Challenges & Strategies for Controlling Weeds in Vegetable Crops

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Are we prepared for the future?
There seem to be more “challenges” than “answers”
Bottom line: Is it economical for the grower?

What are weeds?

1. Unwanted competitive plants.
2. Plants for which there is no known purpose.
3. Plants that haven't adapted to growing in rows.
4. God's torture of man.

Competition for:

Nutrients
Moisture
Light
Space

What's unique about weed control in vegetable crops?

Fewer chemical options.

More costly per acre.

More labor intensive.

Hand-weeding, laying black/clear plastics.

Greater influence on quality.

Consumer expectation is visual.

More rotational restrictions.

Why the difference for vegetables?

It's all about the "Economics" –

1. **Cost of manufacturing product +**
2. **High value crops / small acreage +**
3. **Research dollars spent +**
4. **Risk to manufacturer (Liability)**

(some don't register in high risk counties)

PROFIT (must be achievable)

Ten basic challenges to effective vegetable weed control

Challenge No. 1

Will herbicides continue to be used in future vegetable production?

- There are fewer chemical product manufacturers.
- Due to budget constraints and streamlining, most companies are reducing their research efforts away from investigating new herbicide chemistries *($20 - $50,000,000 from discovery to labeling).*
- Trend for less “unrestricted” funding available from chemical companies.
- University budget cuts have reduced weed science research and extension positions throughout Texas and the United States. (*Challenges must be met on a regional or national level*).

Challenge No. 2

Older herbicides continually come under EPA review and some are lost due to cost of re-registrations or toxicity and environmental concerns (result of 1996 FQPA requirements). Also "Risk Cup" for many products becomes too full.

Chemical	LD50 mg/kg (Rat / oral)
Aspirin	200
Trifluralin	5000
Halosulfuron	8866
Paraquat	150
Glyphosate	5000

Challenge No. 3

Environmentalists are interested in decreasing or "eliminating" herbicides.

Challenge No. 4

Weed control and food quality / supply

Vector diseases.

Harbor insects.

Reduce quantity and quality (size, shape, uniformity).

Contaminate product during processing.

(high potential for load rejection at processing plant)

