Organic Weed Management - Overview

"Weeds are plants that are especially successful at colonizing disturbed but potentially productive sites, and at maintaining their abundance under conditions or repeated disturbance" (Mohler 2001)

- Weed Impact
- Weed biology
- Control Techniques

How do weeds impact crop production?

- Competition (light, water, nutrients, space)
- Consistently present every year (not host specific)
- May encourage insect and disease problems
- Poor wedding = increased pressure "One year's seeding…'
- Increased harvest cost
- Primary pest problem for organic growers

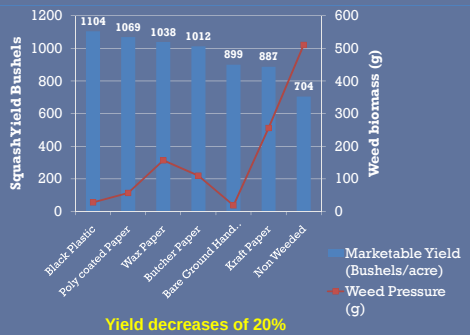
Hairy Galinsoga

Weed Management

- About 1000 seeds/yd^2 on average
- About 50% of the seedbank is from previous year
- Can reduce weeds by 50% by controlling for one year
- One pigweed can produce 500,000 seed

Forcella and Teasedale, 2003, Agricultural Research

Squash Yields



Yield decreases of 20%

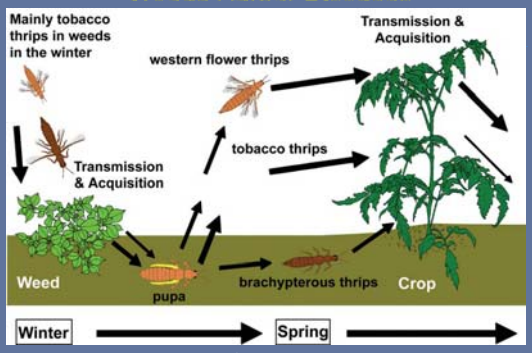
Weed Management

- Weeds harbor insect pests (pigweed and beet armyworm)

Weeds harbor diseases

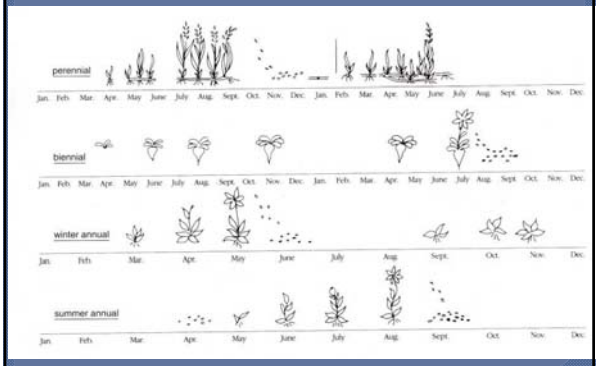
Tomato spotted wilt virus

Weeds Harbor Diseases



Riley et al., 2005. Thrips as vectors of TSWV, In: Tospoviruses in solanaceous and other crops in the coastal plain of GA.

Plant Life Cycles



Types of Perennial Weeds and Examples

Nature of the root system	Examples
Stationary perennials	
Taprooted	Dandelion, burdock
Fibrous rooted	Broadleaf plantain
Wandering perennials	
Bulb or tuber	Yellow nutsedge, wild garlic
Shallow storage organ	Quackgrass, johnsongrass
Deep storage organ	Bindweed, Canada thistle

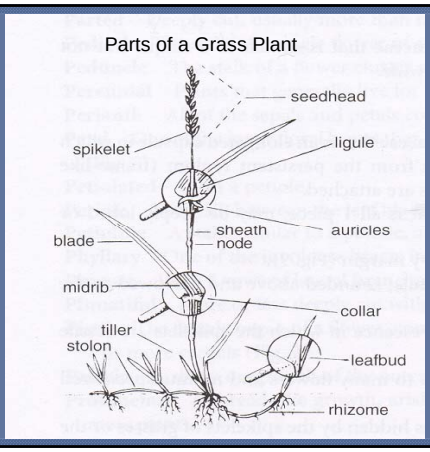
Mohler, 2003. In Organic Vegetable Management, NRAES-165

