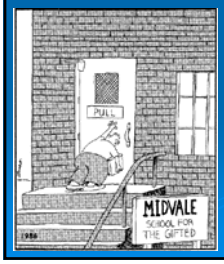
Weed Management in Vegetables



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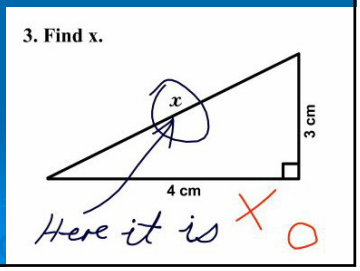
Key aspects for weed management

- Weed identification
- Impact of weeds
- Herbicide resistance
- Designing a program



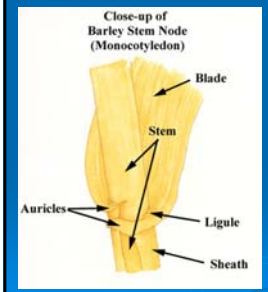
Weed identification:

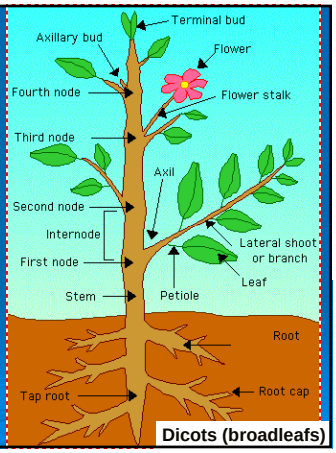
- Identify the most abundant weed first (biggest impact on yield)
- Also identify the most recent weed that you have noticed (potential unknown impact)
- Finally, identify the weed that is not responding to your weed control practices (resistant?)

How do I get started?

- Isolate the weeds you want to identify
- Write down every detail about the weed as if you were going to describe a criminal (shape, what they were wearing (leaf characteristics, flower color, etc.)
- Take a digital picture and document
- View available resources or contact your county or regional extension agent

Key terms





Dicots (broadleafs)

We do not have to manage all the weeds in fields

- Survey in MS soybeans (100 fields) found an average of 12 species per field; vegetable areas will have more)
- Winter annuals may not compete with summer annual vegetables and could serve to protect soil from erosion
- Some low-growing weeds have minimal impact (nutrients and water may be problematic)

What happens when we know what the weed is?

- We can use the proper name rather than #/!&*@!
- Learn the life cycle
- Identify the potential impact to your crops
- Herbicide label can be consulted to see if weed is controlled
- Other management approaches can be considered

Web cams in action?

Web resources

- http://www.ppws.vt.edu/weedindex.htm
- http://weeds.cropsci.uiuc.edu/weedid.htm
- www.weedid.missouri.edu (under construction)
- http://weedid.wisc.edu/weedid.php

Know the impact of the weed

- Weeds compete for light, nutrients, and water, not space
- Weeds reduce the amount of crop to harvest (competition) and the harvestability (quality) of the crop
- Weeds can increase labor costs or turn away (U-pick) potential customers

Critical weed-free period

Period during crop production when weeds are most likely to reduce yield or harvest

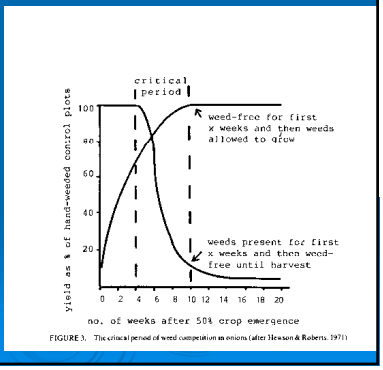


FIGURE 3. The critical period of weed competition in onions (after Henson & Roberts, 1971)

Things on the surface may not be as simple as they appear

Canada thistle

2 years after establishment

Why do we see specific weeds in vegetable crops?

