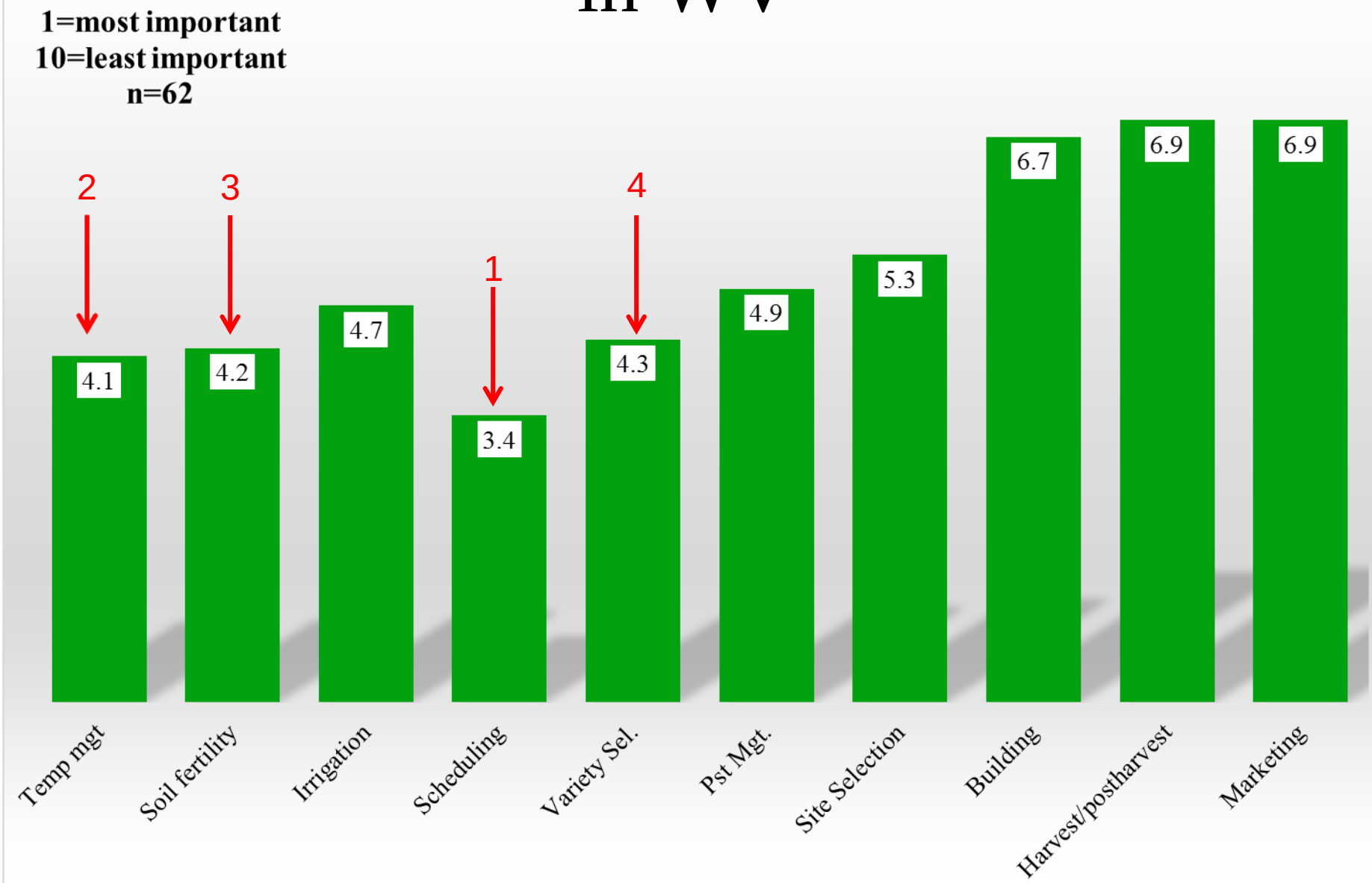
Successfully Using Cover Crops within High Tunnels in West Virginia

