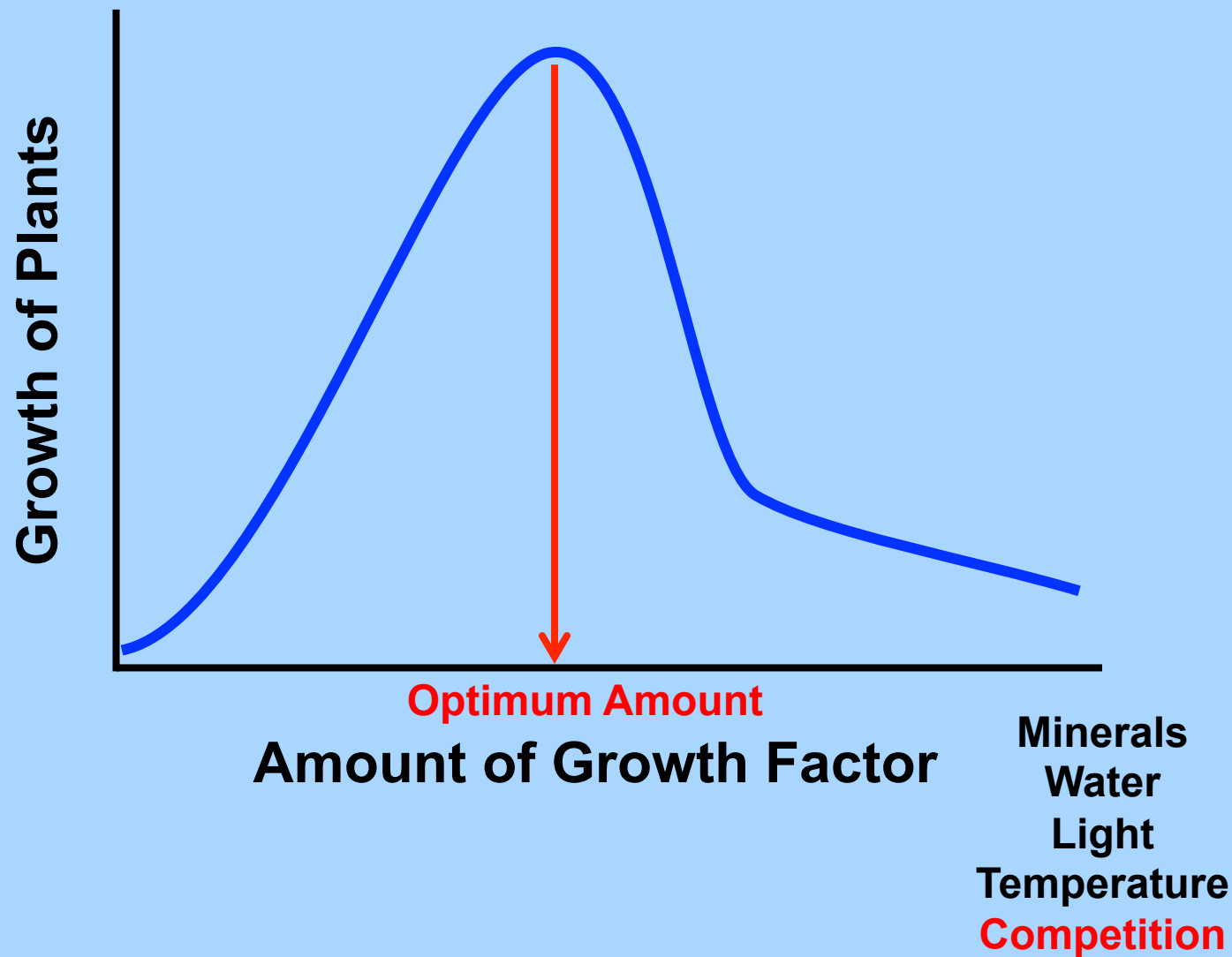


# Weeds and Pests

Our Last Topic for Optimizing  
Plant Growth

**Goal: Optimize the growth of our plants**  
**Strategy: Optimize each factor for growth**



# Competition: Plant Spacing Effects

## Too Close:

- Competition Increased: Yield Decreased
- Higher Humidity: Yield Increased
- Fungal Growth: Yield and Quality Decreased

## Too Distant:

- Increased Soil Heat: Yield Decreased
- Increased Airflow: Yield Increased
- Less Fungal Growth: Yield and Quality Increased
- More Water Needed: Yield Decreased
- Wasted Space: Yield Decreased
- Weeds Invade: Yield Decreased
- Erosion Increased: Yield Decreased

# Two Important Spacing Considerations

## Thin Seedlings

Remove Weeds Of Course

But Even Desired Plants!

