Weed Control

David South
Auburn University

Handweeding at the Stuart Nursery near Pollock, Louisiana

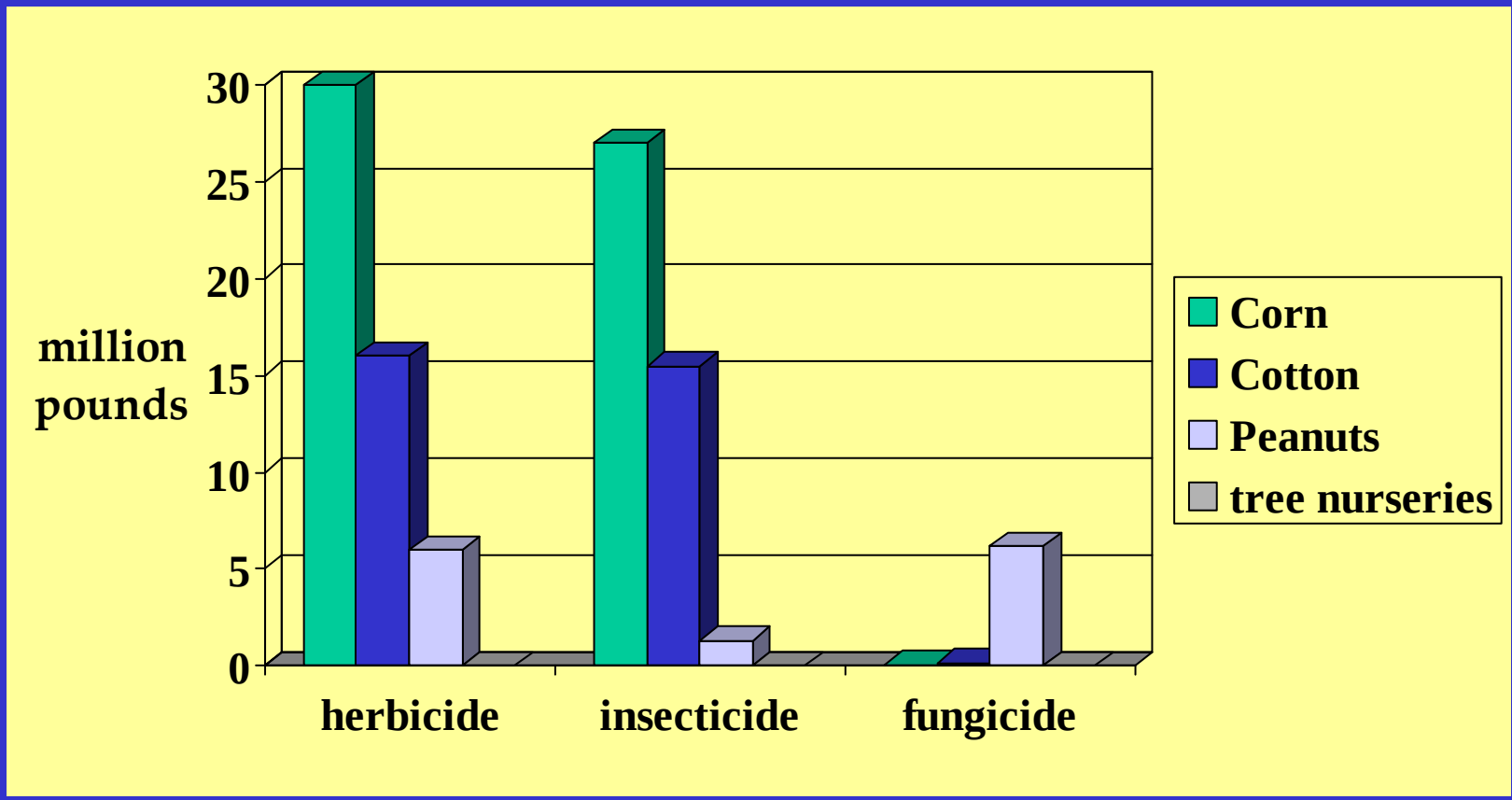
Photo taken by M.A. Huberman October 1935. Credit Line: U.S. Forest Service. (photo #310266)

High value : Ultra-minor crop

- 1 acre of loblolly pine nursery is worth about $23,000.
- 2,000 crop acres would be enough land to produce 1.277 billion loblolly pine seedlings (1997 production)

