IPM and Cultural Controls

Prevention, Avoidance, Monitoring and Suppression

Host plant resistance

- Crop rotation
- Soil quality management
- Sanitation
- Farmscaping/habitat manipulation
- Trap crops
- Cover crops
- Use of mulches
- Intercropping
- > Alter planting/harvest dates

Transplants

Using transplants instead of direct seeding has several benefits

- Transplants produce earlier fruit
- Transplants are larger when pests show up in the field
- Transplants have a competitive advantage over weeds
- More efficient use of expensive hybrid seeds
- > Can treat with systemic at transplant time



Seeds and Transplants

Some diseases live in the soil.

>Begin with new potting media

Do not allow it to contact soil or infected plant material

Place transplant trays on tables, shelves or if on the floor use a barrier between pots and the soil underneath



Seeds and Transplants

Many diseases come in on seeds.

- Do not save seed from year to year
- >Use treated seeds when possible
- Choose resistant varieties
 - ➢ Johnny's
 - ≻Seedway
 - ► Baker Creek

VEGETABLE	DISEASE
Broccoli	Downy mildew • Brown bead • Black rot
Cabbage	Black rot • Fusarium yellows • Bacterial speck
Cantaloupe and other melons	Downy mildew • Powdery mildew • Fusarium, races 0, 1, 2
Cucumber	Angular leaf spot • Anthracnose • Zucchini yellow mosaic virus • Cucumber mosaic virus • Papaya ringspot virus • Watermelon mosaic virus • Downy mildew • Powdery mildew • Scab
Eggplant	Tobacco mosaic virus • Verticillium wilt
Lettuce	Downy mildew • Lettuce mosaic virus
Pepper	Tobacco mosaic virus • Bacterial leaf spot, races 1, 2, 3, 5 • Potato virus Y • Cucumber mosaic virus • Pepper mottle virus • Tobacco etch virus
Squash (summer)	Powdery mildew • Zucchini yellow mosaic virus • Cucumber mosaic virus • Papaya ringspot virus • Watermelon mosaic virus
Squash (winter)	Powdery mildew
Tomato	Alternaria stem canker • Bacterial speck • Early blight • Fusarium, races 1, 2, 3 • Nematode • Stemphyllium • Gray leaf spot • Tobacco mosaic virus • Verticillium, races 1, 2 • Tomato spotted wilt virus
Watermelon	Anthracnose, races 1, 2 • Fusarium, races 0, 1, 2



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Some diseases for which you can buy disease resistant transplants

Site Selection

- > Do soil tests
- > Drainage is crucial
- Consider irrigation and weed control possibilities.
- Consider previous use

Grubs and wireworms are usually abundant in sod, so never plant root crops into a field that was pasture



Art Cushman, USDA; Property of the Smithsonian Institution, Department of Entomology, Bugwood.org

Different Crops require different conditions to thrive.

- Start with a clean field, preferably the preceding fall
- Make soil amendments based on crop needs
- Have irrigation and weed control in place at planting time

University of Missouri-Columb	a Re	l Test port		Soil Testi 23 Mumfo Columbia, Phone: (5	ng Labora rd Hall, MI MO 6521 73) 882-06	atory J 1 223	or	Soil Testin P.O. Box 1 Portagevill Phone: (57	ng Laborat 60 e, MO 6383 '3)379-543	73 1
						http://www	w.soiltest.	psu.missou	ri.edu/	
EIEL			7			Ser	al no. S	/22/6-1	Lab no.	01014317
Field ID BUSVEG1S1	Sampl	e no 1	-			Sub	mitted		Processo	4
Acres 2 Last Limed	unkriown	Irrigated No	-			9/2	8/2010		10/5/201	0
Last crop 27 WARM SEA	ASON GR PAST	FSA Copy N			Soil s	ample sub	mitted by	Firm N	umber: (Outlet:
LINCOLN U P.O. BOX 2 JEFFERSO	JNIVERSITY STE 9 N CITY MO 6510	VE BEAL 2								
SOIL TEST INFO	PMATION				R	ATING				
SOIL TEST INFU		Very Low	Low		edium	Hi	gh	Very Hi	gh	Excess
pH _s (salt pH)	4.6	******	**							
Phosphorus (P)	48 lbs/A	*******	*****	****	****	****	****			
Calaium (K)	362 Ibs/A	********	*****	****	*****	*****	*****	*****	ł	
Magnesium (Ma)	540 lbs/A	********	*****	*****	*****		**			
Sulfur (SQ-S)	0-10 105/A		~ ~ ~ * *	*	A A A A A	*****				
Zinc (Zn)	ppm									
Manganese (Mn)	pm									
ron (Fe)	ppm									
Copper (Cu)	ppm									
Organic matter 3.2	% Neutra	izable acidity 6.0		meq/10	0g Catio	n Exch.	Capacity	12.8		meq/100g
PH in water	Electric	al Conductivity		Mmho/	cm Sodi	um (Na)				lbs/A
Nitrate (NO ₃ -N) Topsoil	20.3 ppm Subs	DI ppm	Sampling	Depth	Тор	6	Inches	Sub	soil	Inches
Cropping or	otions	Yield goal		Pou P ₂ O ₅	nds per a K ₂ O	cre Zn	S	s	LIMESTO	IONS
18 COOL SEASON GRA	ASS HAY	3 T/A	120	20	0			Effective N	eutralizing	1675
								Material (El	NM)	1010
								(EMa)	agnesium	0
	annly nitroge	n just before spi	ring grow	th beai	ns (typi	cally M	arch) (Consider	splitting	nitrogen
For hay production applications if the rat Some herbicide lal 5.1 . Use this estimat or Extension speciali If no P2O5 or no K applied. To determine limes dealer. Ammonium is 5.98 Particle Size Analy	e exceeds 90 bels list restric ted pH in wate st listed below (20 is recomm stone needed i ppm. rsis: Texture: \$	bs N/acre, appl ions based on s r as a guide. If y ended retest an n tons/acre, div ILT LOAM ; %	ying 60% soil pH in you wish inually to ide your Sand: 17	6 in Ma water. to have determ ENM re	rch and This sa e soil pl- nine wh equirem Silt: 65.0	the bal ample h i in wat en mair ent by t and %	ance ir as an e er anal ntenanc the gua	n mid Au estimated yzed, co ce fertiliz nantee c 17.5.	gust. d pH in v ntact yo er shoul of your lii	vater of ur dealer d be mestone

