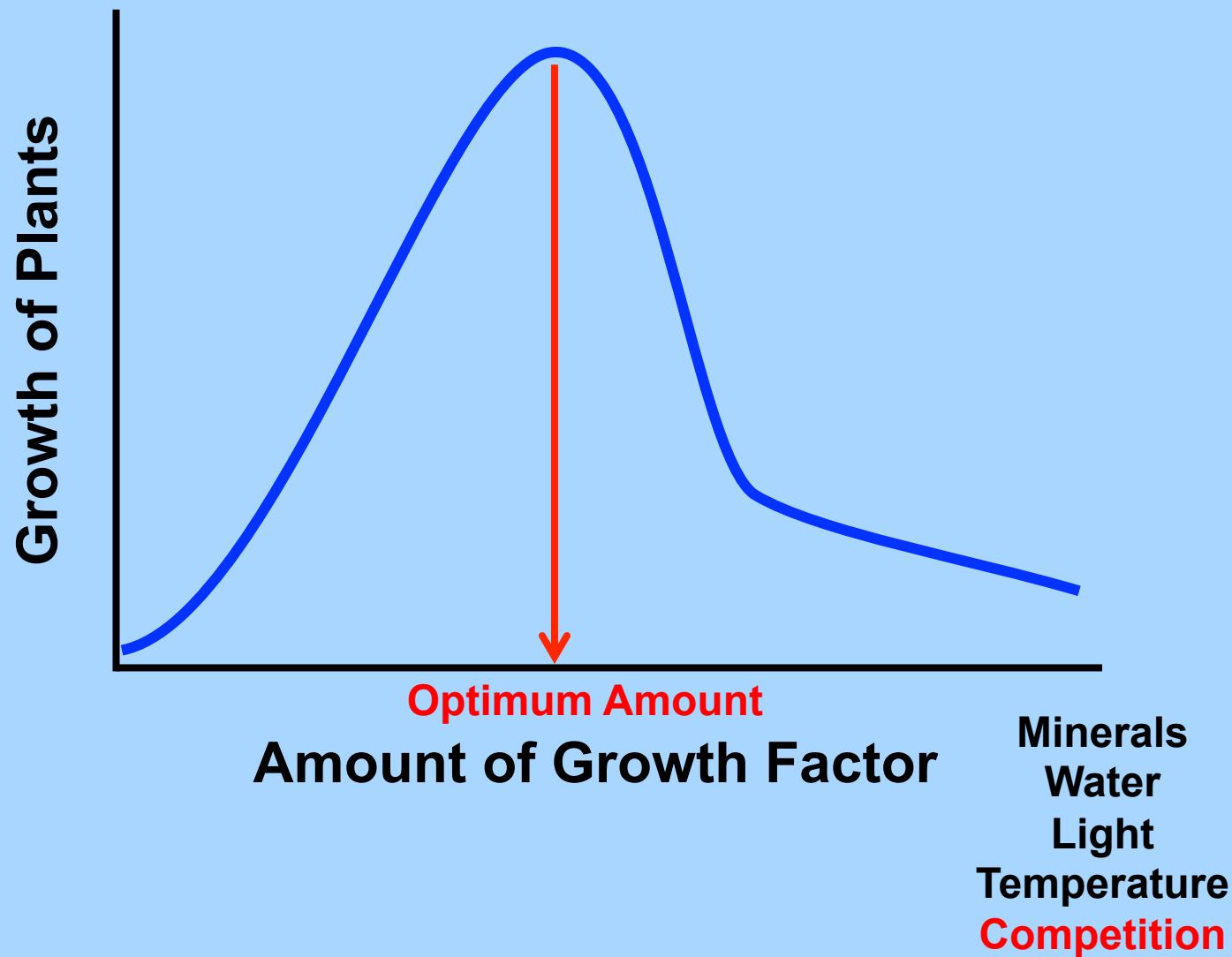


Weeds and Pests

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