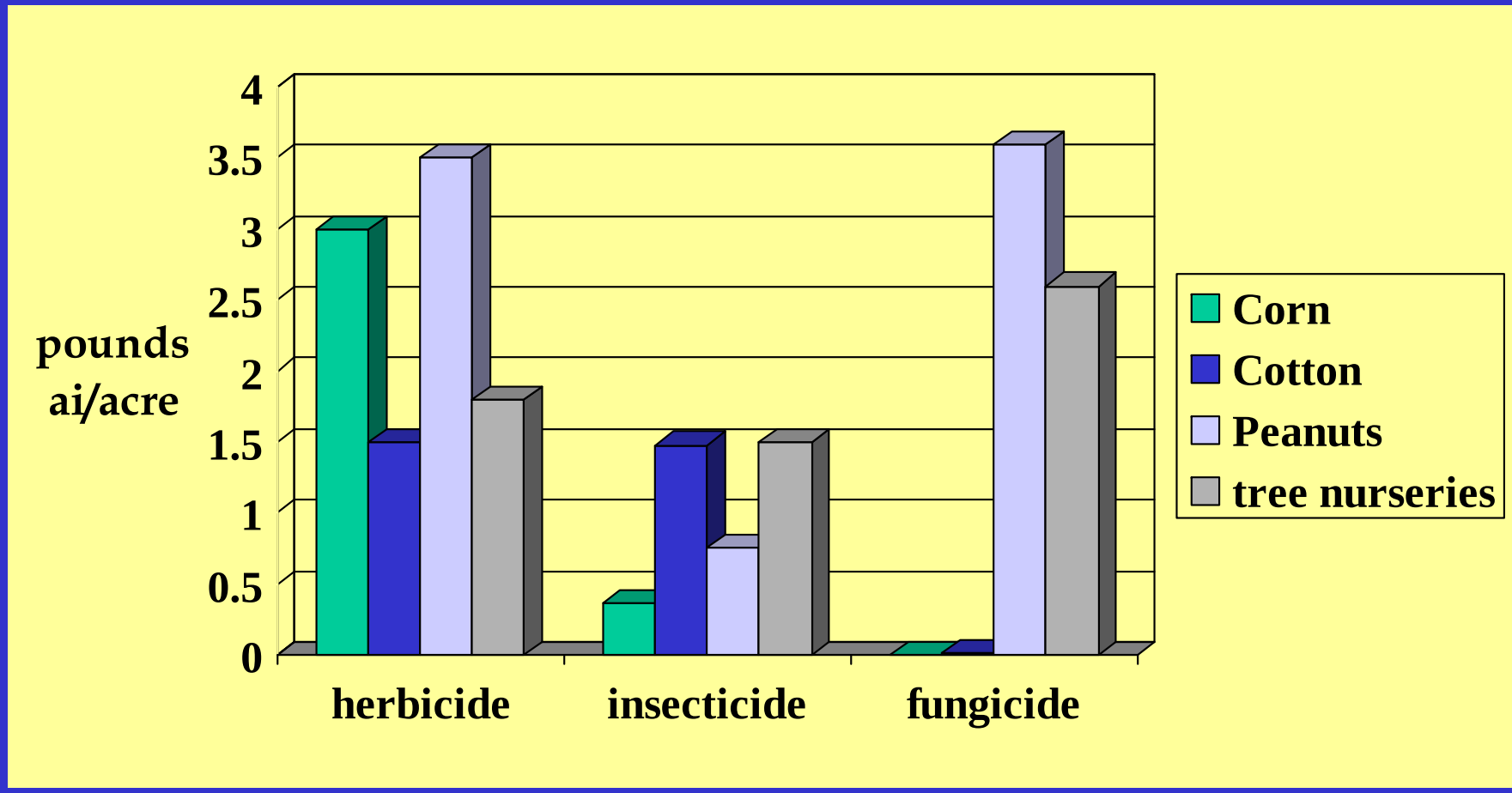
Pesticide use 1989-92

219

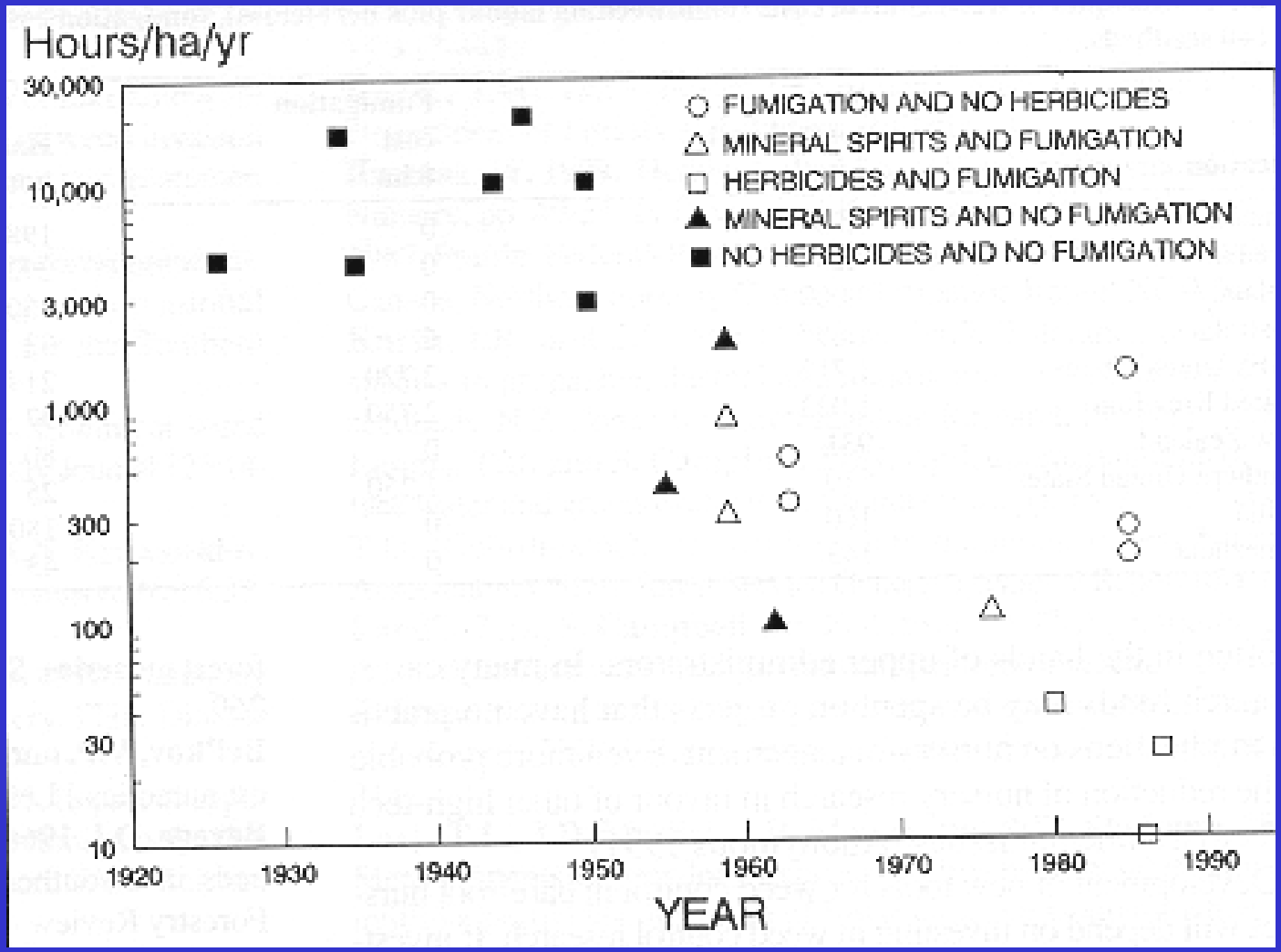


7,300 6,000 10,300 lbs tree nurseries

Pesticide use 1989-92



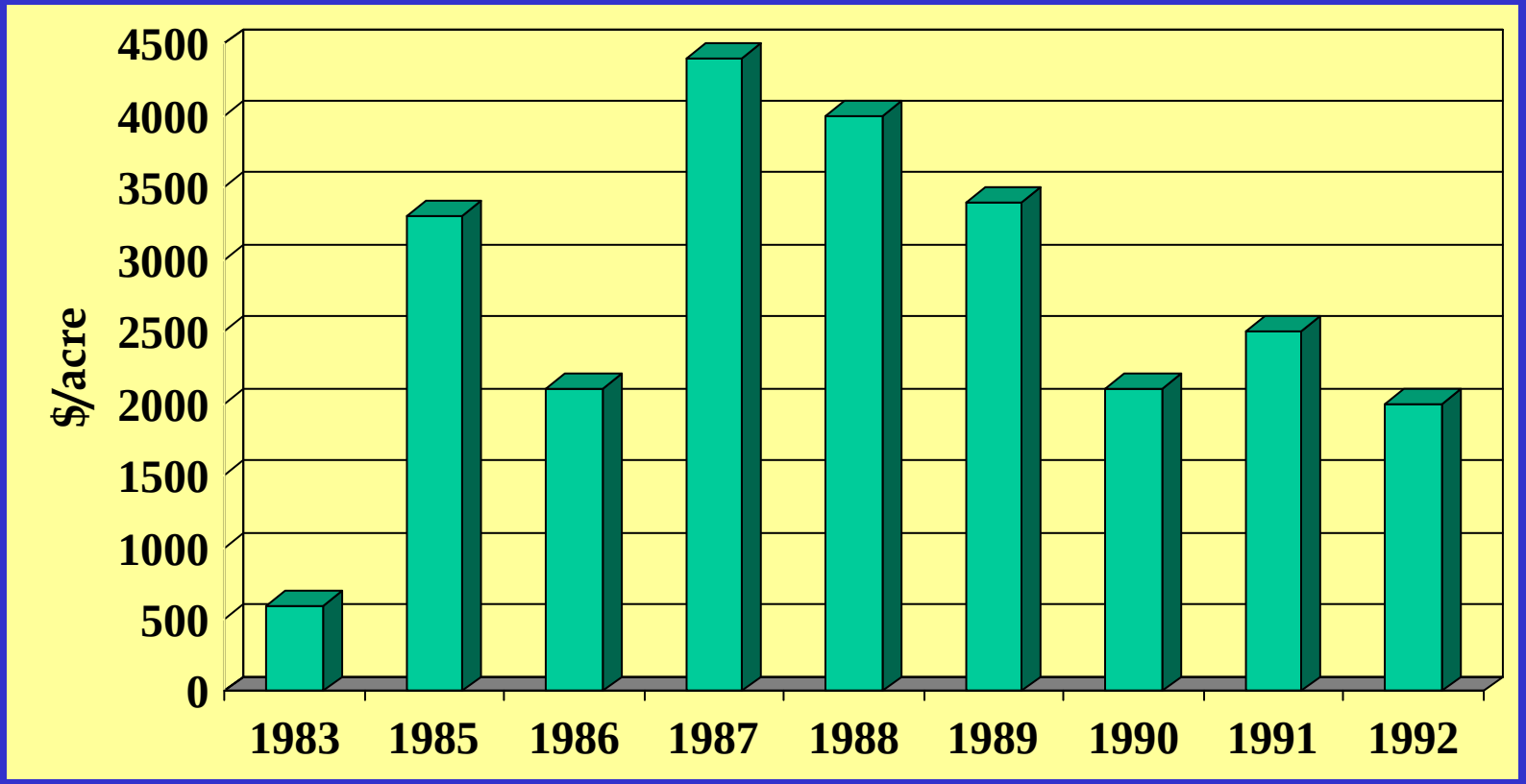
Handweeding times in forest tree nurseries.



Handweeding in 2000

- AL- 2 hours/acre
- NC, GA, VA- 3
- AR- 5
- GA- 11
- TX- 24
- SC- 6-87
- VA-300 in hardwoods

Weed Control Costs – J.H. Stone Nursery



No herbicide - 1985-1992

Nursery Weed types

- Grasses
  - Annual
  - Perennial
- Broadleaves
  - Annual
  - Perennial
- Sedges
  - Annual
  - Perennial

http://www.csdl.tamu.edu/FLORA/gallery1.htm

Perennial grasses: Quackgrass

Perennial grasses: Bermudagrass

Annual grasses: large crabgrass

Perennial sedges: Yellow nutsedge

Perennial sedges: chufa *Cyperus esculentus* var. *sativus*

CHUFA

GLENDALE ENTERPRISES, INC.

Chufas

Home | Up | What Are They | Horchata de Chufa | Not Michigan | Harvesting Chufas

Up
Next

Information

- The "What Are They" page.
- The "How To Grow" page.
- The "Horchata de Chufa" page.