Benefits of Plasticulture on raised beds.

- Increased drainage
- ➤ Faster soil warming
- >Better moisture retention
- More efficient irrigation
- Reduced disease problems
- Earlier harvest
- Excellent weed control
- >More efficient nutrient use
- >Reduced Insect problems*

Mulch Layer



Plastic Mulch

- PLASTIC MULCH: Intercepts sunlight and warms up the soil, allowing earlier planting and faster growth early
- More efficient water and fertilizer use
- Can result in earlier crop maturity, higher yields, increased quality, and improved disease and insect resistance
- Provides an impermeable barrier for almost all weeds except nutsedge
 - Different colors of plastic mulch can give different results:
 - Clear heats up fastest but likely to have weed problems
 - Black heats up slower, but excellent weed control
 - White and reflective may keep soil cooler and confuse some pests



Drip Irrigation

- Foliage stays dry so many diseases are prevented
- Water is directed only to the root zone of your cash crop, not to weeds
- Systems operate under very low pressures
- Chemigation can be used
 - Water soluble fertilizers can be injected directly into the irrigation line
 - Insecticides can be pumped in, which eliminates drift and collateral damage



Plasticulture

A small investment for a large return.

- A typical plasticulture system would use the following:
- >2-4' x 4000' plastic mulch \$310
- ≻7500' drip tape \$157
- > Mulch layer rental \$100
- Fotal \$567 or \$.07 per foot of row



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- Remove and destroy diseased plant material
- Disinfect garden tools and shears
- After harvest, plow weeds and other debris into soil. This removes overwintering sites for a lot of insect pests and plant pathogens

Pathogen	Disease	Overwintering sites
Colletotrichum coccodes	Anthracnose	Infected plant debris, in soil, and seeds
Botrytis cinerea	Botrytis gray mold	Infected plant debris
Alternaria solani	Early blight	Infected plant debris
<i>-ulvia fulva = Cladosporium fulvum</i>		Infected plant debris, in seeds, and soil
Septoria lycopersici	Septoria leaf spot	Infected plant debris

Cucumber Beetles



The pathogen that causes bacterial wilt of cantaloupe, cucumber, and other cucurbits overwinters only inside the beetles' gut.

Field-grown Strawberries

- Sanitation of plantings by removal of infected/infested plant material including overripe fruit, leaf litter, and plants to eradicate pathogen and pest populations"
- Destruction of this material is accomplished through burning, chipping, burying, and composting"

2011 **Production Guide for Organic Strawberries** NYS IPM Publication No. 226 v2 **Cornell University** Cooperative Extension Integrated Pest Management

SANITATION: AN IMPORTANT COMPONENT OF DISEASE MANAGEMENT IN HIGH TUNNELS

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Diligent sanitation in high tunnels, as in greenhouses, is a critical step in managing diseases caused by pathogens able to survive in soil, in plant debris, on objects like stakes, or in weeds.

 Keep high tunnels free of weeds year-round. Control weeds around high tunnels. Many weeds are hosts for pathogens and/or can harbor insect vectors of pathogens.

Clean any benches, tables, floor coverings, hoses, etc before planting. Also any trays or pots being re-used, as well as trellising stakes and tools.

Sweep to remove loose dirt and debris. Organic matter decreases disinfectant activity.

Power-wash to remove dirt and debris stuck on surfaces.

Use a greenhouse cleaner on the structure. Let stand a few minutes before rinsing.

http://glvwg.ag.ohio-state.edu/documents/HighTunnelSanitation-Diseases-2010.pdf