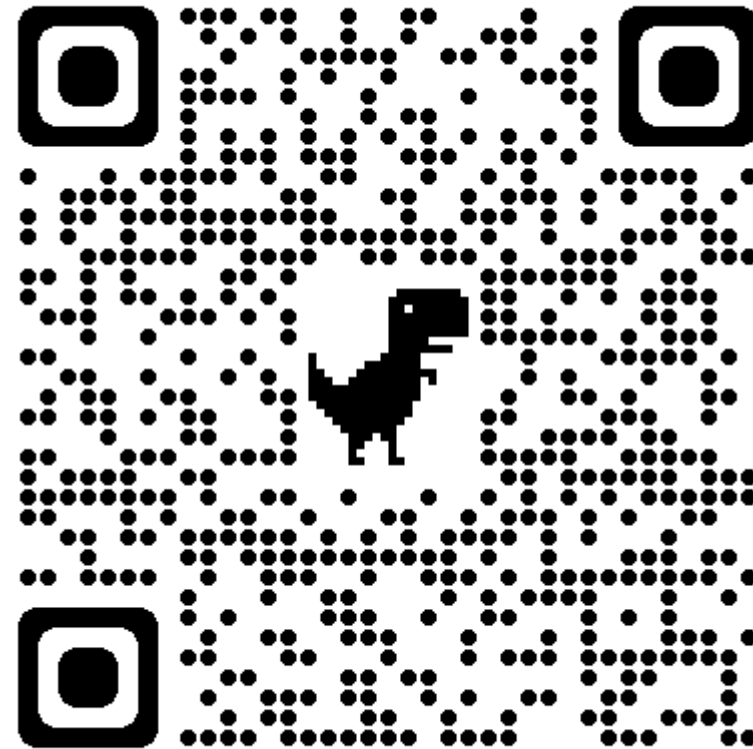
Resources



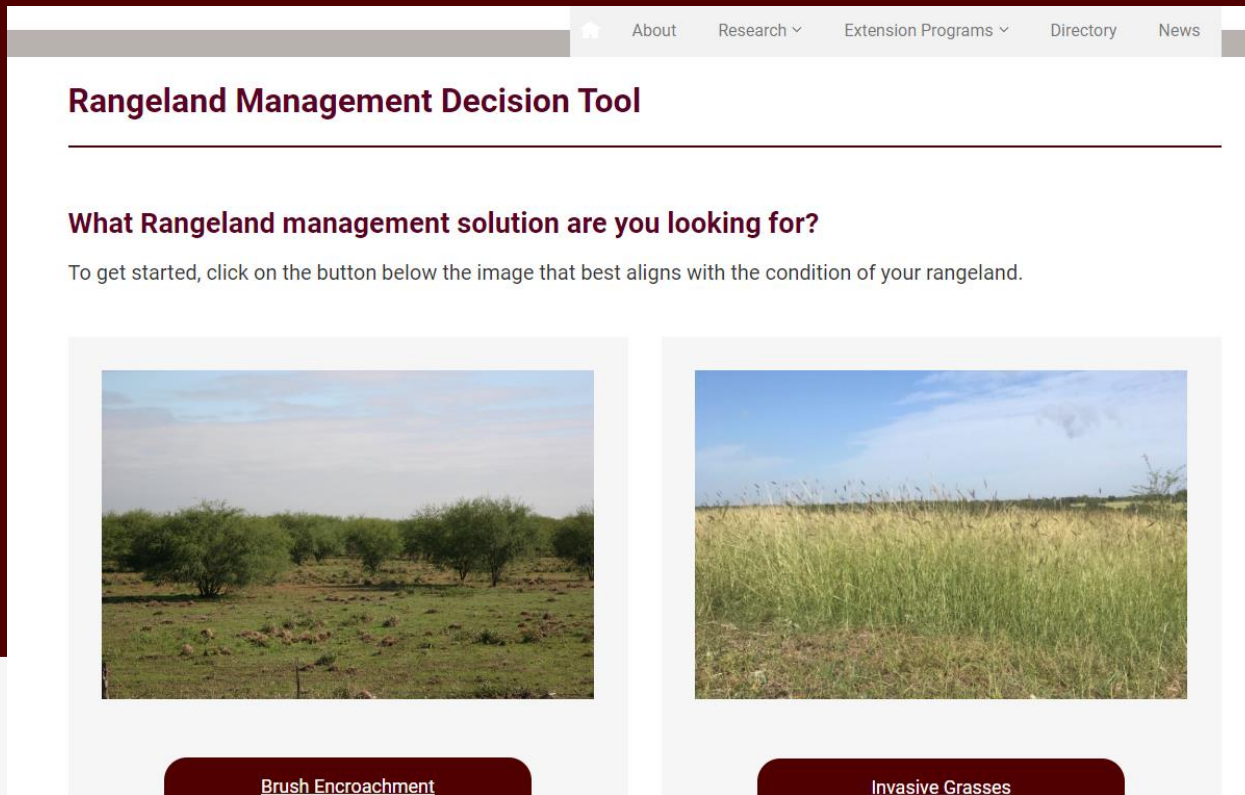
Brush Busters: AgriLife Learn

More Resources

YouTube
[@stacyhines-qy2fp](#)



**How to Use ERM-1466 :
Chemical Weed & Brush
Control for Rangelands**



**AND ... More
Resources**



My Website:
**[https://ccag.tamu.edu/extension
/rangeland-habitat-](https://ccag.tamu.edu/extension/rangeland-habitat-)**

Contact Me

Dr. Stacy L. Hines


→ **Phone Number**
361.265.9203 (Office)
361.360.4533 (Cell)

→ **Email Address**
stacy.hines@ag.tamu.edu

→ **Website**
<https://ccag.tamu.edu/extension/rangeland-habitat-management/>

→ **YouTube**