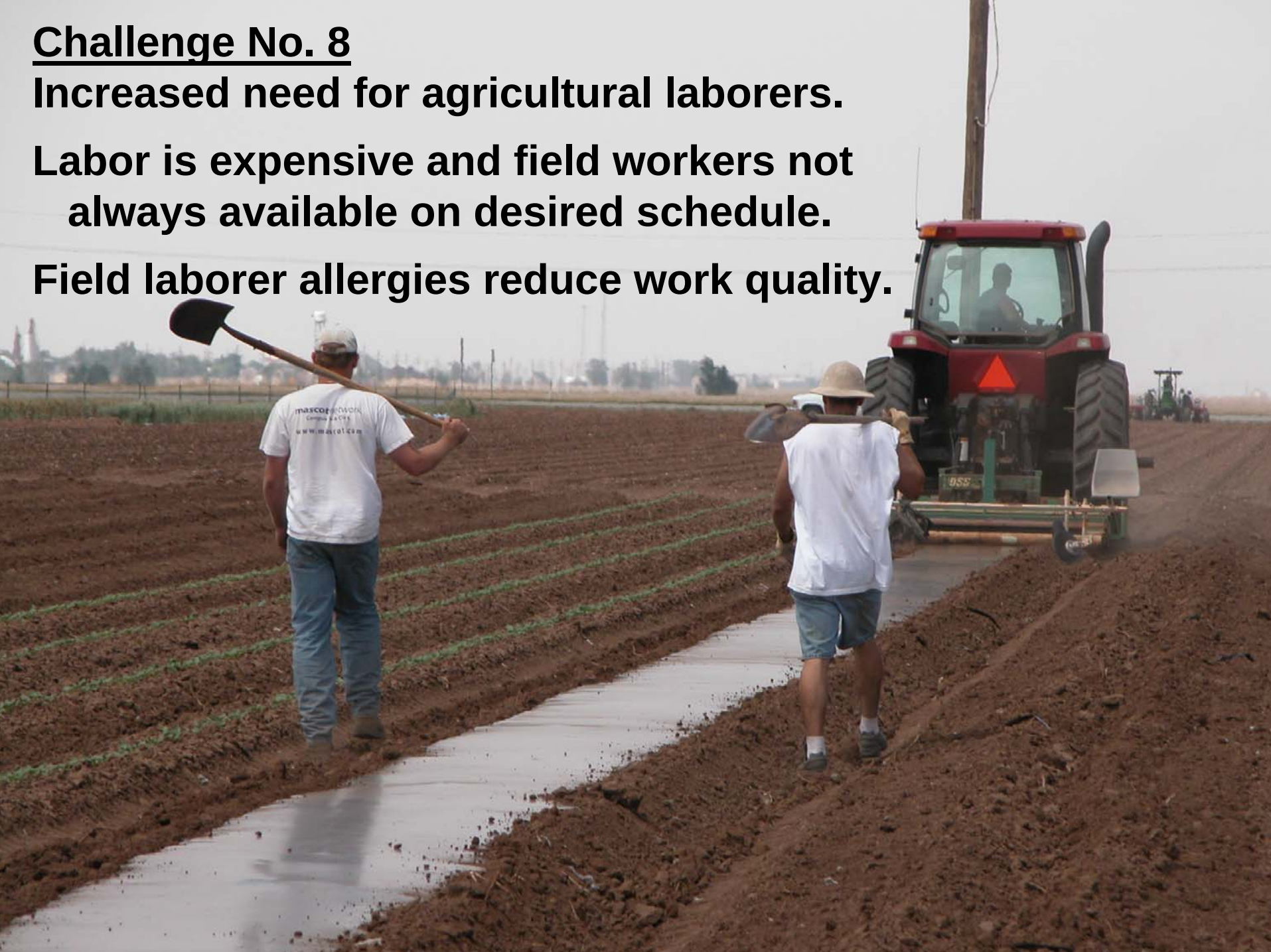

Challenge No. 5
Precise weed control is needed.
Excellent “preemergence” control is essential.
Many crops are hand-harvested.

Challenge No. 6

Low tolerance for crop injury.

Any delays in harvest and grower may miss economic windows.


Challenge No. 7
Weed control is not always a simple task.
Unable to cultivate vine crops.
Field laborers crush vines/leaves.