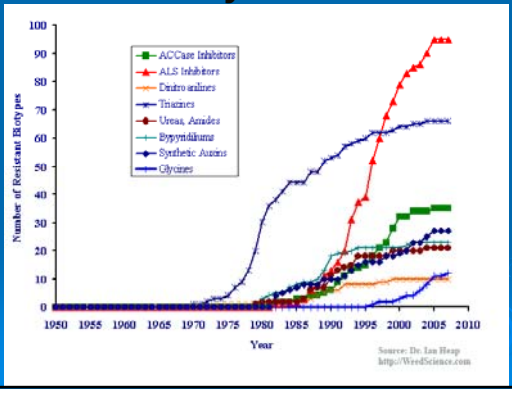
- Weeds mimic crops and reduce our ability to recognize them
- Weeds with similar life cycles as crops "hide" themselves within the crop to avoid control
- Weeds were there before many of us arrived, and adapt to our attempts to control them

Eastern black nightshade in tomatoes (Solanaceae family)

Resistance

- The ability of a pest to survive and reproduce following exposure to a dose of pesticide that is lethal to the wild type
- First documented for diseases in 1960; citrus storage rots to aromatic hydrocarbons
- First documented for insects in 1914
- For herbicides, common groundsel to simazine in 1970 in WA apple orchard

Resistance by mode of action

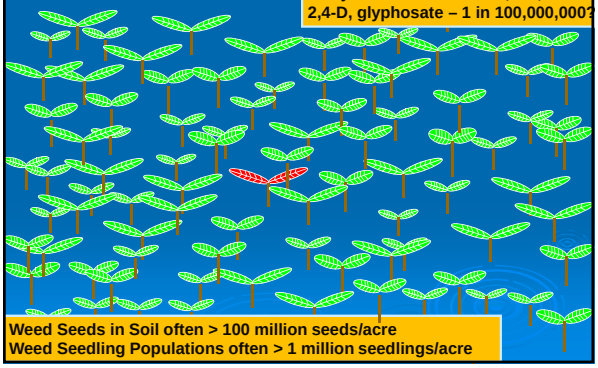


How did resistance occur?

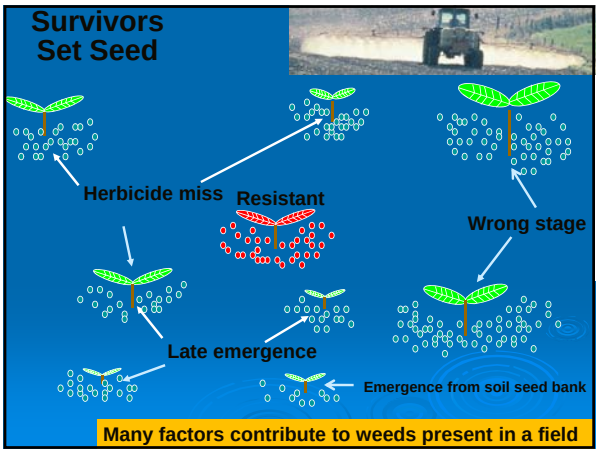
- One application at a time
- People are creatures of habit – continue to utilize a pesticide, especially when it is effective initially
- Resulted from lack of diversification in weed management systems; same mode of action applied over time
- Fact: most farmers do not change weed control practices in a field until >30% of a weed species not affected

