

Four green triangular shapes are positioned at the corners of the slide, pointing towards the center. They are located at the top-left, top-right, bottom-left, and bottom-right corners.

# Non-chemical and non- biological control strategies for problem weeds - “cultural” practices -

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# Topics:

1. Background Info
  - What cultural practices can, and can't accomplish
  - Determine this *first*
  - General management strategies
2. Mowing
3. Mulching
4. Burning
  - Winter propane torch
  - Prescribed fire
5. Solarization
6. Tillage

# What cultural practices can, and can't accomplish

- Implemented consistently and properly, many cultural practices can slow the population growth and spread of *some* weed species
- *Sometimes* cultural practices alone can hold weed populations to levels significantly below what they would have been otherwise
- Very rarely can cultural practices eliminate a well-established weed species
- To be effective, weed management measures must be made a part of a *regular schedule of practices* for a crop or land management enterprise. Weed management cannot be something done “as needed.” It must be imbedded in the regular flow of operations.

# Determine this *first*

## 1. What plant(s) you are dealing with

- Ideally, dig up a whole plant specimen that includes the upper portion of its roots, and flowers. Find the best specimen(s) you can. Some weeds can be identified without flowers, but flowers are always preferable when they are available
- Confirm their identities with Ag Commissioner staff or Farm Advisor

## 2. Each plant's life-cycle

- Annuals
- Biennials/short-lived perennials (3-5 yrs)
- Long-lived perennials (5+ yrs)

## 3. Known vulnerabilities

# Weed Management Strategies

## Life-cycle-oriented control strategies

- Annuals
  - Suppressing or eliminating flowering/seed production is key.
  - Population control requires:
    - maintaining suppression on flowering
    - preventing new seed from coming in over the fence (neighbors), and
    - exhausting the soil seed bank
- Biennials/short-lived perennials
  - Like annuals, except you will have mixtures of plants at different stages in development and, depending on your management strategy, this may make suppression more complex.

# Weed Management Strategies

## Life-cycle-oriented control strategies

- Long-lived perennials
  - Usually among the harder challenges.
  - Single-stem species are vulnerable to tillage and repeated mowing.
  - Rhizomatous species (spread underground) are often more difficult.
    - While top-growth can often be readily killed by herbicide it is killing the *crown* that matters.
      - If the plant translocates nutrients into the crown for dormancy, creating a lot of fresh leaf tissue by defoliating (mowing/grazing) a couple weeks before day-length changes trigger carbohydrate storage in crown can increase effect of herbicide application

# Mowing

- Mowing can be effective in suppressing problem weeds when weeds grow earlier, taller, and flower before the preferred crop or pasture vegetation
  - a. In an ideal world, mowing weeds would be most effective when weeds reach the flowering stage when desired plants are still dormant
  - b. If the weeds have time to recover and produce flowers following the first mowing, one or more additional mowings may be necessary to be effective
  - c. Some weeds can *adapt* to mowing!

When mowing can sometimes get you into trouble

*PST and the clover hay story...*

# Mowing

- What can be controlled about a mowing treatment?
  - a. Timing (season, period within season, or stage of growth)
    - i. Objective is to select a time when the mowing will do the most damage to the weeds and the least to the plants you want to keep
  - b. Frequency (repeats of the treatment within the growing season)
    - i. Objective is to prevent flowering, reduce photosynthesis, and exhaust carbohydrate reserves
    - ii. Problem: some species will respond by changing growth form (shorter, spreading) and increasing the number of flowering stems, especially if moisture and nutrient availability is high
  - c. Height
    - i. Objective is to mow low enough to cause damage to the weed
    - ii. High enough to minimize damage to preferred plants



# Mulching

- Mulch is any material that is spread or laid over the surface of the soil as a covering.
- Mulching works best on annual weeds
  - perennial weeds tend to punch up through most mulches.
- Mulches of wood chips, straw, grass clippings, paper, rocks, rubber, black plastic, or landscape fabric can be used to control weeds.
- In order to be effective as a weed barrier, organic mulches should be 3 – 6 inches thick.
  - When using organic mulches like wood chips, straw, or grass make sure the material comes from a weed free source and/or does not contain any weed seeds or fragments.

