Weed control in field production
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Weeds

• Plants that are successful colonizing disturbed, but potentially productive, sites and maintaining their abundance with repeated disturbance.
  Liebman et al.

Redroot pigweed

• Seed survive for more than 30 years
  – Soil surface or buried
• Seed can be wind dispersed
  – Small size
• Plants produce up to 100,000 seed
  – 13,860 with no fertilizer
  – Over 34,600 when fertilized

Field bindweed

• Convolvulus arvensis
• Seeds persist in soil for 60 years
• Roots grow to a depth of 30 feet.

Nursery weed management

• Field production
  – Seeds in soil
  – Each crop planted back is same soil
  – Weed control should be preventative
  – Several postemergence options
• Container production
  – Bark is weed-free
  – Each new crop planted in fresh bark
  – Weed control must be preventative
  – No postemergence herbicides.

Field weed control

• Start clean .......... stay clean
Field weed control

1. Field preparation
2. Prevent weed establishment
   - Most important step
   - Sanitation
   - Cultural practices
   - Preemergence herbicides
3. Control (kill) escape weeds

Field preparation

1. Spray with broad-spectrum post herbicide
   - Wait 2 weeks
2. Till weeds under
   - Wait 3 weeks
   - Apply soil amendments?
3. Till field again, final prep
4. Plant nursery crops

Perennial weeds

- Tillage can be used to eradicate perennial weeds
- Probably will take at least 2 years
  - Tilling every 3 weeks
Field preparation

- Goal is to reduce weed populations
  - Complete eradication is impossible
- Excessive tillage is damaging to soil structure
- Limit the number of tillage passes (plow, disk, roto-till, etc.) to a minimum.

Weed prevention

- Sanitation
  - Clean tillage equipment
  - Control non-crop area weeds
  - Physical barriers
- Cultural practices
  - Tillage
  - Fertilization
  - Irrigation
- Preemergence herbicides

Sanitation

- Clean tillage equipment
  - Prevent spread of perennial weeds

Sanitation

- Control weeds in non-crop areas

Sanitation

- Physical barriers
  - Prevent wind-blown seed
  - Thistles, groundsel, fireweeds
- Seed dispersed during growing season
  - Use fast growing deciduous plans (poplar)
Cultural practices

- Fertilization
  - Band apply fertilizers
  - Do not broadcast apply Nitrogen
- Weeds grow poorly in absence of nitrogen

Cultural practices

- Irrigation
  - Switch to drip irrigation if possible
- Drip irrigation
  - Faster growing crops
  - More uniform crops
  - Less labor
  - Less water
  - Less money
  - FEWER WEEDS!

Cultural practices – Tilling

- Tilling
  - Low/no chemical input
  - Prevents soil from crusting
  - Looks good
  - No weed resistance
- Repeated tilling
  - Damages soil structure
  - Degrades soil aggregates
  - Accelerates organic matter degradation
  - Leaves soil prone to erosion
Tillage
• If perennial weeds are present
  – Flag area
  – Do NOT till
  – Eradicate with post herbicides
  – Wait 30 days for regrowth
  – Spray again
  – Excavate if necessary

Clean cultivation
• 100% vegetation control
• Herbicides within rows
• Till between rows

Clean cultivation
• Disadvantages
  – Reduces soil organic matter
  – Destroys soil structure
  – Degrades soil aggregates
  – Soil compaction
  – Allows for erosion

Living mulch
• Cover crop growing between rows of nursery stock
Living mulches

- Disadvantages
  - They can compete with nursery crops
  - Cover crops can attract unwanted pests
  - Seeds can become weed problem
  - They require maintenance
  - Many don’t look very good.

Living mulch

- Advantages
  - Reduced soil erosion and runoff
  - Increases soil organic matter
  - Increase soil aggregates
  - Reduces soil compaction
  - Suppresses weeds
  - Improves percolation
  - Reduces temperature fluctuations in soil

Living mulches

- Characteristics of a good living mulch
  - Small or low growing
  - Requires minimal maintenance (mowing)
  - Minimal competitor for nutrients and water
  - Forms dense cover for weed suppression
  - Not attractive to pests or wildlife
    - Clover attracts deer
    - Turf attracts Japanese beetles in some areas

Preemergence herbicides

- Herbicide selection
- Application timing
- Maintain the chemical barrier

Plant uptake

- Most seed germinate in the top 1 inch of soil.
- Herbicide placement should occur where seeds will germinate and begin growing.
- Application of herbicide followed by incorporation with water is necessary for proper placement.
Preemergence herbicides

- **Will not** kill weeds present at time of application
  - Exception is spray-applied Goal and SureGuard
- Even small weeds have roots large enough to escape effect of pre herbicides.

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Preemergence herbicides

- **Do not** prevent seed from germinating
- **Do not** kill dormant seeds

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Herbicide timing

- **First application**
  - February-March
  - Irrigate newly plant crops to settle soil
  - Apply preemergence herbicide to soil
  - Incorporate the herbicide with ½ inch of irrigation

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Herbicide timing

- **Second application**
  - Early summer (May)
  - Reinforce herbicides applied earlier
  - Control emerging summer annuals
  - Be careful of herbicides on tender foliage

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Herbicide timing

- **Third application**
  - Late summer (September)
  - Winter annual weed control
  - Can provide weed control through next spring
Maintain the chemical barrier

- Incorporate the herbicide
- Reduce unnecessary traffic
- Reduce excessive irrigation

Incorporate the herbicide

- Most abused aspect of weed control
- Incorporate immediately after application
  - Herbicides degrade on soil surface
- Incorporate with irrigation if possible
- Do NOT incorporate with drip irrigation!!!

Field weed control

- Controlling escape weeds

Controlling escape weeds

- Herbicides
  - Glyphosate and paraquat most commonly used
  - Spot spray only
  - Broadcast applications are dangerous around valuable nursery crops.

Controlling escape weeds

- Cultivation
  - Used extensively for weed control between tree rows.
  - Negative consequences on soil structure and health.
Controlling escape weeds

• Hoeing
  – Safe
  – Labor intensive
  – Inefficient
  – Very expensive!

Summary

• Field preparation
• Weed prevention
• Weed eradication

Website

• http://oregonstate.edu/dept/nursery-weeds/