Stacyhines-qy2fp

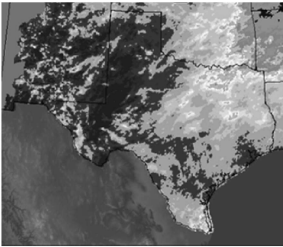





TEXAS A&M
AGRI LIFE
EXTENSION

Managing Hay and Grazing Lab
What is the cost of do and not doing??

Improving Lives. Improving Texas.







Drought is nothing new for Texas



Recovery from Drought is Variable

- Preparation before drought
- Actions during the drought





Factors effecting recovery are based on prior management.

Considerations

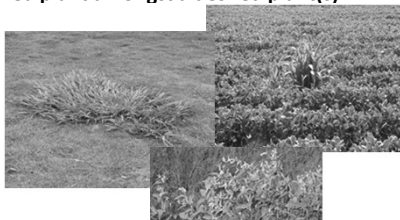
- Fertility
- Weed control
- Haying heights/grazing heights
- Forage canopy

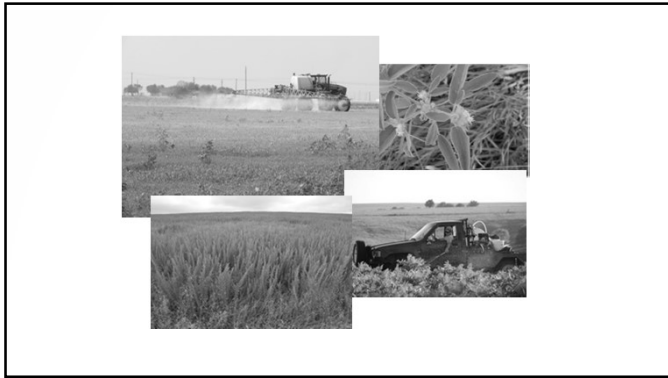
The first issue often observed is weed pressure.



What are weeds?