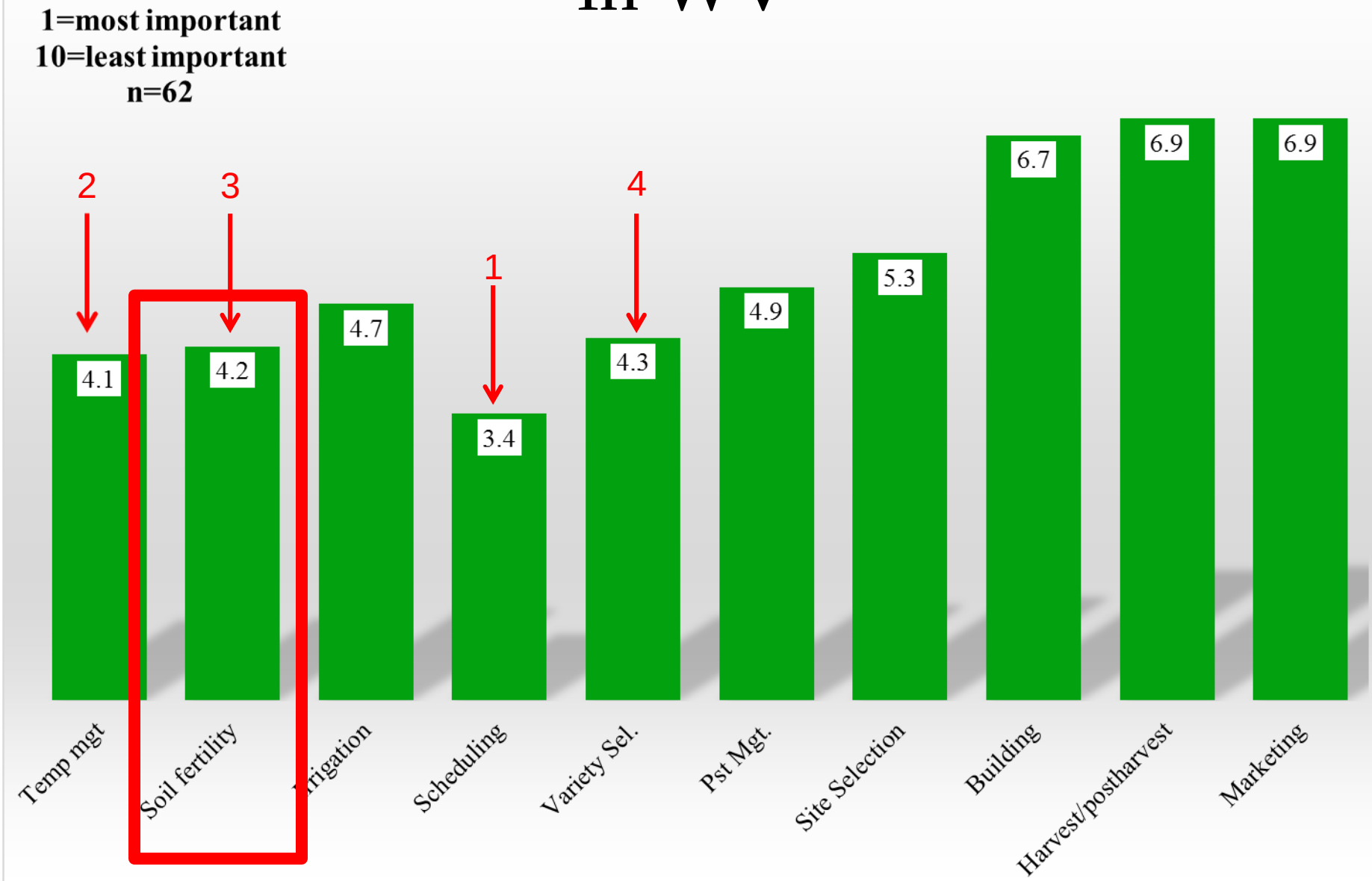
West Virginia University
EXTENSION SERVICE

- **800 USDA-NRCS-cost share high tunnels in West Virginia.**
- **150 independently-funded high tunnels in West Virginia.**
- **Total of ≈1000 high tunnels by 2020.**