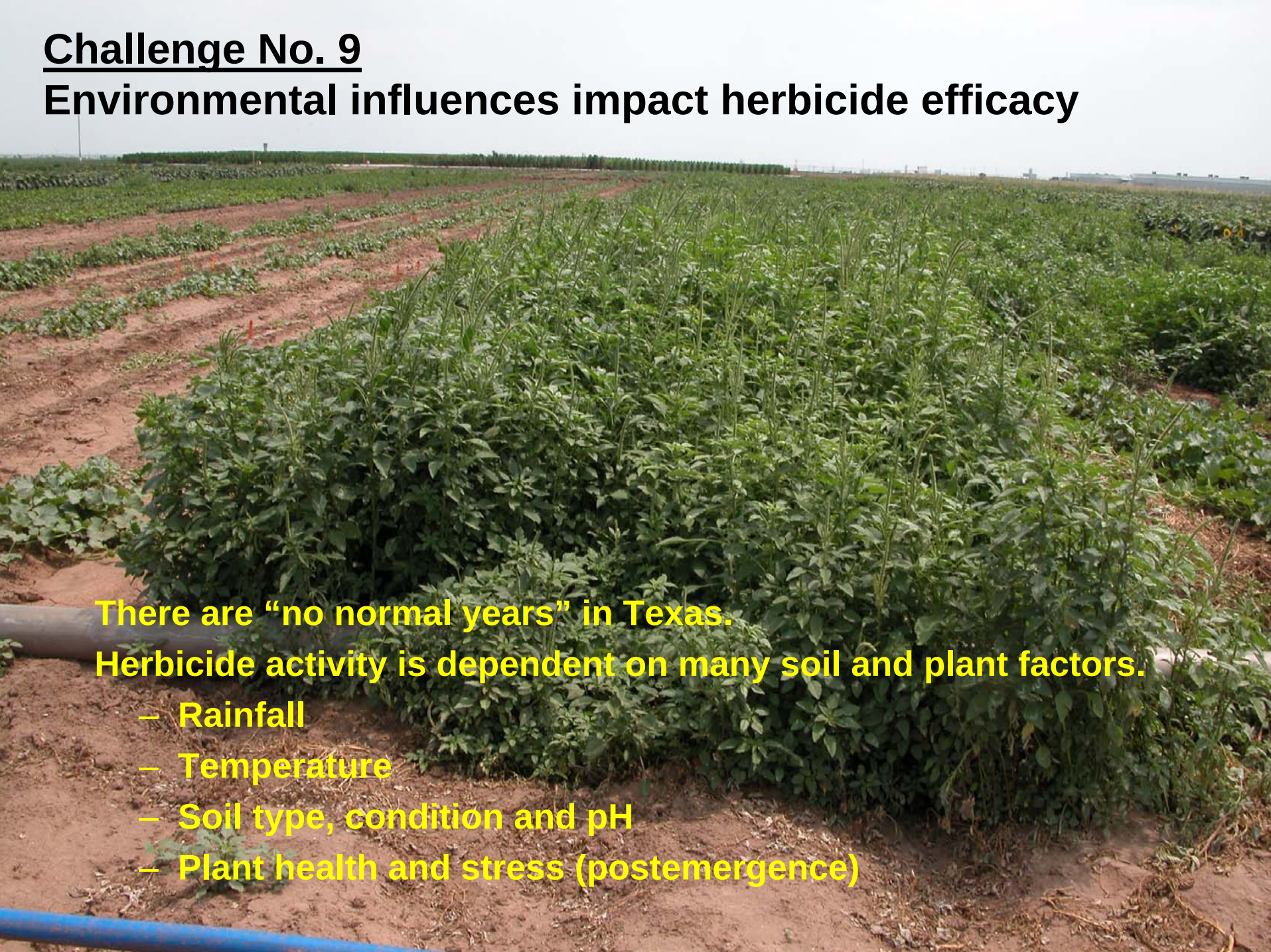
Challenge No. 8

Increased need for agricultural laborers.

Labor is expensive and field workers not always available on desired schedule.

Field laborer allergies reduce work quality.