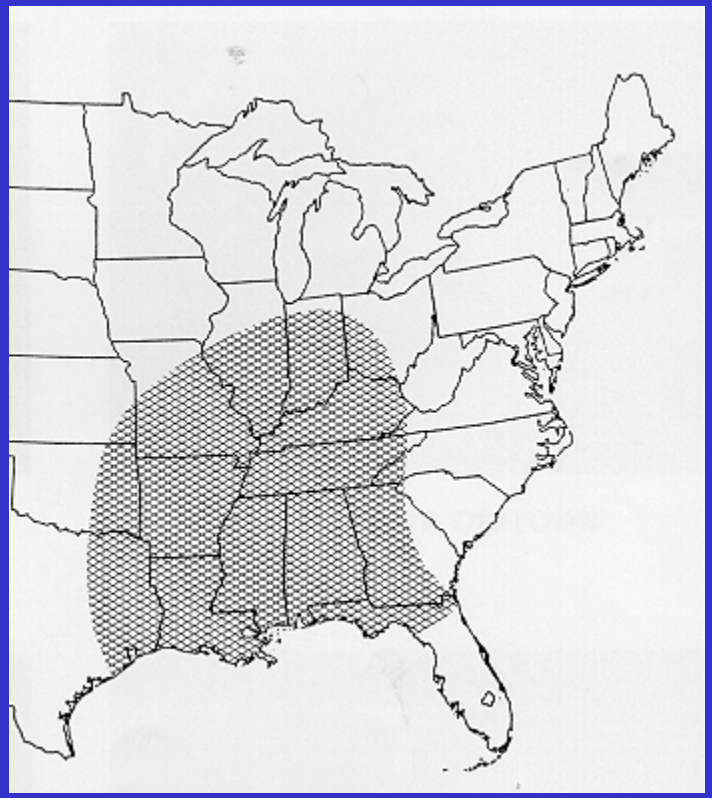
Chufas shown in root turf

Perennial sedges: Purple nutsedge

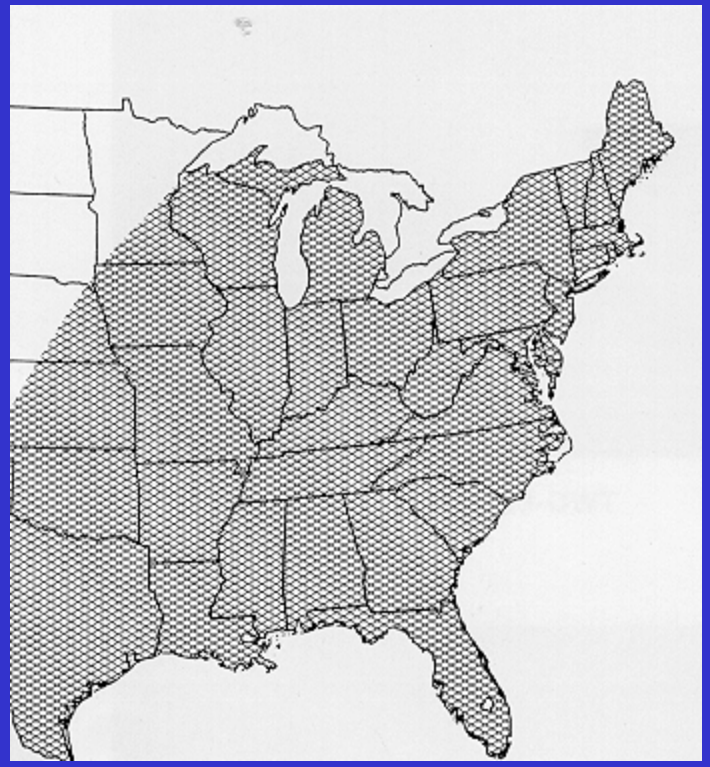
Annual sedges: Flathead sedge

Annual broadleaf: Prostrate spurge

Prostrate spurge



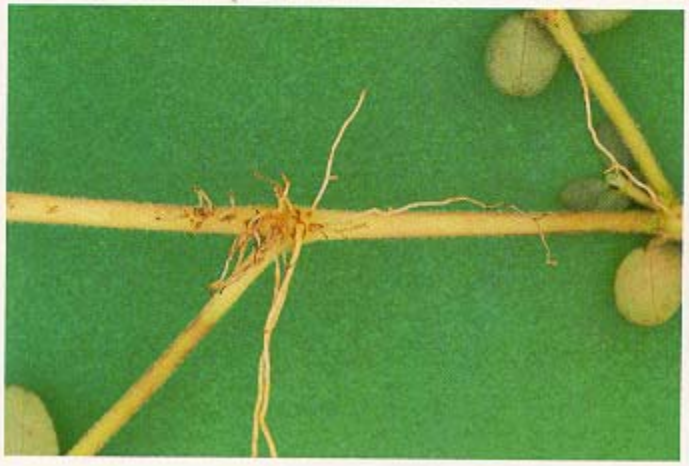
Spotted spurge



Prostrate spurge

FLOWER

YOUNG SEEDLINGS



ROOTING AT NODE

TWO-LEAF SEEDLING

Spotted spurge

FLOWER

TWO-LEAF SEEDLING

Annual broadleaf: Purslane

Annual broadleaf: Sicklepod

Annual broadleaf: Coffee senna

Annual broadleaf: Morningglory

Perennial broadleaf: white Clover

Herbicide selectivity

- Morphological differences
- Physiological differences
- Adsorption differences
- Translocation differences

Herbicide formulations

- EC – emulsifiable concentrate
- AS – aqueous solution
- WP – wettable powder
- WSP – water soluble packet
- F – flowable
- DF- dry flowable
- G - granular

Equipment

- Boom sprayers
- Directed applicators – tractor
- Directed applicators – hand
- Fertilizer spreaders
- Fertigation

Equipment

Equipment

Some nursery equipment

Electrostatic sprayer

Dilution equations

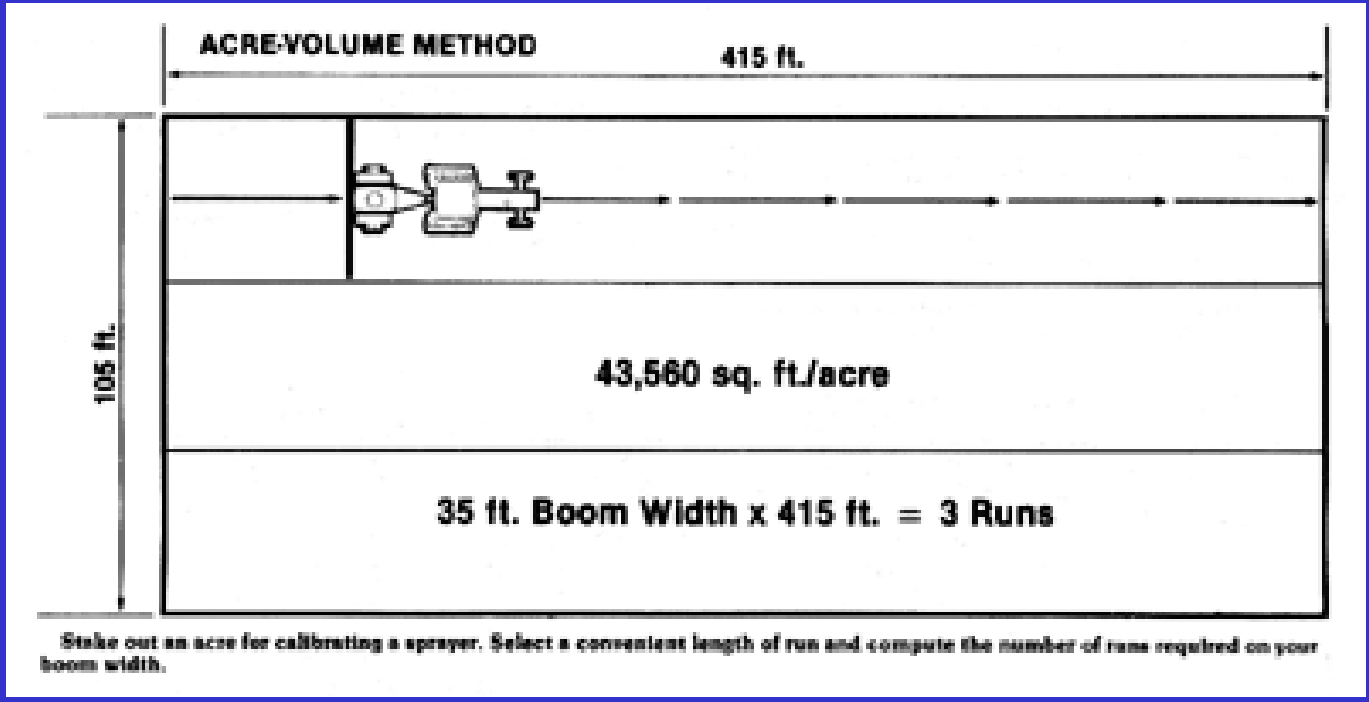
Active ingredient vs. Product

- $\frac{\text{Rate of a.i./acre}}{\%\ \text{a.i.}} \times 100 = \text{pounds of product/acre}$

  $\frac{\text{Rate of a.i./acre}}{\text{lbs a.i. Per gallon}} \times 100 = \text{gallons of product/acre}$

Calibration

The 100 foot method



Stake out an acre for calibrating a sprayer. Select a convenient length of run and compute the number of runs required on your boom width.

Warning!!!!

Banded applications differ when applying herbicides or fertilizers !!