Important issues for new HT Growers in WV



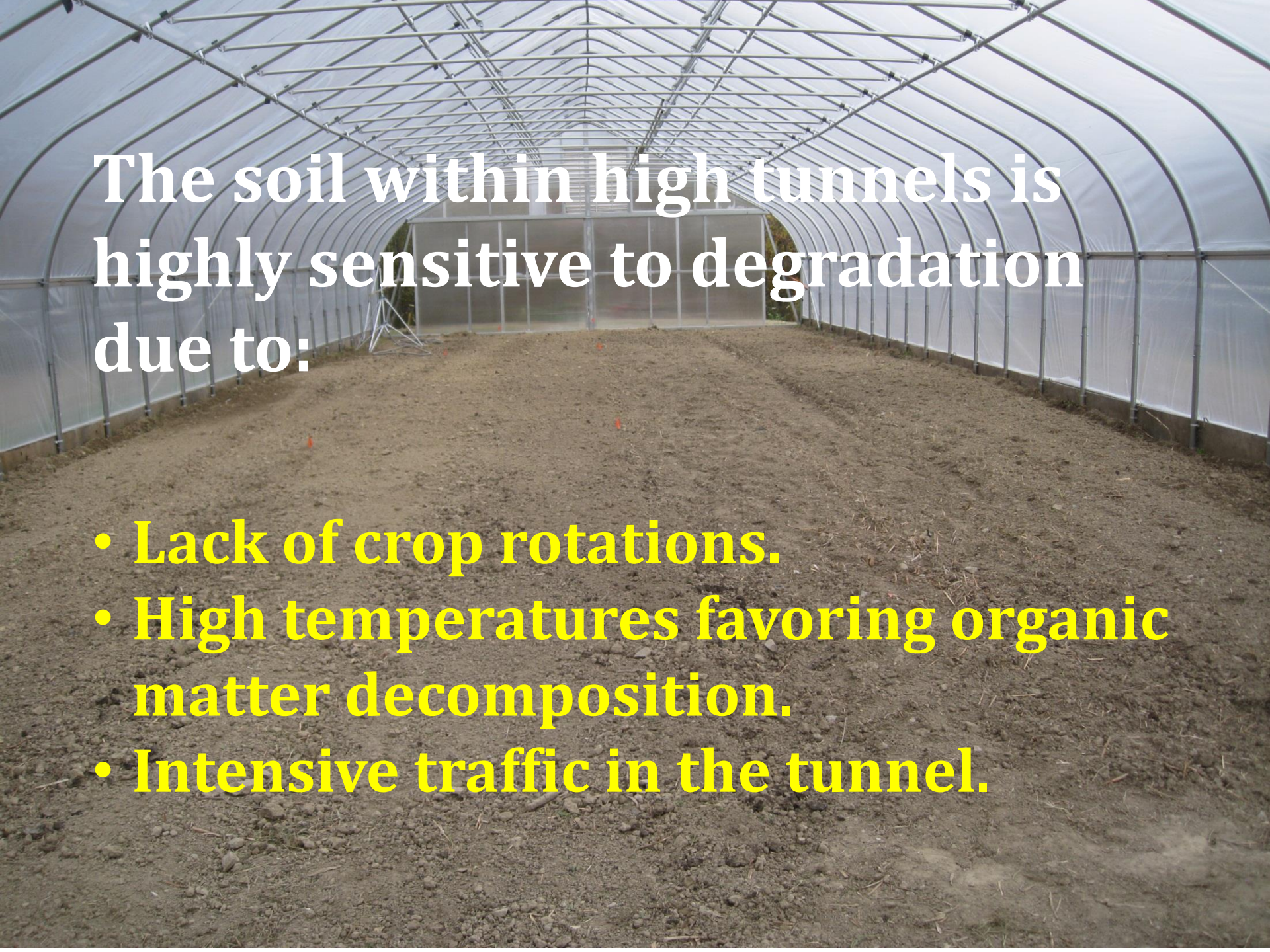
Important issues for new HT Growers in WV




Mountain Harvest Farm,
Morgantown, WV


Blue Mountain Organic Farm,
Hedgesville, WV


WVU Horticulture/Organic Farm,
Morgantown, WV



The soil within high tunnels is highly sensitive to degradation due to:

- **Lack of crop rotations.**
- **High temperatures favoring organic matter decomposition.**
- **Intensive traffic in the tunnel.**


Intensive tillage of the soil is harmful.


Winter high tunnel crops have a developing market.
Shafer Heritage Farms, Bruceton Mills, WV