Challenge No. 9
Environmental influences impact herbicide efficacy

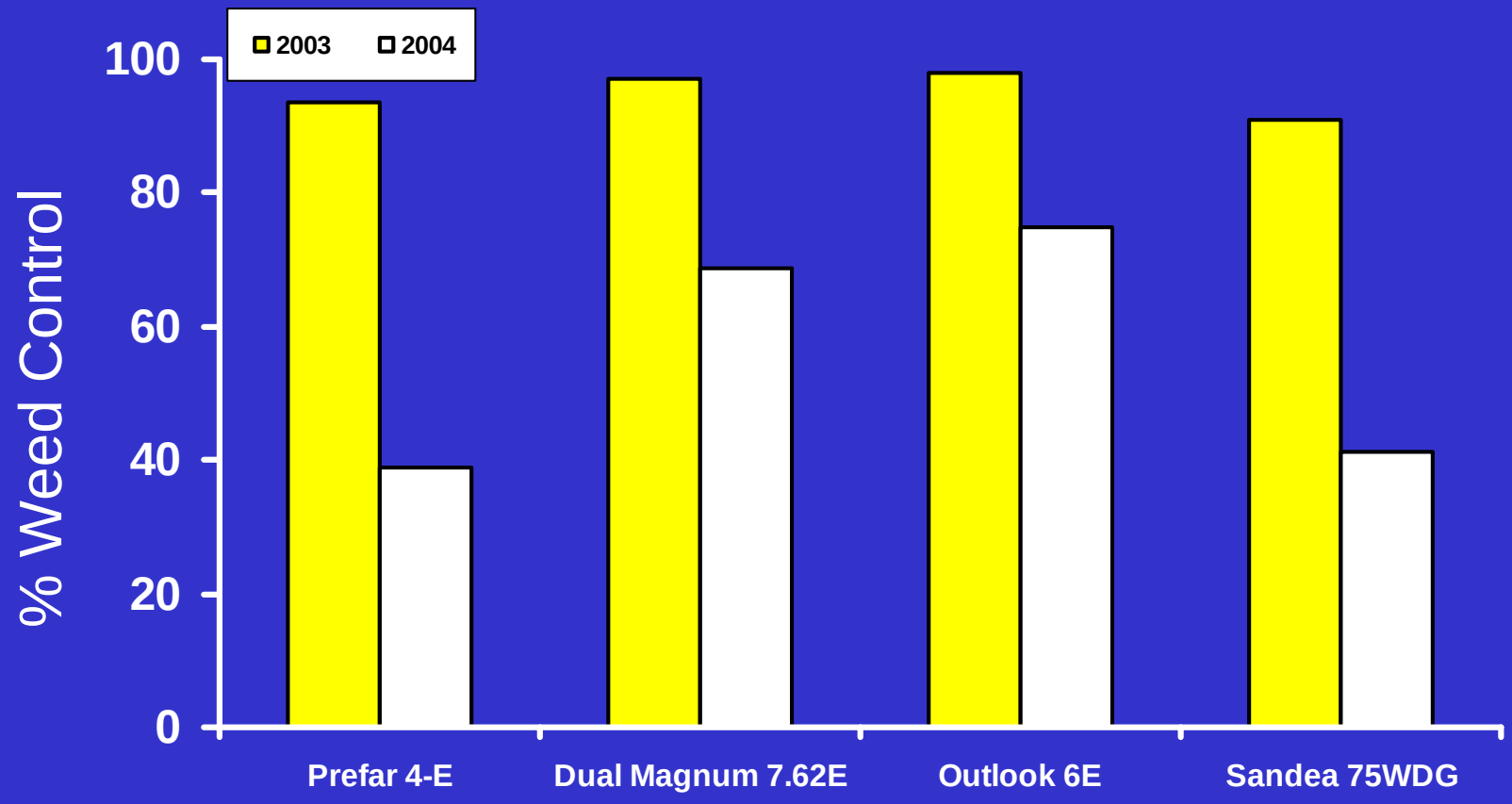


There are “no normal years” in Texas.

Herbicide activity is dependent on many soil and plant factors.

- Rainfall
- Temperature
- Soil type, condition and pH
- Plant health and stress (postemergence)

Effect of Precipitation on Control of *Palmer Amaranth* by Selected Herbicides in Pumpkins



Challenge No. 10

Finding alternatives to reduce or eliminate herbicide use while maintaining high standard of weed control and high quality of produce all while being economical to growers.