# Mulching

- Landscape fabrics are heavy, sometimes woven and are made of polypropylene or other weather-resistant materials.
  - Water passes through them slowly and many are made to prevent weeds from growing through them.
  - Both significantly more expensive and (usually) longer-lasting than organic mulches



Municipal rangeland compost application trial, Morro Bay

# Fire



- Fire can be a particularly satisfying way to treat weed infestations, but its effectiveness can vary a great deal.
  - Winter propane torch
    - Weeds are most susceptible to flame heat when they are 1 to 2 inches tall or in the three- to five-leaf stage (Sullivan, 2001). Broadleaf weeds are more susceptible to flaming than grasses
    - Exposing a weed seedling to flame for 1/10 of a second (Row Crop, 2007) is usually enough to ensure control, although this may vary with weed type and size
  - Prescribed fire
    - In California, prescribed fire has been shown to be effective for control of late-season invasives like medusahead, yellow starthistle, and barbed goatgrass.
    - These three plants go to seed later than most desirable species, making them vulnerable to fire in the late spring/early summer.

# Solarization

Soil solarization is the process of holding solar energy in the soil to heat it to temperatures that kill bacteria, fungi, insects, nematodes, mites, weeds, and weed seeds.

The process involves covering the ground with a tarp, usually a transparent polyethylene cover, to prevent solar energy from being reflected or transmitted from the soil surface.

<https://agrilifeextension.tamu.edu/library/gardening/soil-solarization/>

# Solarization

To solarize your soil:

1. Clear the area of plants and debris.
2. Water the soil deeply until it is wet.
3. Cover the area with clear plastic (such as 1 to 4 mil painter's plastic). Don't use white or black plastic; they don't allow enough heat to get to the soil.
4. Bury the plastic edges in the soil to trap the heat.
5. Leave the plastic in place for at least 4 weeks in the hottest part of the summer.
6. Remove the plastic.

Soil solarization works best on **heavy** soils—those containing clay, loam, or mixtures of them. These can hold more water than can light soils, long enough to produce steam every day. **Steam** is needed to kill nematodes, weed seeds, and insect eggs in the soil.

<https://agrilifeextension.tamu.edu/library/gardening/soil-solarization/>

# Tillage

- Annual weed control is improved if primary tillage (first tillage after previous harvest) is used together with delayed planting. This allows the annual weeds to germinate prior to the tillage operation.<sup>2</sup>
- If tillage is delayed to the point where weeds become larger, the effectiveness of tillage as a control tactic can be reduced. Summer annual weeds that are not killed by tillage can be more difficult to control with herbicides later in the season.<sup>3</sup>
- Moldboard plows are more effective in burying weeds and weed seeds than chisel plows.
- Secondary tillage (smoothing after first tillage) can control small seedlings and germinating annual weeds by desiccation; therefore, it is best used when soil conditions are dry, and temperatures are high.

# Tillage

Control of existing weeds					
Tillage implement	Seedlings	Established annuals or biennials	Simple perennials	Creeping perennials	Burying annual weed seed
Moldboard	Good	Good	Good	Fair	Good
Chisel	Good	Fair	Fair	Poor	Fair
Disk harrow	Good	Good	Good	Poor	Poor
Field cultivator	Good	Poor	Poor	Poor	Poor

Table 1. Tillage implements and control of various weed types (adapted from Cahoon, C., Curran, W., and Sandy, D. 2018. Pre- and Post-Plant Mechanical Weed Control. In Integrated Weed Management Guide for Mid-Atlantic Grain Crops. pp. 103 -127).

The image features a white square background with four solid green triangles positioned at the corners. Each triangle is oriented with its right angle at the corner of the square. The word "Questions?" is centered in the white space.

Questions?