(Mrs. Fulton's Tomato Seedlings)

## Plan For Mature Size of Trees and Shrubs

Foundation Plantings

Am I softening the corners?

Where are the windows?

How far away are the basement walls?

Sidewalk and Driveway Proximity

Overhead Wires

Maybe "Just Say No" to Connecticut Light and Power Subcontractor

# Weed = Plant out of Place = Competitor

Excess tomato Seedlings

Goldenrod = garden flower in Europe

The Weed is in the mind of the Gardener!

## Weedy Characteristics

1. Rapid Growth
2. Mature Young
3. Produce Many Seeds
4. Vegetative Propagation Spread
5. Stress Tolerant
  - Biological Stress—Few Pests, Competitive
  - Environmental Stress—deep roots, efficient biochemistry
6. Longevity in Soil—"Seed Bank" of 100+ Years!

# How To Control Weeds

## Mechanical Elimination

- Pulling out by hand—“Ouch! My aching back!”
- Hoeing—“I’m beginning to hate gardening!”
- Wheel Hoe—“Now this is better!”
- Garden Rake—“So that’s what it’s for!”

## Mulching

- Deep enough to smother weeds & prevent germination
- Apply when plants are tall enough (6” or so)
- Remove when needed—e.g. thermal insulation mulch
  - Apply after ground is frozen
  - Remove early spring to permit perennial growth
- Water Use Benefits!!
- Soil Conditioning Benefits
- Types of Mulch
  - Inorganic—rocks, plastic, old carpet strips
  - Organic—wood (not PT), newspaper, leaves, grass clippings, straw, salt marsh hay (not hay!)

# How To Control Weeds

## **Chemical Controls: Non-selective Herbicides**

- Arsenic—heavy metal toxin lasts “forever” in soil and wells!
- Glyphosate = Roundup = Kleenup—comparatively safe vegetation killer
- Boiling Water—just be careful
- Torch—propane fuel but often does not kill roots

## **Chemical Controls: Selective Herbicides**

- 2,4-dichlorophenoxyacetic (2,4-D) acid kills broadleaf plants in grass (suspected pancreatic carcinogen)
  - 2,4,5-T was active material in Agent Orange
  - Dioxin was contaminant in synthesis by low bidder contractor
- Eptam—kills grass seedlings in broadleaf crops
- Trifluralin = Treflan—kills seedlings (pre-emergence) for keeping weeds away in established perennial gardens

# Considerations for Chemical Pesticides

**Application:** using on correct crop and pest?

**Concentration:** is the dilution correct?

**Frequency:** how often should I use it?

**Conditions:** when and weather OK for spray?

(you don't spit into the wind...be ready to drink what you spill—it is in your well soon)

**Residue:** how long will plant be toxic, washable?

**Uptake: is it a systemic?** Whole plant toxic?

**Duration:** when is the soil/environment pesticide free?

Can I grow a different crop here next year?