- An undesired plant amongst a desired plant(s).





What weeds are present?

- Important to know.
 - Provides valuable info for control
 - Insight into possible issues.



Traits of Weeds

- Faster growing than desired plants
- Lower nutrient requirements than desired plants
- Shorter growing season???
- Capacity to tolerate lower pH soil
- Capacity to handle compaction and limited rooting
- Capacity to handle limited oxygen in rooting zone.

Weed Control with Soil Management Questions to ask...

- What weeds are present?
- Why are pests present?/What is the cause and effect?
- What management can be altered to reduce the “expression” of weeds?

What Weeds are Present



Before attaching the pasture or hay field with the entire Army.....

Deploy the Scouts

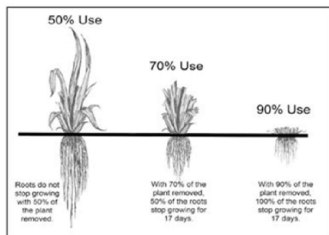


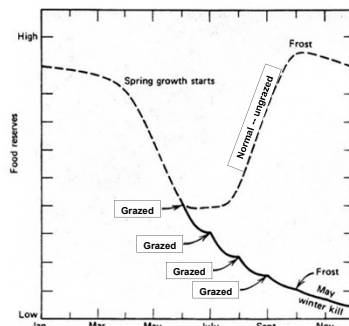
Field Scouting

- Map of field
- Document time and type of weeds
- Condition of forage
- Open ground
- Season long activity
- Historic perspective




Impact of forage/removal height on rooting






Food reserves of a perennial ungrazed plant compared with reserves of a repeatedly grazed plant.



Left. A properly stocked pasture on the Texas Range Station near Barnhart in good condition, Feb 1951. In 1955 this area had made a remarkable recovery from the drought.



Right. A heavily stocked adjacent pasture after two years of drought. In 1955 this pasture, stocked at a rate common to the general region of the Edwards Plateau, had only partially recovered from drought.

Young, Vernon A. 1956. The effect of the 1949-1954 Drought on the Ranges of Texas. JRM. pp. 139-142.

**An now, the biggest
Environmental Challenge**

Likely 75% of what you learn in soil testing.

Hint: It's not lab data

75 Percent?



- Soil testing reports are often just an indication of historic fertilization and crop nutrient removal of the soil, but lacks information including:
 - Soil tilth
 - Pests
 - Etc.

Soil Tilth

- What is it?
- Why care?
- How to address?

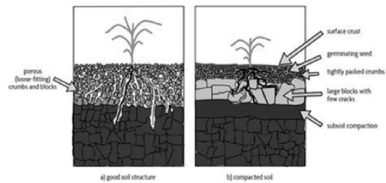
Tilth Defined

- **Soil tilth** is its physical condition, especially in relation to its suitability for planting or growing a crop. Factors that determine **tilth** include the formation and stability of aggregated **soil** particles, moisture content, degree of aeration, rate of water infiltration and drainage.

What Factors Influence Tilth?

- Plant rooting density (often #1)
- Soil Density
 - Compaction and root development
 - Aggregate Stability
- Organic Carbon
 - Root development
- Micro to Macro Pore ratio
 - Compaction

Tilth Comparison



Soil Compaction

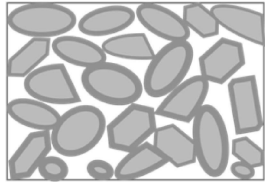
- In moist and wet soil, water effectively lubricates the individual soil peds and under even modest weight, the particles are pushed together.