Alternative cultivation

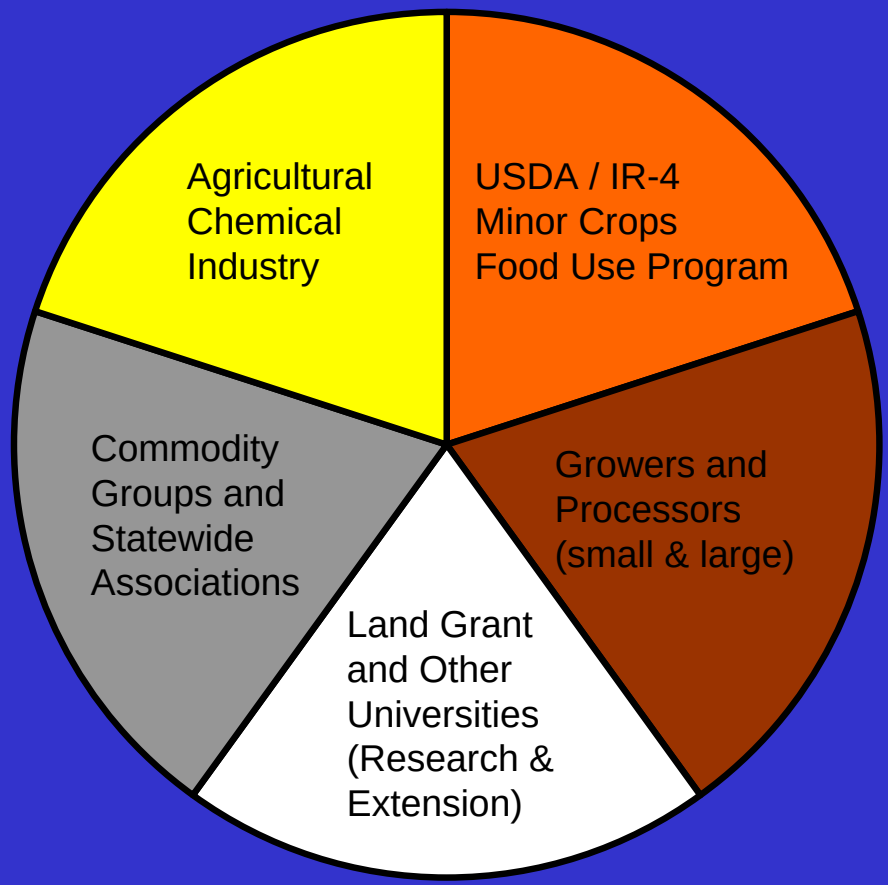

Inter-cropping systems


No-tillage production

Strategies for Weed Control

Are we heading in the right direction?

<u>Strategy No. 1</u> "Cooperative Approaches" are required in order to meet the herbicide and weed control challenges in the future.



IR-4 Minor Use Crops Program

Founded in 1964

Located at Rutgers University, New Brunswick, NJ

- "Minor Use" pesticides are those for which the national production of a crop is fewer than 300,000 acres.
- "Minor Use" also applies to pesticide uses which do not provide sufficient economic incentive for a registrant (chemical company) to support registrations.
- Since 2001, IR-4 petitions submitted to the EPA comprised 50% of the total number registrations approved by EPA for minor use crops [over 7,300 registered uses]. In 2004 there are over 190 requests for new herbicide uses and potential registrations throughout the United States on Minor Use Crops.

The IR-4 Regulatory Clearance Process

Stakeholder:

Define Pest Problem

Identify Pest Management Solution

Request Assistance from IR-4

The process starts with requests

Submitted from:

- **Growers**
- **Grower Groups**
- **State/Federal Research & Extension Personnel**

Request reviewed by the manufacturers

Requests Prioritized

Top priorities researched that year

Second priorities researched as money allows

Field and Lab Research

- **Measure residue levels in Crop/Crop Group**
- **Top priorities are completed within 30 months**