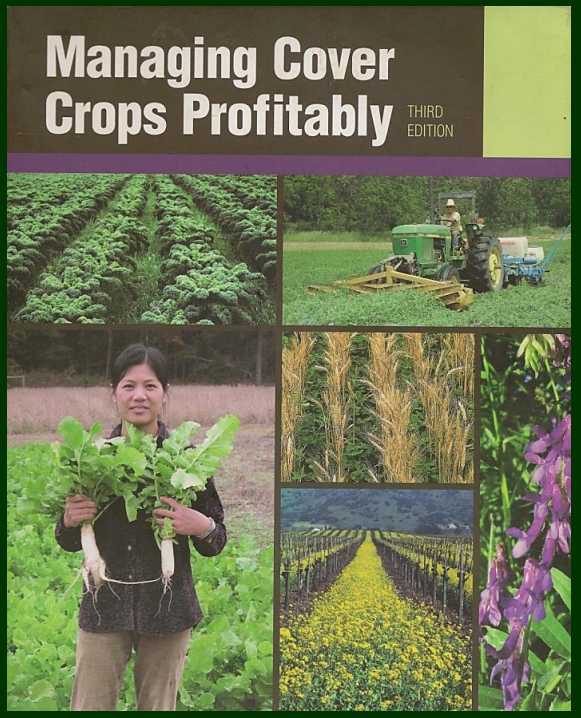

NORTHEAST
SARE
Sustainable Agriculture
Research & Education

Evaluating Cover Crops for High Tunnel & Field Production


No-till Cabbage


WVU Horticulture Farm,
Morgantown, WV

Cover Crops:



- Improve long-term soil health
- Provide nutrients
- Increase organic matter
- Reduce nutrient leaching
- Reduce weed populations
- Increase populations of beneficial insects

Common Organic Fertilizers

Blood Meal (12-0-0)
Alfalfa Meal (3-1-2)
Feather Meal (13-0-0)
Chilean Nitrate (15-0-2)

Alfalfa Meal
3-1-2


Compost
Manure-based compost has 10-15 lbs. of Nitrogen/ton

WestVirginiaUniversity.
SOIL TESTING LABORATORY

A collaboration between the
WVU Davis College - Plant and Soil Sciences and the
WVU Extension Service - Agriculture and Natural Resources

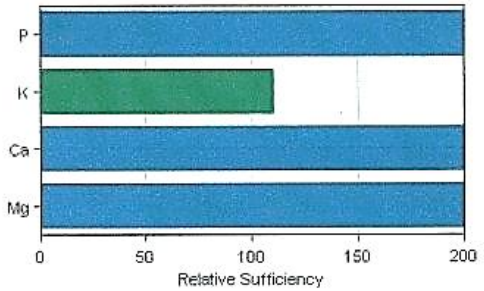
CHUCK TALBOTT
12093 WINFIELD RD.
WINFIELD, WV-25213
Customer ID: HOMETOWN GBL HT
Date Sampled: 11/15/2018
Date Received: 1/18/2019
Area Sampled: 384 sq ft
Tillage Method: Conventional

County: Putnam County
Email: CHUCK.TALBOTT@MAIL.WVU.EDU,
Phone: 304-586-217
LAB ID: 19-0110
Date of report: 2/04/2019
Previous Management: GARDEN
Predominant Soil Series: Unknown
Soil Texture: Manufactured

LAB TEST RESULTS

Soil pH: 6.0 **Soil Organic Matter:** N/A **EC (dS/m):** N/A

Nutrients	Values	Rating
P (ppm)	100	Excess
K (ppm)	100	Optimum -
Ca (ppm)	2600	Excess
Mg (ppm)	500	Excess
Psat (%)	38	High



Fertilizer recommendation for H01: Home Vegetable Garden having an expected yield of N/A

	A) Crop Sufficiency Rate	B) Build to Optimum Rate
N (Oz./100 sq. ft.)	0-7	0-7
P_2O_5 (Oz./100 sq. ft.)	0	0
K_2O (Oz./100 sq. ft.)	2	2
Ag Lime	9.0 lbs./100 sq. ft. 100% ENV Limestone	

Recommendation Notes are provided on the following page.