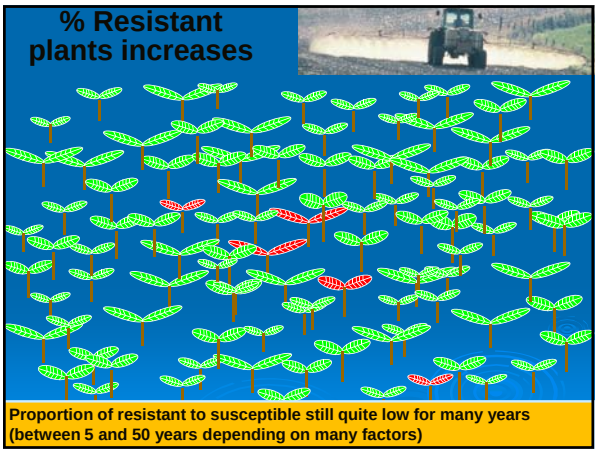
Model for resistance selection

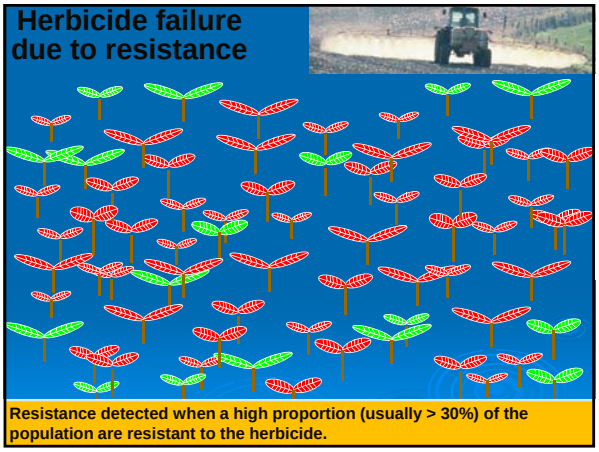
Mutation rates:
ALS – 1 in 100,000?
ACCase – 1 in 1,000,000?
Many herbicides – 1 in 10,000,000?
2,4-D, glyphosate – 1 in 100,000,000?



Weed Seeds in Soil often > 100 million seeds/acre
Weed Seedling Populations often > 1 million seedlings/acre


Survivors
Set Seed
Herbicide miss
Resistant
Wrong stage
Late emergence
Emergence from soil seed bank
Many factors contribute to weeds present in a field


% Resistant
plants increases
Proportion of resistant to susceptible still quite low for many years
(between 5 and 50 years depending on many factors)


Herbicide failure
due to resistance
Resistance detected when a high proportion (usually > 30%) of the
population are resistant to the herbicide.


Glyphosate 3 lbs ae/A, 0.5"
Glyphosate 3 lbs ae/A, 3"
Glyphosate 3 lbs ae/A, 10"
Stanley Culpepper, UGA


Will this program work?
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Potential hazards to adjacent species
Drift

Considerations if selecting a program?

- Can I afford a residual (most growers have multiple crops on same land I 12 month period (most soybean/corn herbicides >24 months for vegetables)
- Weather conditions (colder climates result in less breakdown)
- pH (above and below 7.0 can change breakdown)
- Do you have an applicator's license?

Cost and efficacy

- Glyphosate and some other herbicides are cheap, but have long-term costs (resistance)
- Organic approaches (vinegar, etc.) are size and species limited (contact activity only)
- Mulches
- Tillage – erosion a concern, requires dry conditions, stimulates new germination

Management techniques

- Mulching
  - 2 inches is minimum thickness
  - Raises soil temperature and may restrict water penetration
  - Potential source of new weed seed if organic (straw)
  - Expensive on large areas
  - Not effective on perennials
  - Specialized equipment necessary

Cultivation

- Only effective on small weeds (buries, breaks, and exposes weeds)
- Technique will spread perennial weeds
- Best done in morning when soil moisture is moderate to low
- Will not remove weeds most competitive initially (in the row)
- Promotes soil compaction and erosion

Key to avoiding problems!

Waiting can cost you!

- Most herbicides not effective on weeds larger than 6 inches
- Non-selective herbicides (playing with fire)
- One bad year in weed control is worth a lifetime (common lambsquarters)

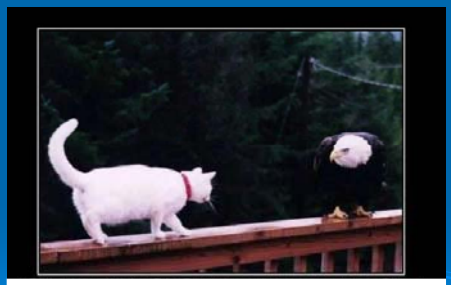
Hand-weeding

- Effective when repetitive but HARD WORK!

Herbicides

- Effective under proper conditions, but should not be considered the only option
- Can cause irreparable damage
- Biggest problems in using:
  - Applied at wrong time, improper calibration, did not control target weed (weed ID critical), user did not read the fine print (LABEL)

Confidence can create opportunity and mask obstacles!



Questions?