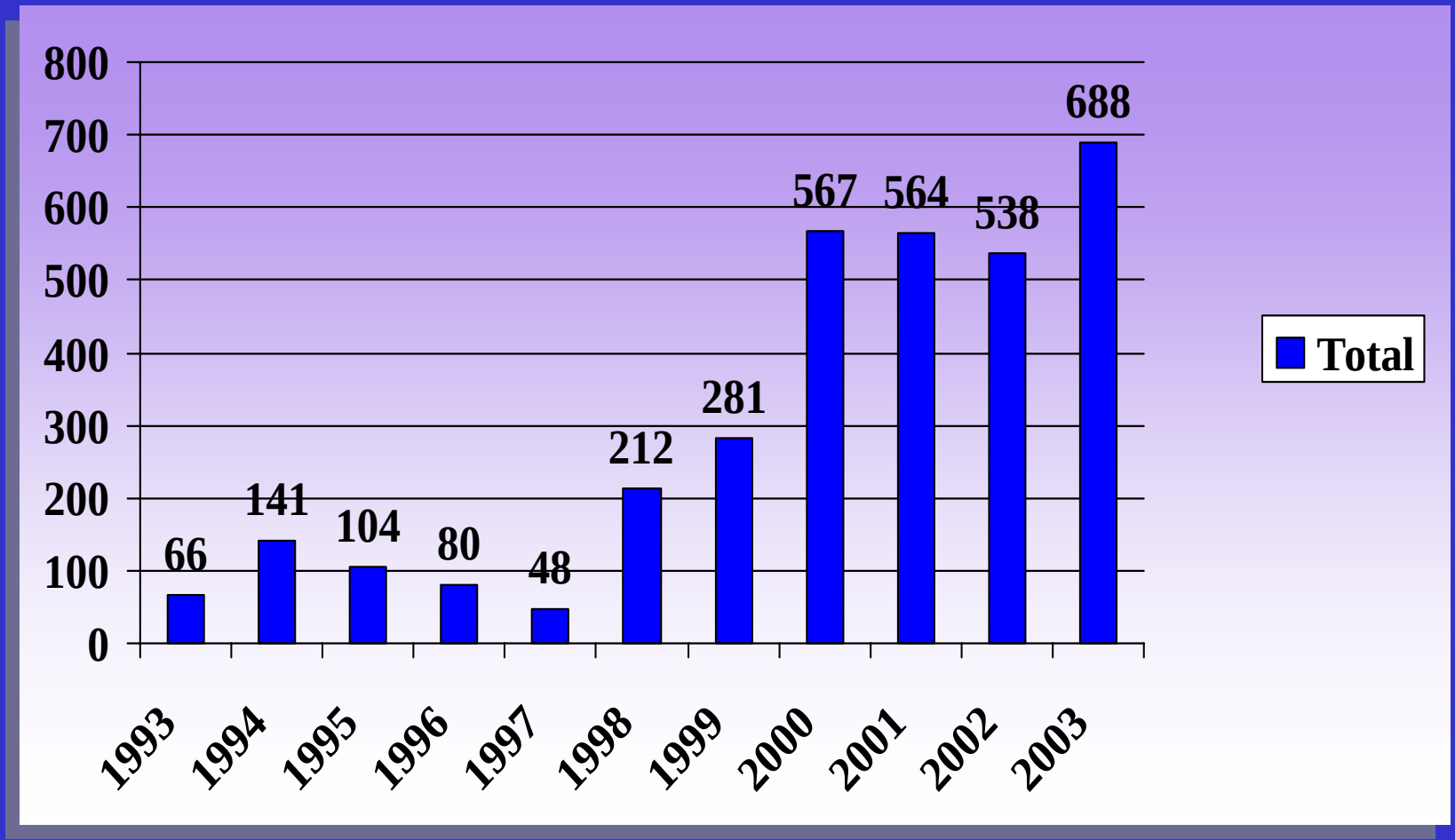
Data is submitted to the EPA

Risk Assessment

Tolerances established by the EPA

Manufacturer adds the crop to the product label

The IR-4 Program 10-year track record for "Food Use Clearances" of pesticide products



Strategy No. 2 We must work with the herbicides we've got (and try to keep them!)

- FQPA (1996) required re-registrations and some herbicides were lost due to costs and/or environmental/health issues.

- Find new uses for older marketable herbicides. This will require more herbicide/crop screening on less funding (greenhouse & field studies).

- Align Texas closely with other regional and national efforts within the IR-4 Minor Use Program.

  IR-4 Pilot Research Program – "Leafy Greens"

  PMAP – Pesticide Management Alternatives Project "Leafy Greens" (TX, NY, OK, AR, SC, NC, FL and other states).

Current Popular Strategy – “One Spray Fits All”

Chemicals

- Synthetic, man-made, non-selective/selective herbicides.
- Natural / organic (currently are only non-selective burn down PRE or POST harvest.

Followed by handweeding as-needed.

Strategy No. 3 Find alternative methods for controlling weeds in vegetable crops.

Weed suppression and/or herbicide use reduction using cover crop mulches.

Reduced-tillage, rye stubble, non-sprayed potatoes

Conventionally-plowed, non-sprayed potatoes


Crimson Clover
(*Trifolium incarnatum*)


Lana Vetch
(*Vicia dasycarpa*)


Spring Oats
(*Avena sativa*)


Hairy Vetch
(*Vicia villosa*)