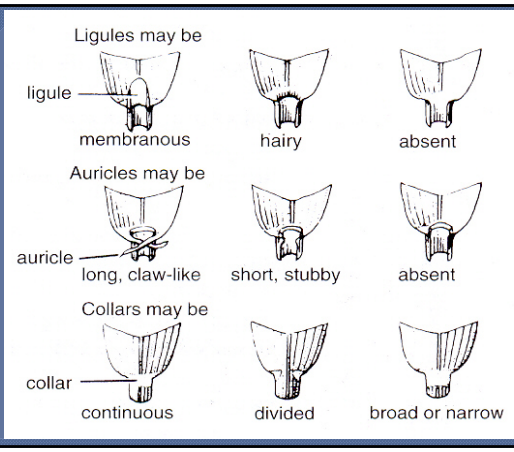
Annual Weeds

- Produce many small seeds (less then 2 mg)
  - Spreads risk of death by disturbance
  - Competition, in-row weeding, mulches
- Limited resources
  - Emerge from top 1-2 inches
  - Tiny seedlings
- Germination cues are important for survival
  - Light, soil temp., oxygen, nitrate
  - Important for fallow cultivation
- Season of germination
  - Germination-dormancy cycle

Lambsquarters

Parts of a Grass Plant





Identifying Broad Leaf Weed Seedlings

1. Cotyledons (Seed Leaves): shape, venation, hairy or glabrous, coloration
2. True Leaves: arrangement on stem, shape, margins, venation, hairy or glabrous, pinnately or palmately lobed
3. Root System: perennial or annual
4. Other Characteristics: stem hairiness, odor,

Henbit, Purple deadnettle

Bittercress

Organic Weed Control Techniques

Management decisions influence weed pressure

Prevention
- Rotation or crops, fields and tools
- Growing cover crops
- Composting animal manure
- Cleaning implements
- Controlling weeds in non-crop areas
- Mulching

Suppression
- Mechanical cultivation
- Hand-hoeing and pulling
- Flame-weeding

Cultural Practices -Crop Rotations

- Crop rotation subject weeds, diseases and insects to an ever-changing habitat, thereby reducing the proliferation of species that prefer certain conditions.
- Cultivation regimes can be continuously changed with the rotations.

Coleman, 1995. The New Organic Grower

Cultural Practices-Cover Crops

- Short and long term control
- Starves weeds of light, nutrients
- Weakens perennials and reduces annual seed populations
- Allelopathy – Sudex, ryegrass
- Warm-season: buckwheat, sudex, millet
- Cool-season: oats, field peas, ryegrass, hairy vetch

Additional Cultural Practices

- Stale seedbeds
- Interseeding
- Mowing
- Placement of resources
- Crop establishment

Weed Control Through Cultivation

- Equipment for preemergence cultivation (blind cultivation) (flex-tine weeders, rotary hoes)
- Equipment for postemergence cultivation (basket weeders, finger weeders, rolling cultivators, sweeps, flamers)
- Cultivation tools vary in aggressiveness and can cultivate between rows or within rows
- Cultivation implements may dislodge, cut or bury plants
- Proper timing of cultivation is critical (get weeds when they are small), setup for speed
- Matching the tool to the crop, the weed and the soil condition is key. Versatility is important.

Cultivation - Matching the tool to the production system

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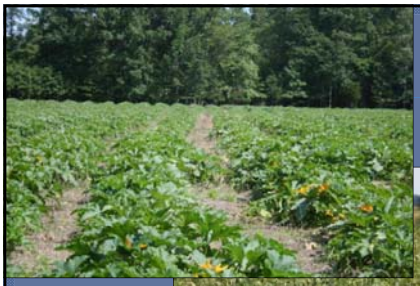

It's all in the management

http://newfarm.rodaleinstitute.org/depts/weeds/index.shtml