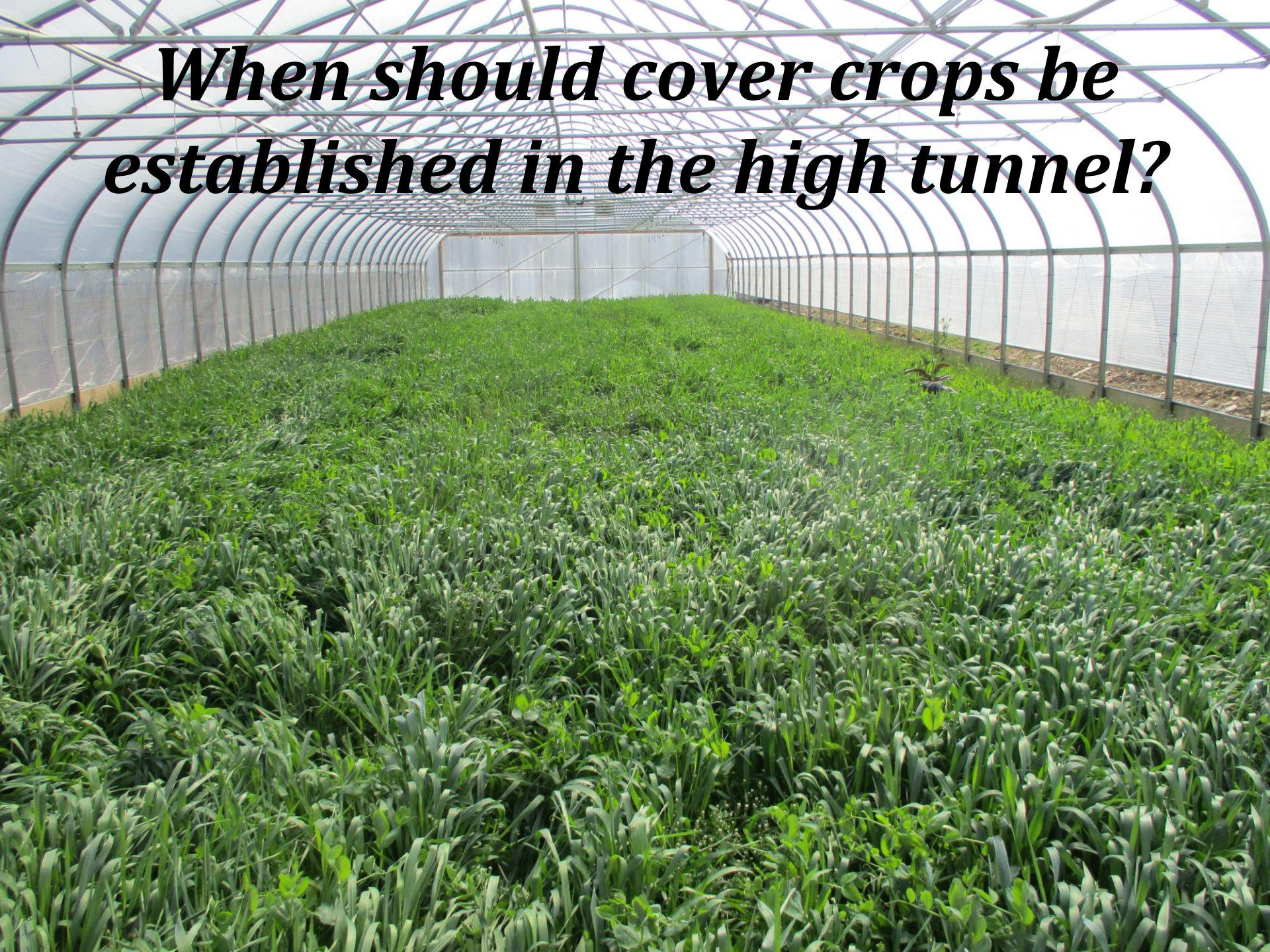
V. High P

Nutrient Management within High Tunnels

- Prevent loading of P and K
- Prevent buildup of salts
- Prevent compaction


SOUTHERN STATES
Fertilizer
46-0-0
UREA
50 lb.
22.7 kg
net weight
Fertilizer


Cover crops are an integral part of any nutrient management plan.


When should cover crops be established in the high tunnel?