- Herbicide rate = 1 lb / acre

  50% band (4 feet treated and 4 feet not treated)

  Herbicide people will buy ½ lb per acre

  But fertilizer people will buy 1 lb per acre
  (which makes rate 2 lbs/treated acre)

Proper storage of pesticides

Tank Mixing Nutrients with Herbicides

Cost per ton of nitrogen fertilizers

Anhydrus ammonia	$253
Ammonium nitrate	$193
Urea	$195
UAN-liquid	$134
Slow-release	$2,000

Cost in Cents per thousand of nitrogen fertilizers

	Nitrogen per acre	
Type	150 lbs	300 lbs
Anhydrus A.	3.8	7.7
A. nitrate	7.3	14.6
Urea	5.3	10.6
UAN-liquid	5.8	11.7
Slow-release	86.0	172.0

E-mail questionnaire (28 nurseries)

- 5-GA, 4-AL, 4- SC, 3-LA, 3-TX, 3-VA, 2-MS, 2-NC, 1-AR, 1-FL

- 7 use only granular
- 21 use liquid (with some granular pre-plant)
- 2 inject into irrigation system

Liquid fertilizers can be applied throughout the day (even when it is raining).

With the right equipment, a nursery (50 acres) can be fertilized in just 4 hours.

In Virginia we use liquid fertilizers at all three nurseries. At GGFC and NKFC the fertilizers are tank mixed with the weekly Goal application. A custom blend is used that includes Uran, liquid KCL and sulfur (Ammonium thiosulfate). By doing this we do not make any extra trips through the fields to apply fertilizers except for minor nutrient applications which we could also probably do in the tank mix. Chuck Davey usually recommends one or two summer applications of KCL at higher rates. Applying this with the
weekly applications eliminates the extra trip(s) and is far better at
keeping adequate levels available for the seedlings.
We always irrigate after these applications.

Just an observation, but we rarely, never is probably more accurate, have any significant yellowing of our seedlings in the heat of summer. We have not applied iron since we started using this tank mix in the eighties. I am not sure but I think the sulfur could be important in this matter. I added sulfur to our mix after observing better "greening" of seedlings that had Ammonium sulfate applied and reading that sulfur is important in nitrogen utilization by plants. I wonder if the sulfur doesn't have some additional effect besides nitrogen utilization.

As you and I have discussed, I also believe our weed control is better with our tank mix.

At Augusta Forestry Center we use Uran and liquid Ammonium Sulfate (mostly on the pines) on both pines and hardwoods with good success.

Adding ammonium to herbicides like Goal, Reflex and Cobra increases the phytotoxicity to weeds. Farmers often add ammonium nitrate to herbicides to act as an adjuvant.
The ammonium ion also can increase the “burn” on newly formed needles. To reduce injury, many managers apply irrigation soon after applying the tank-mix.

Not all herbicides respond this way.

Irrigate after application

Garland Gray Nursery - VA

Goal	fertilizer tank-mix	Lbs N/acre
• June 15	10-1-14 (+2.5% S)	20
• June 22	10-1-14 (+2.5% S)	20
• June 29	10-1-14 (+2.5% S)	20
• July 6	10-1-14 (+2.5% S)	20
• July 13	10-0-8 (+4% S)	35
• July 20	10-0-8 (+4% S)	35
• July 27	10-0-8 (+4% S)	35
• Aug 3	10-0-8 (+4% S)	35
• Aug 10	10-0-8 (+4% S)	35
• Aug 17	10-0-8 (+4% S)	35

290 Lbs N/acre tota

UAN (50% Urea and 50% Ammonium Nitrate)

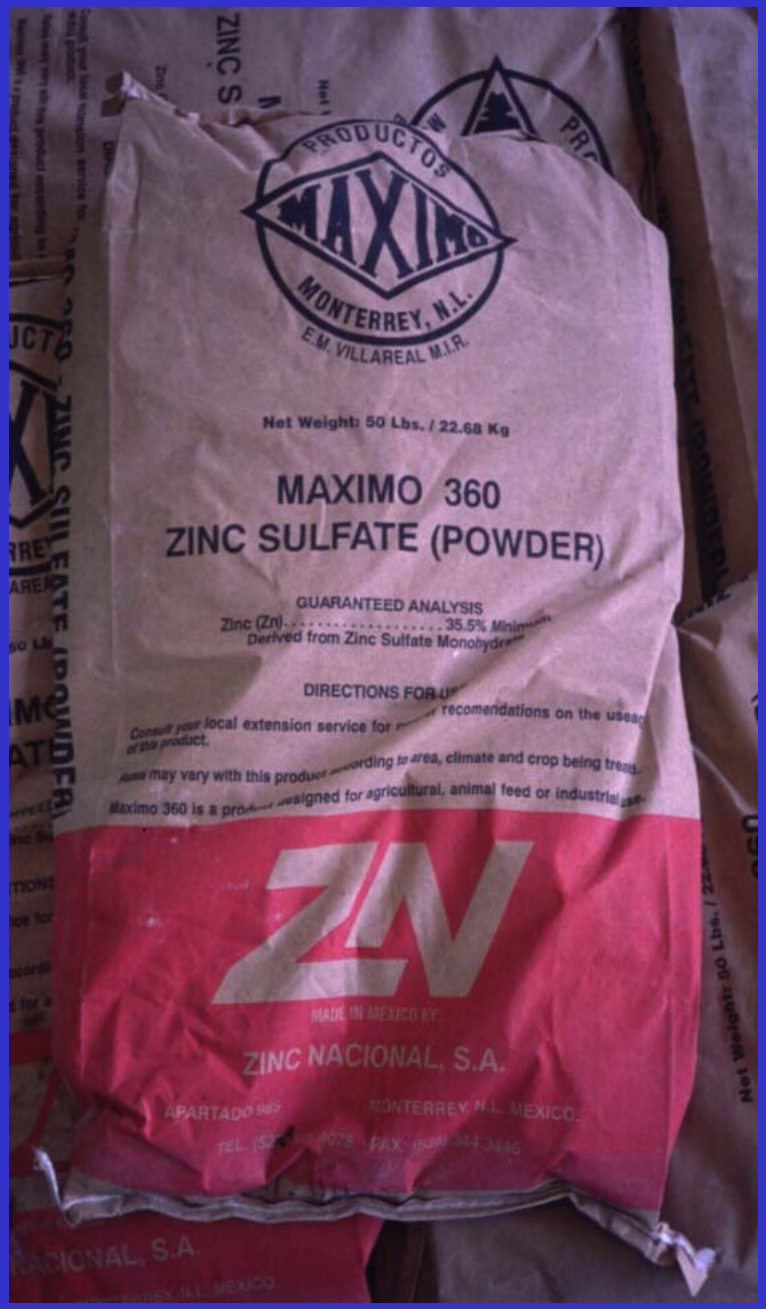
To use UAN on farms (transportation, storing, spreading) is about 30 % cheaper than to use ammonium nitrate. Urea ammonium nitrate solution can be spread in combination with plant protection products, it is easily miscible with other liquid fertilizers. This fertilizer contains no admixtures harmful for plants. UAN fertilizers have more advantages against solid nitric fertilizers:

· you can absolutely mechanize transportation, loading, unloading and storage process,
· storage is easy and cheap,
· you can spray fertilizer on the ground evenly in small quantities,
· UAN meets better local and additive fertilizing requirements,
· UAN is suitable for composing mixtures with various pesticides

http://www.achema.com/eng_p03.htm

Urea + 3%S + 6% Fe

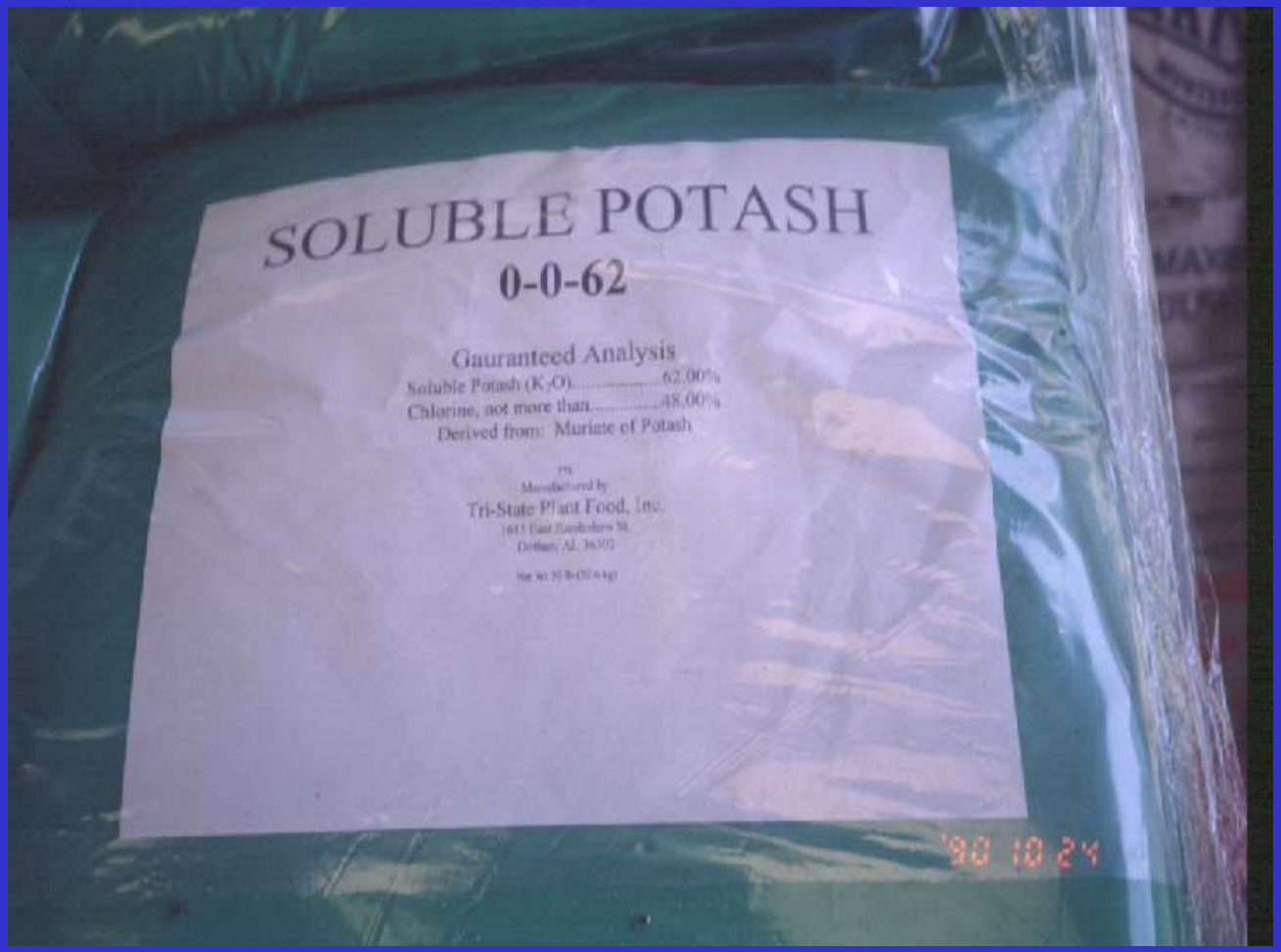
15-0-0



Zinc sulfate

35% zinc

SOLUBLE POTASH 0-0-62



Ammonium phosphate

10-34-0

N (32-0-0) UAN

50% Urea and 50% Ammonium Nitrate

N (15-0-0)

15% urea, 3% S and 6% Fe (Six Iron)

P (10-34-0) Ammonium phosphate

K (0-0-62) Potassium chloride

(62% white - fine standard grade)

The Mississippi Potash East facility produces a 62 percent white product that is supplied to agricultural and industrial markets. These products include a standard and a fine standard grade that is used as a source of potassium for liquid fertilizer mixes.

Predictions for the Future

Due to economics, ease of application, uniformity of application,
9-bed sprayers, ability to tank-mix with herbicides and the ability to control nutrient release,
the use of liquid fertilizers will increase.

Nutsedge control

Less fumigation…more weeds and disease

- Nursery diseases have been largely controlled by routine fumigation with methyl bromide. This fumigant is being phased out, and “nursery problems are expected to increase dramatically.” USFS