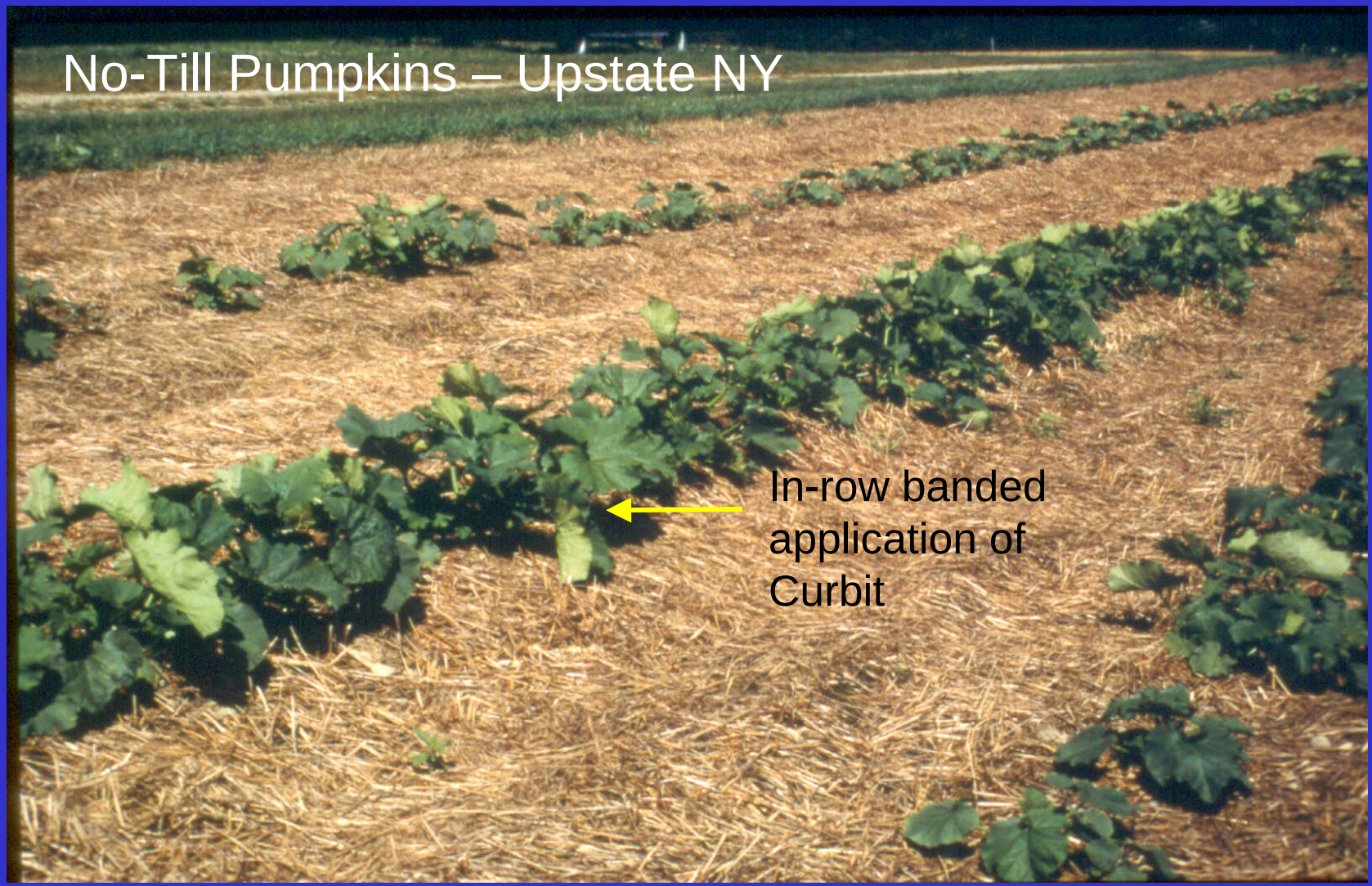

Austrian Winter Peas
(*Pisum sativum* ssp. *arvense*)


Winter Rye
(*Secale cereale*)


Oats and Hairy Vetch
(Late winter)
OATS
HAIRY


Winter Rye and Hairy Vetch
(Early spring)

Combining cover crops and reduced herbicide rates or applications.



Alternative cultivation technologies used to enhance weed control and reduce herbicide use.