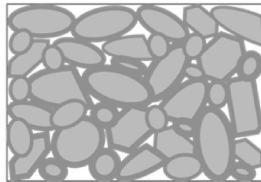
Impacts of soil compaction

- Influences water holding capacity
- Water infiltration
- Nutrient Availability
- Rooting depth

'Ideal Soil' (50% solid, 25% air, 25% water)



Compacted Soil

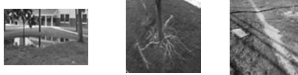


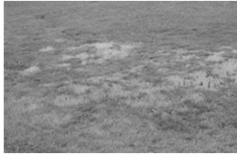
Soil Solid Water Air

Figure 1. Soil compaction causes a reduction in available space for soil air and water, and limits pathways for crop roots.

Soil Compaction

- In moist and wet soil, water effectively lubricates the individual soil peds and under even modest weight, the particles are pushed together.



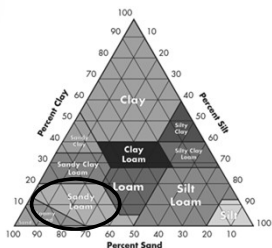


Excessive traffic can cause compaction

- Wet clay soils compact quickly.
- Results in loss of macro-pores and water holding capacity



But these are sandy soils, they don't compact.



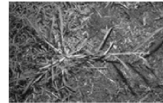
Sandy Loam soils are often more compactable due to high macro-pore volumes yet very weak soil structure.

Environmental Conditions

- Soil tilth (compaction, rooting, workability, and etc.)
- Water and air infiltration
- Nutrient Availability
- Shading/open canopy (result of above and other factors)

Compaction

- Many weeds have shallow rooting systems, thus can survive/dominate in irrigated/higher rainfall areas



Compaction

- Weak canopy from pasture/hay species
 - Light penetration to soil surface
 - Weed seed germination caused by “right” wavelength of light
 - Moisture available



Compaction

- Many weeds have a very short life cycle.
 - Rapid growth and seed development



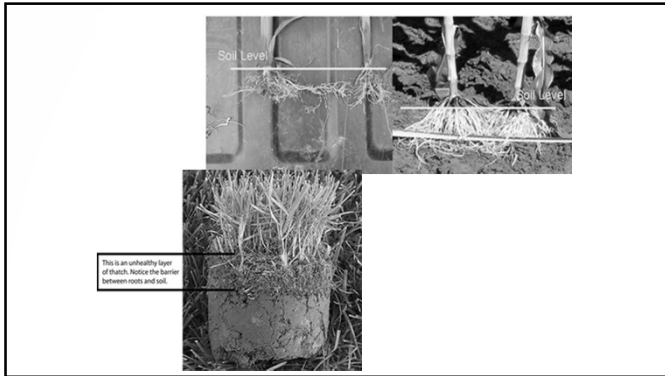
Other Environmental Challenges

Roots

Rooting and Compaction



Iowa State University Extension

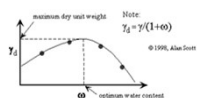


Soil Compaction

- How to address?
- In a wet clayey soil????????

How wet is too wet?

- Proctor test





How does soil tilth influence weed pressure?

- Weed competition
 - Rooting
 - Canopy density
 - Nutrient requirements
 - Annual, short reproductive timeframe

Reducing Macro-compaction



Biological compaction control

Winter legumes
Limit grazing-maintain canopy
Remove cattle prior to rainfall



What part of the environment can we manage for the reduction in weed pressure?

- Manage for canopy cover
- Manage for intended crop growth rates
- Manage for soil tilth



All start with collecting soil samples.

Evaluate Soil Test Report

- Considerations
 - Historical analyses
 - Time since last testing
 - Changes in parameters
 - Recommendations for same yield goal/crops
 - Differences in recommendations