Perennial sedges: Yellow nutsedge

1 tuber = 140 shoots in 6 months
All within 8 inches

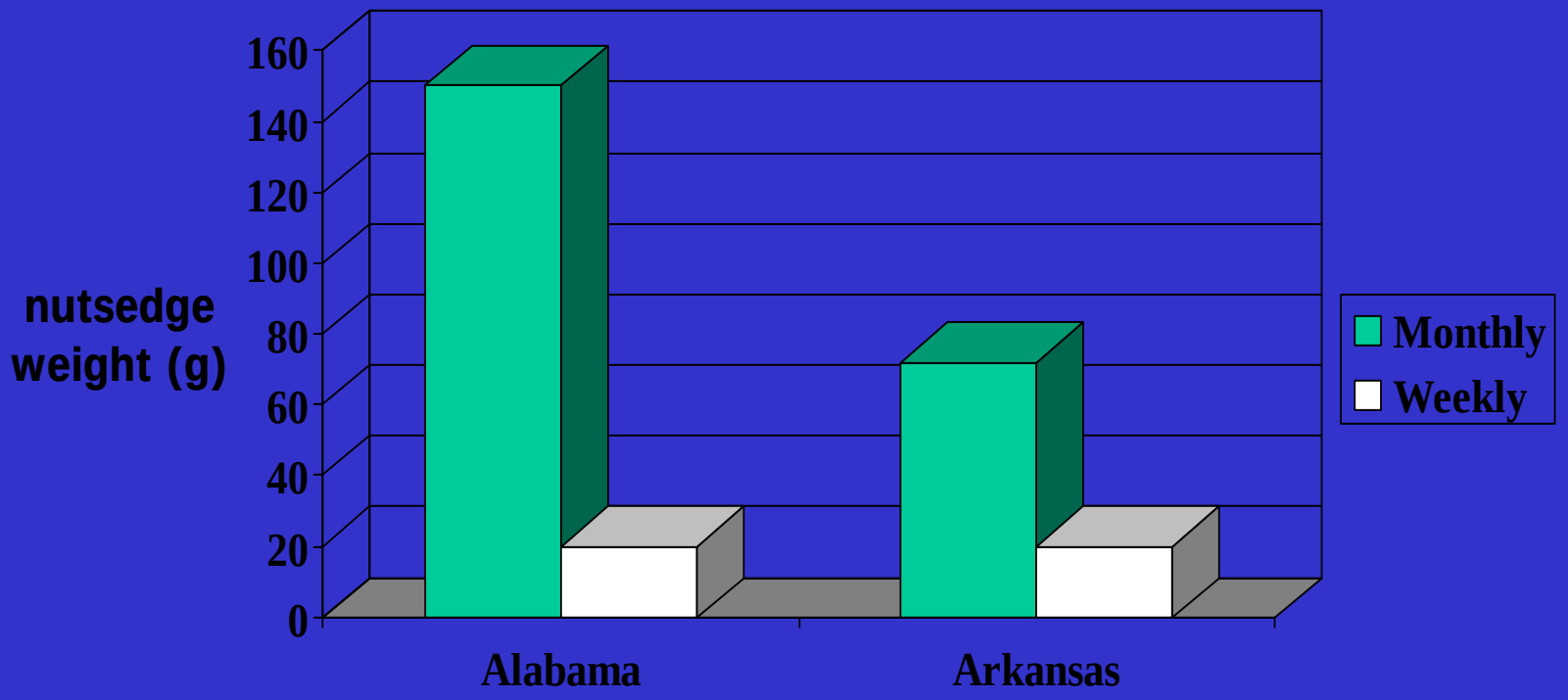
Perennial sedges: Purple nutsedge

1 tuber = 280 shoots in 6 months

All within 10 feet

Weekly applications improve weed control

Monthly vs weekly Goal



Questionnaire (11 nurseries)
of postemergence
Goal and Cobra applications

# trips	# nurseries	Total herbicide
15	1	2.3 pounds
9	2	1.3-1.2
8	2	1.2-2.1
7	2	0.9-1.7
6	3	0.5-0.8-0.8
5	1	0.8


NC-20484
UBI-S734
DPX-4129
ethofumesate
bentazon
cyperquat
perfulidone
hexazinone
glyphosate
imazapyr
EPTC
imazaquin
metolachlor
fomesafen
metsulfuron-methyl
halosulfuron-methyl
sulfometuron-methyl
cloransulam-methyl
metsulfuron-methyl

Oust
Manage
FirstRate

Selective Nutsedge Herbicides for pine

- Reflex – PRE (AL, AR, GA, MS, NC, SC)
  do not use on fine textured soils

  POST (NC) no-surfactant

- Eptam (PPI 14 days before sowing)

Controlling nutsedge with herbicides

Hardest

Easiest

Seedbeds

cover-crop

fallow

Oust (1.33 oz product per acre)

Nutsedge Herbicides for fallow land

- **Methyl bromide**
- **Roundup**
- **Glyphomax**
- **Finale**
- **Oust**
- **Permit**

WORK PLAN
3-WAY TANK-MIX FOR NUTSEDGE ON FALLOW LAND

Project Leader: Dr. David South: Auburn University

A. Objectives:

To evaluate the efficacy of a tank-mix (glyphosate, fomesafen, sulfometuron) for controlling purple and yellow nutsedge on fallow land.

B. Procedures:

Table 1. Herbicide rate per treated acre. (all rates in product per acre rates)

Treatment	Roundup-ultramax	Reflex	Oust	First application	Second application	Third Application (if needed)
Tank mix	2.5 quarts	1.5 pints	1.33 ounces	July	--	--
	2.5 quarts	none	1.33 ounces	--	August	Late September
	2.5 quarts	none	1.33 ounces	--	--	Late September
Roundup	2.5 quarts	none	none	July	August	Late September

Treat in 25 to 40 gallons of water per acre.
Apply when nutsedge plants are 3-6 inches tall.

3-herbicide tank-mix for fallow land

- **First spot spray**
  - **Roundup**
  - **Oust**
  - **Reflex**
- **Second spot spray**
  - **Roundup**
  - **Oust**
- **Third spot spray**
  - **Roundup**
  - **Oust**

Al Pest Management Handbook
Weed control ratings (0-10)

Nutsedge	Cobra	Reflex	Duel	FirstRate	Eptc	Roundup	Permit
Yellow	2	4	1	6	7	7	8
Purple	2	4	6	6	7	7	8

Selective Nutsedge Herbicides for cover-crops

- Permit – Field corn – grain sorghum
- Roundup – Roundup ready corn

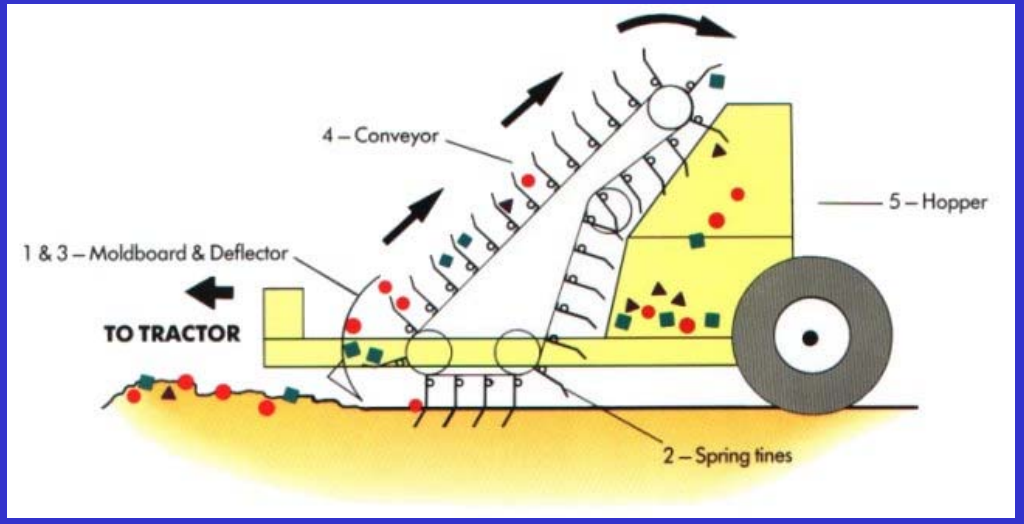
Non-selective control of nutsedge in seedbeds

Direct treatment

A Nutsedge program

- Cover crop: Permit – Roundup ready corn
- Fallow land: Oust-Roundup-Reflex tank-mix
- Methyl bromide fumigation (while it lasts)
- Reflex at time of sowing (for sandy nurseries)
- Weekly applications of Goal-Cobra
- Drip apply Roundup-Reflex to center of escape nutsedge plants (use purple dye)

Mechanical lifting of nutsedge tubers at sandy nurseries?