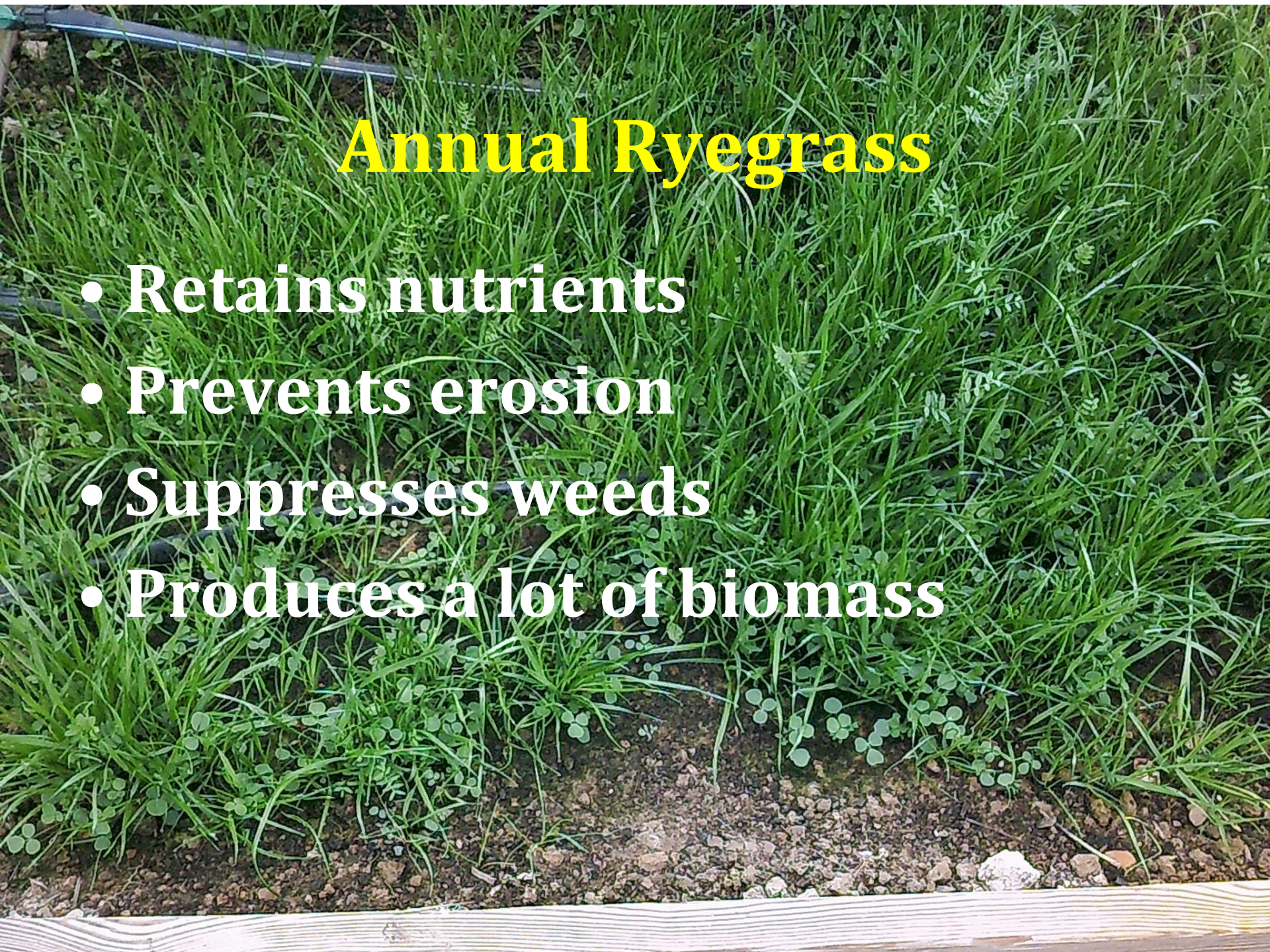
Planting window for high tunnel cover crops:

- April-September- Spring/Summer cover crops
- October-November-Winter cover crops


November-Seeded
October-Seeded
Elle Cronlund,
Philippi, WV

Cover crop species to plant: Winter

- Annual Ryegrass
- Winter Wheat
- Winter Rye
- Triticale
- Crimson Clover
- Red Clover
- Winter Pea
- Hairy Vetch


Annual Ryegrass
• Retains nutrients
• Prevents erosion
• Suppresses weeds
• Produces a lot of biomass


Floating row covers (1 oz./yd²) used during winter .


Winter Rye, Winter Wheat,
Triticale, Barley
• Very cold tolerant
• Retains nutrients
• Increases organic matter
• Prevents erosion
• Suppresses weeds
• Produces a lot of biomass

Winter (field) Pea

- Fast growing
- Cold tolerant
- Fixes nitrogen
- Produces a lot of biomass

Hairy Vetch

- Good when mixed with a grain
- Improves soil tilth
- Fixes nitrogen
- Scavenges Phosphorus
- Produces a lot of biomass

Crimson Clover

- Fixes nitrogen
- Produces abundant biomass
- Beneficial habitat and nectar source


Cover Crop Mixtures
Rye + Crimson Clover
+Field Pea


Winter Pea
Winter Rye
Crimson Clover
Tillage Radish

Summer Cover Crop Species

- Buckwheat
- Sudan Grass
- Cowpea
- Sesbania
- Sun Hemp
- White Dutch Clover


Sun hemp
• Fixes nitrogen
• Suppresses weeds
• Suppresses nematodes

2 systems for cover crops in high tunnels:

- **Green manure:** The cover crop is turned into the soil to increase nutrients, “fumigate”, and increase organic matter.