Review on Sampling

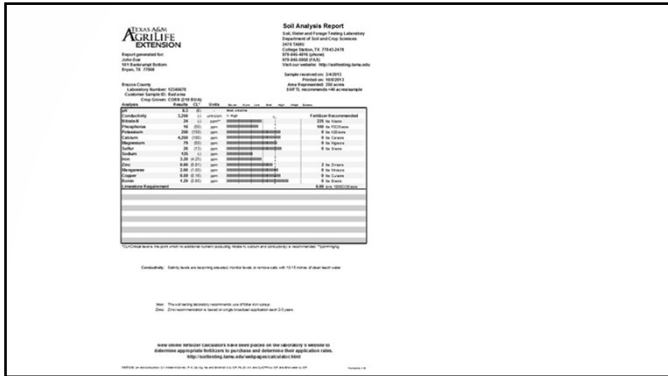
- One composite sample for every 10-40 acres
- 10-15 subsamples mixed to form one composite sample
- Sampling depth of 0-6 inches
- Avoid small ditches, gullies and anomalies
- Make map of sampling areas/zones.
- Ship as soon as possible

Common Issues with Differences

- Different sampling depths
- Sampled different areas
- Pickup incubated samples
- Limited subsamples

Information During Sampling

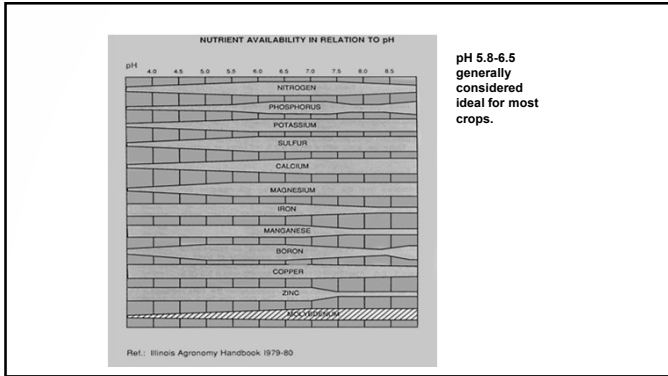
- Information collected during sampling is often more important than that obtained from the sample analyses
- No level of fertilization can offset the effects:
 - Compaction
 - Overgrazing
 - Weeds



Soil Test Report

The graphic interpretation is placed across a range of ratings (ExLow-Excess).
The ranking are based on probability of response to additional nutrients.

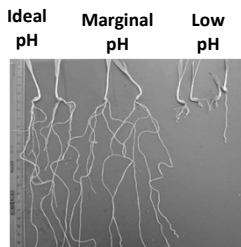
Exceptionally low	95+% probability
Very low	90% probability
Low	75-90% probability
Medium	15-75% probability
High	1-15% probability
Very high	<1% probability
Excessive	Likely to result in detrimental response



Other Environmental Challenges

Rooting limitations

- Soil pH
- Aluminum Toxicity
- Weed tolerances??
- Loss of rooting
- Loss of nutrient uptake
- Reduced canopy
- Weed pressures
- Everything.....

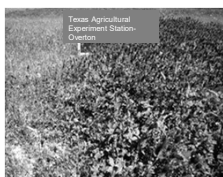


Soil Acidity and percent plant nutrient recovery of fertilizer

Soil pH	% Nitrogen	% Phosphorus	% Potash
7.00	200	300	600
6.00	650	750	600
5.00	200	750	400
4.00	300	700	300
3.00	200	300	200

Crop Tolerance/Yields

- Most crops do best with a pH range of 6.0-7.0



What about soil pH's influence on pesticides?

- Most pesticides are formulated to dissociate at a desired range of solution or soil pH levels. Typically, this range is 5.5-8.0.
- Allowing soil pH to drop into the low pH 5's or pH 4 range may reduce the effectiveness of pre-emergence herbicides or soil applied insecticides.
- Additionally, some herbicide labels will limit or alter application rates based on soil pH levels.

Correcting Acidity

- Monitor through annual soil testing
- Apply only the best quality limestone
- Long-term management
- Only grow hay on best land, reserve poorer land for grazing (lower N requirement)

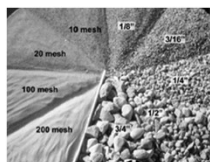
Limestone Quality

- CCE=% calcium carbonate equivalent
- ECCE = % purity x fineness of grind
- Not a Craig List testimonial.....