At 3,800 pounds, the 600HD is H. Barber & Sons' largest SURF RAKE beach cleaner. It has been successfully used in a variety of municipal applications. Cleaning up to seven acres an hour with its six foot wide conveyor, the 600HD has the greatest cleaning capacity of any beach cleaner. The 1 ½ cubic yard hopper can lift up to 3,700 pounds of material and dump its contents hydraulically from a height of eight feet.

Mechanical lifting of nutsedge tubers?

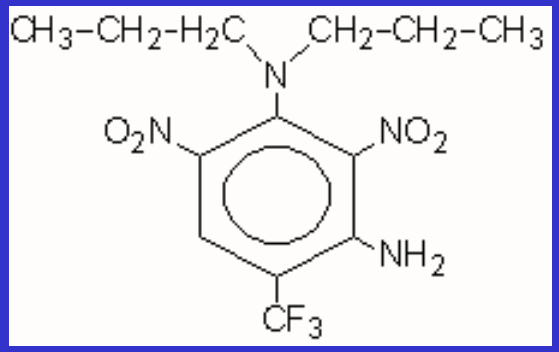
http://www.lockwoodmfg.com/Beach_Cleaner/beach_cleaner.html

Selective herbicides for: prostrate spurge and spotted spurge

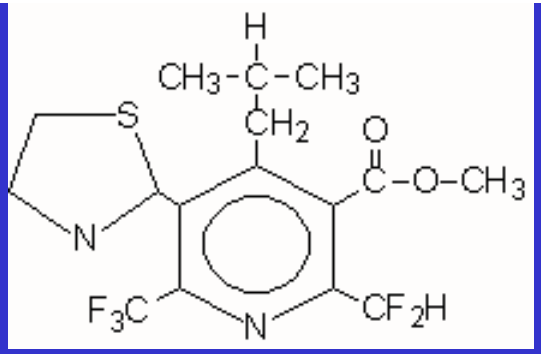
Rate product/acre

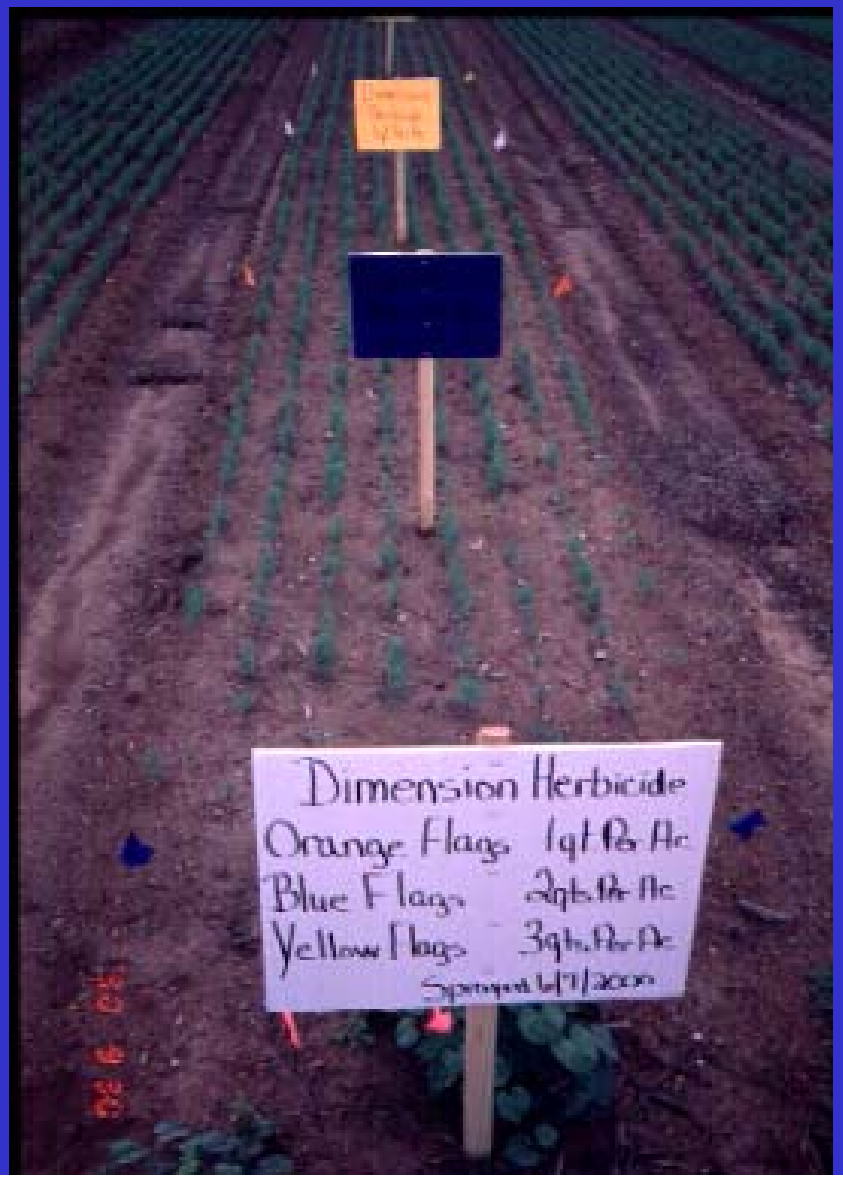
Cobra 2EC	13 oz	Apply before 1” diameter
Barricade	1.5 lbs	Apply before weeds emerge

Barricade Injury



Visor Injury





MANAGEMENT IMPLICATIONS

Young loblolly and slash pine seedlings have demonstrated some tolerance to dithiopyr. However, casual observations indicated this herbicide was not completely effective in controlling prostrate spurge at the Shubuta Nursery. For this reason, no tests of this herbicide will be made in 2001.

QUESTIONS?