Weeds:
Definitions, Adverse Effects, Utility, and Introduction to Ecological Management

Carlene A. Chase
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Objectives

Students will:

1. Learn about/review the adverse effects of weeds.
2. Be able to distinguish between common definitions of weeds and an ecological definition.
3. Understand the primary objectives of weed management and be introduced to ecological weed management.

2

Weeds: Defined in reference to humans

3

Weeds: Defined in reference to humans

Plants that:

- Are growing where they are not desired.
- Are out of place.
- Humans consider undesirable.
- Have negative effects on health, crops, domesticated animals, or aesthetics.

Solanum viarum
Tropical soda apple

4

WEED SCIENCE SOCIETY OF AMERICA WSSA Definition

Any plant that is objectionable or interferes with the activities of humans

5

Write and Pass Exercise

1. *Write a negative aspect of weeds on your index card.*
2. *Pass the card to your neighbor.*
3. *Read what they have written.*
4. *Develop by explaining, modifying existing information or by adding another adverse effect.*

6

Adverse effects of weeds

- Human health:
  - allergies, poisoning
- Aesthetics:
  - unsightly, affects recreation, reduce land values
- Livestock:
  - poisoning
  - off-flavors of milk and meat
  - damage to hides and carcasses

7

Adverse effects of weeds

- Interfere with transportation
  - Emerge through asphalt, widen cracks in pavement, impede boat movement
- Invasive weeds displace desirable species
- Fire hazards
  - around flammable storage areas
- Obstruct powerlines
  - Limit access for repairs
  - Cause power outages

8

Adverse effects on crops

- Competition and allelopathy:
  - Reduced yield, crop quality, control costs
- Limit choices for crop rotation
- Alternate host of pests & pathogens
- Delay harvest
- Interfere with harvest:
  - Hand and mechanical harvesters

9

Adverse effects on crops

- Increased transportation and cleaning costs of harvested products:
  - Weight of weed seed in grain harvests.
  - Dockage for cleaning the grain.
  - Weed leaves in salad mixes.
  - Nightshade berries color soybeans.

Nightshade
Solanum sp.

10

Weeds – Ecological Definition

Plants that are especially successful at colonizing disturbed, but potentially productive, sites and at maintaining their abundance under conditions of repeated disturbance.

(Mohler, 2001)

11

Manage not Eliminate

Why?

12

Beneficial aspects of some weeds (Liebman 2001)

1. Sources of food for humans and also animal feed: *Amaranthus*, *Brassica*, and *Chenopodium* species.
2. Leguminous weeds can result in increased yields of some crops, eg. sesame and pearl millet grown with *Indigofera cordifolia*.
3. Limit pest damage on crops by interfering with pest movement, providing habitat for natural enemies.

13

Beneficial aspects of some weeds (Liebman 2001)

4. Provide habitat for gamebirds and other wildlife.
5. Reduce soil erosion.
6. Sources of medicine.

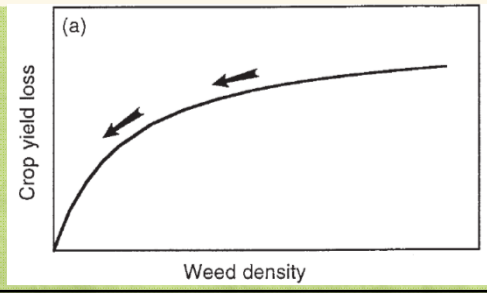
14

Total elimination is not viable

- Very expensive.
- May cause unacceptable environmental damage.
- Deprive farmers and the community of ecological services that some weeds provide.

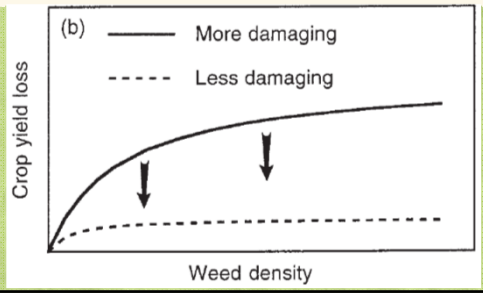
15

Objective 1 of weed management:
Reduce weed density in order to limit crop damage



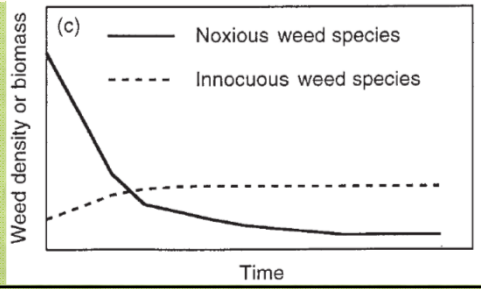
16

Objective 2 of weed management:
Limit the damage that a particular density of weeds can cause to the crop



17

Objective 3 of weed management:
Induce species shifts away from less desirable species



18

Ecology and Weeds

- Ecology
  - The study of the interactions between organisms and the environment.
- Weed Ecology (Booth, Murphy and Swanton, 2003)
  - Can be used to understand weed distribution and abundance.
  - Improved understanding can influence attitudes to and perceptions of weeds and affect the way we manage weeds.

19

Ecological Weed Management (Liebman, 2001)

- Cropping systems with less dependence on herbicides and more reliance on ecological processes:
  - Resource competition
  - Allelopathy
  - Herbivory
  - Disease
  - Seed and seedling responses to disturbance

20

Ecological Weed Management (Liebman, 2001)

- Minimizes herbicide use by developing weed-suppressive agricultural systems.
- Relies on:
  - Biological information
  - Multiple tactical options ("many little hammers approach")
  - Farmer decision-making
  - Adaptation of general design principles to site-specific conditions.
- Farmers have greater responsibility for ensuring success than with chemical-based systems.

21

Advantages of Ecological Weed Management

- More durable weed suppression.
- Cleaner air and water.
- Less adverse effects on non-target organisms.
- Healthier rural communities.
- Possible greater farm profits due to cost reductions, price premiums.

22

Increasing importance of ecological weed management

- Growing demand for organic and low pesticide produce.
- Over-reliance on herbicides – increased incidence of resistance.
- Increased concerns about impacts on human health and the environment of some herbicides.
- To promote farm profitability by reducing production costs.

23