- **No-till:** The cover crop residue remains on the soil surface and the crop is planted in the mulch.

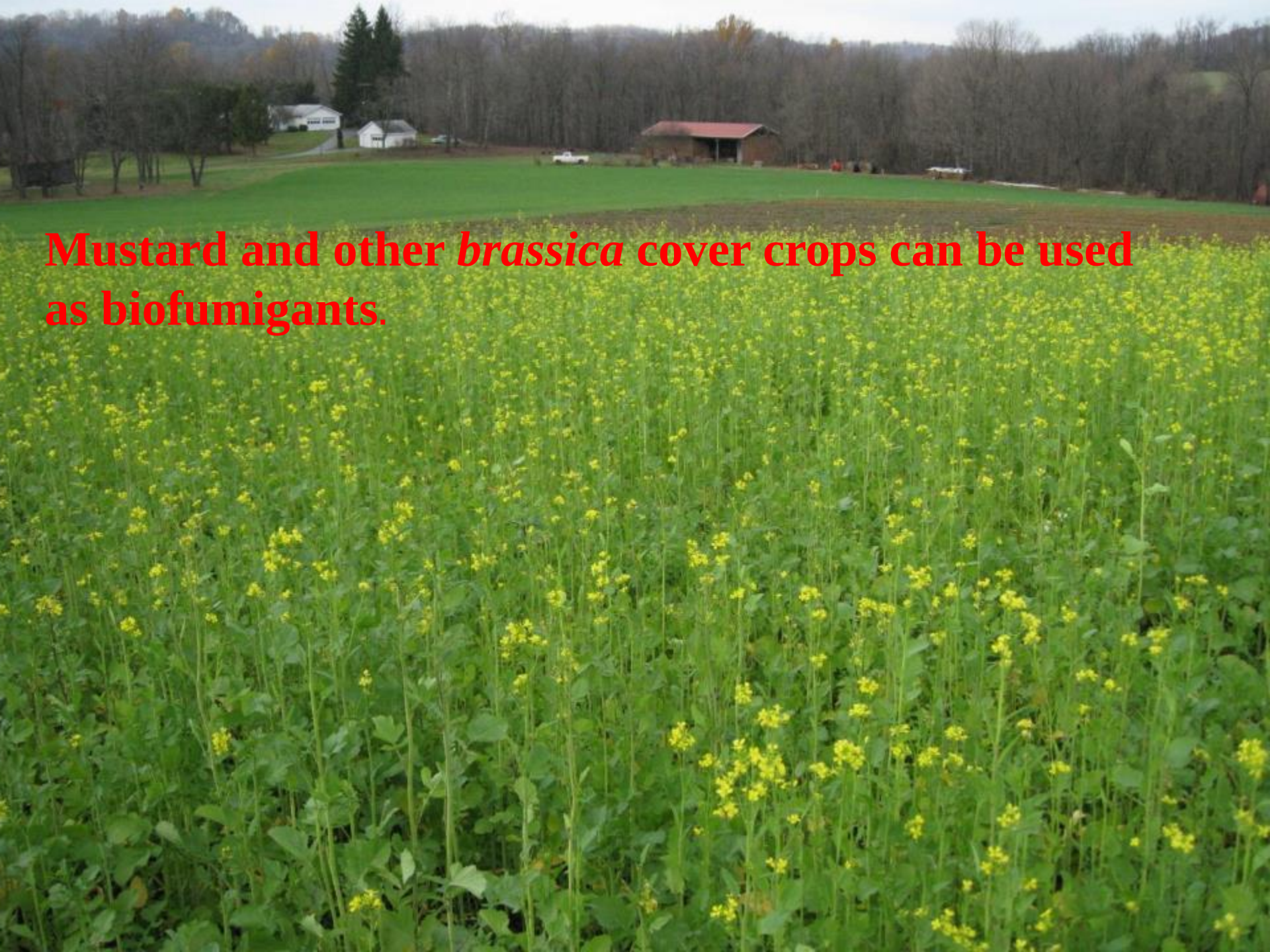

Conservation Tillage Or No-till
Mulch residue

High Tunnel Green Manure Cover Crops:

Annual Ryegrass
Mustards
Red Clover
White Clover
Sweet Clover
Berseem Clover

Hairy Vetch
Woolypod Vetch


Mustard (*Brassica juncea*)


Mustard and other *brassica* cover crops can be used as biofumigants.