The fineness (ECCE)

- >0.093" (0% reactive) (8 mesh)
- 0.093"-0.0335" (20% reactive) (8-20 mesh)
- 0.0335"-0.0098" (60% reactive) (20-60 mesh)
- <0.0098" (100% reactive)



TEXAS A&M AGRILIFE EXTENSION Soil, Water and Forage Testing Laboratory
Soil and Crop Sciences
soiltesting.tamu.edu

Limestone Cost Calculator

Based on ECCE

Source	% ECCE	Cost per ton	\$ True Cost/ ECCE Ton	Pounds product needed for 1 ton ECCE
Source 1	100	35	35.00	2000
Source 2	60	25	41.67	3333
Source 3	85	32	37.65	2353
Source 4				

ECCE = effective calcium carbonate equivalence, the standard measurement for determining the quality of liming products. This value is determined in laboratories by measuring the neutralization capacity of a highly ground sample, plus also the particle size distribution of the liming product as it was received from the vendor. The Texas A&M Agrilife Extension Service limestone recommendations are always made based on a 100 ECCE quality limestone.

Phosphorus Issues

- Texas forage production acreage is often very low or low in available soil phosphorus.
- Low soil phosphorus results in reduced root development, stand loss and low nitrogen, potassium and other plant nutrient uptake.

Influence of Phosphorus Fertility in Low Testing Soils

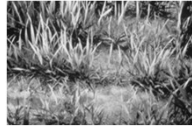
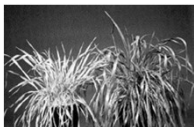
Rate of P	Yield	Response over Control
0 lbs P ₂ O ₅	6950 lbs DM	
30 lbs P ₂ O ₅	7990 lbs DM	1040 lbs DM
60 lbs P ₂ O ₅	9910 lbs DM	2960 lbs DM
90 lbs P ₂ O ₅	11100 lbs DM	4150 lbs DM
120 lbs P ₂ O ₅	12900 lbs DM	5950 lbs DM
240 lbs P ₂ O ₅	15600 lbs DM	8650 lbs DM
500 lbs P ₂ O ₅	17900 lbs DM	10950 lbs DM

DeLeon, TX, 2000 Coastal Bermudagrass Hay 4 cuttings, STP=5-8 ppm

Potassium Fertilization

- Recommend against applying greater than 75 lbs K₂O/acre/application.
- Single applications often result in luxury consumption and late season deficiencies.
- Fall applications, prior to dormancy, are very efficient and often result in greater yields the following year (for v.low and low testing soils).

Sulfur Deficiencies



Reduced emissions (fossil fuels), less ammonium sulfate applications and low organic matter are leading to increasing sulfur deficiencies across Texas. Symptoms are opposite of nitrogen, with yellowing on new growth, as sulfur is not translocated within the plant. Estimated \$132 million economic loss to Texas ag in 2021.

soiltesting.tamu.edu/webpages/calculator.html



Fertilizer Calculators

The fertilizer calculator provides you with the ability to enter a soil testing recommendation for nitrogen (N), phosphorus (P2O5), and potash (K2O) and enter one or more fertilizer grades to determine:

- 1) The amount of fertilizer required to meet the soil test recommendation.
- 2) The amount of fertilizer required to meet the soil test recommendation and the soil test recommendation.
- 3) Other application rates of N, P2O5, and K2O are being applied.
- 4) Other application rates of fertilizer is required to meet the soil test recommendation.

The fertilizer grade, commonly referred to as the fertilizer analysis, is represented by the three numbers with dashes between the numbers, commonly located on the front of a fertilizer bag. It shows the relative amounts of nitrogen, phosphorus, and potassium in the fertilizer. The first number represents the total nitrogen of the product (in percentage), followed by the available phosphorus (in percentage), and finally the total available potassium (in percentage). In some cases, additional numbers may be included on the grade listing and represent other plant nutrients. In all cases, the fertilizer label will describe these additional nutrients with greater specificity.