Physical weed suppression

Plastic mulches

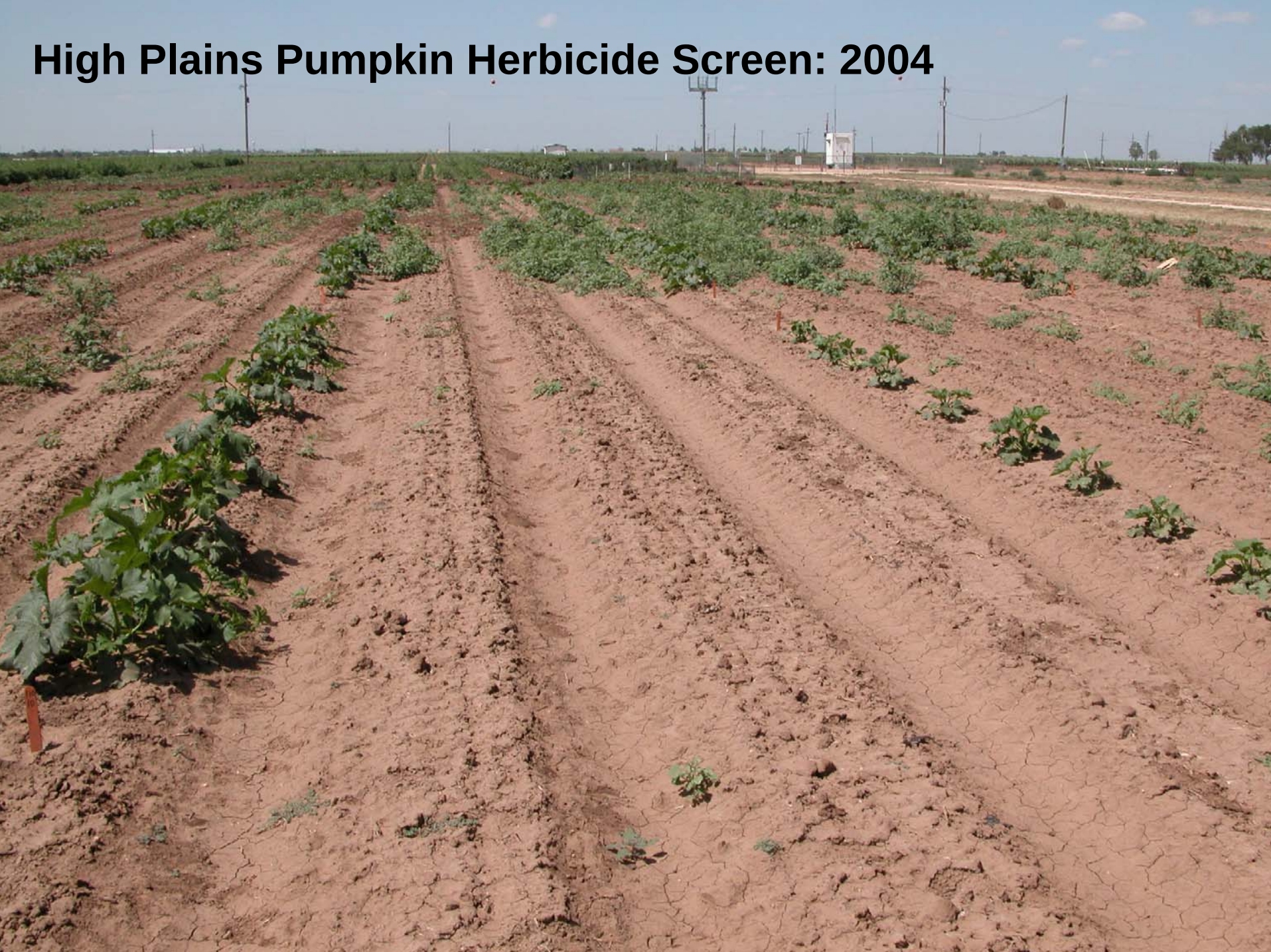
South Plains Food Bank Farm - Lubbock


Pepper Herbicide Screen: 2003


Blackeye Pea Herbicide Screen: 2004
Cooperator: Southern Region IR-4

Sweet Corn Herbicide Variety Trial

High Plains Pumpkin Herbicide Screen: 2004




Onion Herbicide Screen: 2004

Spinach Herbicide Screen: 2003

Cooperators: Wintergarden Spinach Producers Board
Del Monte

Summary

More challenges than answers.

Herbicide research critical to success for the vegetable industry.

Growers need to integrate alternatives into their vegetable weed control programs – there is no “one spray fits all” program.

Successful strategies and adoption require regional and national cooperative efforts from universities, the ag industry, government, growers and commodity organizations.


Thanks!
Any Questions?