**Biological Magnification:** effect on food chain (DDT)



# Do I Really Want a Weed-Free Lawn?

**Monoculture:** lost disease/pest resistance?

**Maintenance hassle:** even one new weed obvious

**Fertilizer cost:** clover is not fixing nitrogen for you!

**Pest control cost:** see first item...will spend more!

**Mowing cost:** faster growth means more work!

**Dethatching cost:** excess clippings build up in lawn

**Aesthetics:** boring!

# Weeds and Pests

Our Last Topic for Optimizing  
Plant Growth

# General Pest Symptoms

Disease or Pathogen—altered physiology or development

Parasite on Host Plant—decreased vigor & yield

Herbivore or Omnivore—missing plant parts

## General Ideas for Avoiding Pests

1. Buy resistant varieties—e.g. TVFN Tomatoes
  - T = Tobacco Mosaic Virus
  - V = Verticillium Fungi
  - F = Fusarium Fungi
  - N = Nematodes
2. Completely remove diseased infested plants or branches
3. Increase air movement and decrease humidity = pruning
4. Optimize growth by optimizing all factors

# More Specific Symptoms

## **Parts Missing = Chewing Insect or Slug/Snail**

Bagworms, beetles, borers, cutworms, hornworms

## **Yellow/deformed leaves = Sucking Insects**

Aphids, mealy bugs, scales, spider mites, white flies

## **Spotted leaf or fruit = bacterial, fungal, viral**

White spots on leaves: likely spider mite or white fly

White tunnels in leaves: leaf miner insect

## **Plant collapse when watering is normal**

Seedlings: damp-off fungi (water less heavily to avoid!)

Mature plants: wilt-fungi (fusarium, verticillium)

# How To Control Pests by Kingdoms

## Viruses – Tobacco Mosaic Virus

- Affect tobacco, tomato, pepper, potato, eggplant, petunia
- There is no cure for these...just as in humans
- Buy resistant varieties (T Tomatoes)
- Keep smokers out of your garden or greenhouse

## Bacteria – Tumors, Galls, Witches Brooms, Rots

- Antibiotics are too expensive
- Cull effected plants
- Keep plants in drier atmosphere—increase spacing!
- Avoid over-watering
- Treat pruning equipment with alcohol or 10% bleach

## Fungi– Molds, mildews, blight, wilts

- Fungicides work but are toxic to humans (Captan, etc.)
  - Bordeaux Mixture = Copper Sulfate + Lime
  - Sulfur Powder = Dust
  - Irish Potato Famine
- Dogwood Anthracnose—open plant for air circulation, light, and buy resistant varieties = Korean dogwood (*Cornus kousa*)
- Keep plants in drier atmosphere—increase spacing!
- Avoid over-watering

# How To Control Pests by Kingdoms

## Plant Parasites– Mistletoe, Dodder, Weeds

- Prune away, especially from any nearby infested plants
- Remove competitive weeds (recall previous discussion)

## Animals– Invertebrate Herbivores, Omnivores, etc.

- Nematodes – nematicide, repel with marigolds, N tomatoes
- Molluscs—snails and slugs, molluscicide = “slug bait”, beer pools
- Arthropods—jointed legs, insecticides
- Contact insecticide: Malathion
- Systemic insecticide: Isotox, Temik, Imidiclopid
- Animal disease: BT = *Bacillus thuringiensis*
- Sticky boards: yellow color + grease for whitefly
- Predators: not all insects are bad...
  - Trichogramma*, *Encarsia*, *Cryptolaemus*, lady bugs, mantids
- Pick off yourself: larger species
- Water spray lower epidermis of leaves (kills eggs by osmosis)
- Soap spray—soap improves effect of water spray
- Oil spray—has to be plant-safe (paraffin based), smothers insects
- Diatomaceous earth—insects bleed to death

# How To Control Pests by Kingdoms

## **Animals— Vertebrate Herbivores, Omnivores, etc.**

- Birds – regurgitation-inducing spray against “scout” birds  
Shiny ribbon or tinsel vibrates in wind to “scare off”
- Mammals – rabbits, ground hogs, mice, deer, moles, humans!
- Fences make good neighbors (humans?)  
10-feet tall required to exclude deer  
Lower-edge buried some inches in soil to avoid tunnels
- Traps—live or dead traps? If live traps, where to release?
- Poisons—these are close relatives so toxic to you too!
- Predators—securely fence yard, leave large dog loose in area
- Remove food supply—special case for mole damage in lawns
- Repellents generally do not work—try smelly soap for deer
- Shoot to kill  
Deer: heavy firearms required; illegal out of season or in-town  
Varmints: If light firearms are illegal, pellet guns may be allowed  
Check with local authorities about ordinances