Urban Fertilizer Calculator - Basic edition: Simple Fertilizer Entry

The urban calculator allows for quick calculation of a soil nitrogen fertilizer and is helpful for soil test recommendations for your lawn, garden or other small areas.

Urban Fertilizer Calculator - Commonly Available Fertilizer List and Simple Fertilizer Entry

The calculator includes a user-selectable list of commonly available fertilizers found in home and garden centers in addition to the fertilizer of the calculator above.

Agricultural Fertilizer Calculator

The agricultural fertilizer calculator allows for the input of up to three different dry fertilizers and calculates the individual rates of application and total combined fertilizer rate.

Obtain new recommendations for other crops or yield goals

The interface will quickly calculate new N, P, and K requirements for other crops, yield goals or land uses based on your existing nitrogen, phosphorus and potassium soil test data. This will be equivalent to the values for similar other scenarios.

Nitrogen Cost Calculator

Calculate the cost per pound of nitrogen for up to 4 different nitrogen fertilizers at a time.

Nitrogen Cost in Blended Fertilizer Calculator

Calculate the cost per pound of nitrogen for up to 4 different nitrogen fertilizers for blended fertilizers containing phosphorus and potassium.

Limestone Cost Calculator



Soil, Water and Forage Testing Laboratory Agricultural Fertilizer Management Calculator-version 1.2

Enter test results, recommendations and pricing in the test boxes.

Soil Test Recommended Nutrient Values
 Nitrogen lbs/acre
 Phosphorus lbs/acre
 Potassium lbs/acre

(Enter your soil test recommendations suggest soil applications of potassium)

This is the grade of fertilizer you might have relatively used or available at your local ag retailer. Please use the net drop-down boxes to select each number of the fertilizer grade.

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

625 lbs fertilizer/acre

Nitrogen applied 100 lbs Nitrate

Phosphorus applied 37.5 lbs P2O5/acre

Potash applied 75 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Second Fertilizer Selection-applied in addition to first fertilizer selection

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Third Fertilizer Selection-applied in addition to first two selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Fourth Fertilizer Selection-applied in addition to first three selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Fifth Fertilizer Selection-applied in addition to first four selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Sixth Fertilizer Selection-applied in addition to first five selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Seventh Fertilizer Selection-applied in addition to first six selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Eighth Fertilizer Selection-applied in addition to first seven selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Ninth Fertilizer Selection-applied in addition to first eight selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Tenth Fertilizer Selection-applied in addition to first nine selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Eleventh Fertilizer Selection-applied in addition to first ten selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Twelfth Fertilizer Selection-applied in addition to first eleven selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Thirteenth Fertilizer Selection-applied in addition to first twelve selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Fourteenth Fertilizer Selection-applied in addition to first thirteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Fifteenth Fertilizer Selection-applied in addition to first fourteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Sixteenth Fertilizer Selection-applied in addition to first fifteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Seventeenth Fertilizer Selection-applied in addition to first sixteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Eighteenth Fertilizer Selection-applied in addition to first seventeen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Nineteenth Fertilizer Selection-applied in addition to first eighteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of selected fertilizer:

166.7 lbs fertilizer/acre

Nitrogen applied 0 lbs Nitrate

Phosphorus applied 0 lbs P2O5/acre

Potash applied 0 lbs K2O/acre

How this fertilizer supplies your soil test needs:

Nitrogen needs fulfilled

PHOSPHATE OVER APPLIED BY 12.5 LBS/ACRE.

POTASH OVER APPLIED BY 12.5 LBS/ACRE.

Your Twentieth Fertilizer Selection-applied in addition to first nineteen selections

"Nitrogen" "Phosphorus" "Potash" Price
 per ton

Apply this amount of