Tilled in the soil


Hidden
River
Farm


WVU Horticulture Farm,
Morganown, WV


No-till production steps:

No-till production steps:

Year 1:

Prepare the seedbed for cover crop planting.

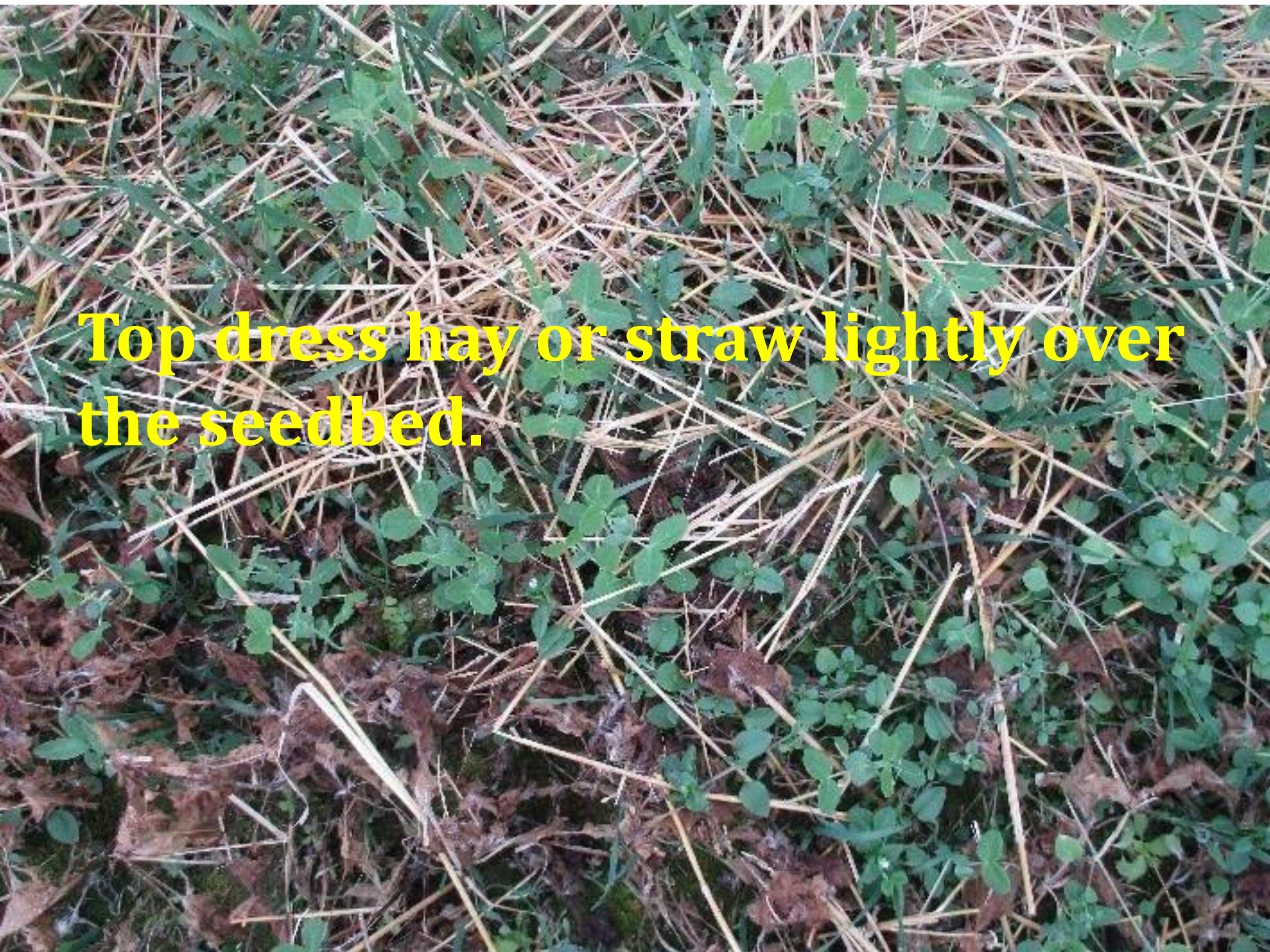

Cover crops are broadcast-seeded.


January


March

March


Establishing the cover crop without significant tillage

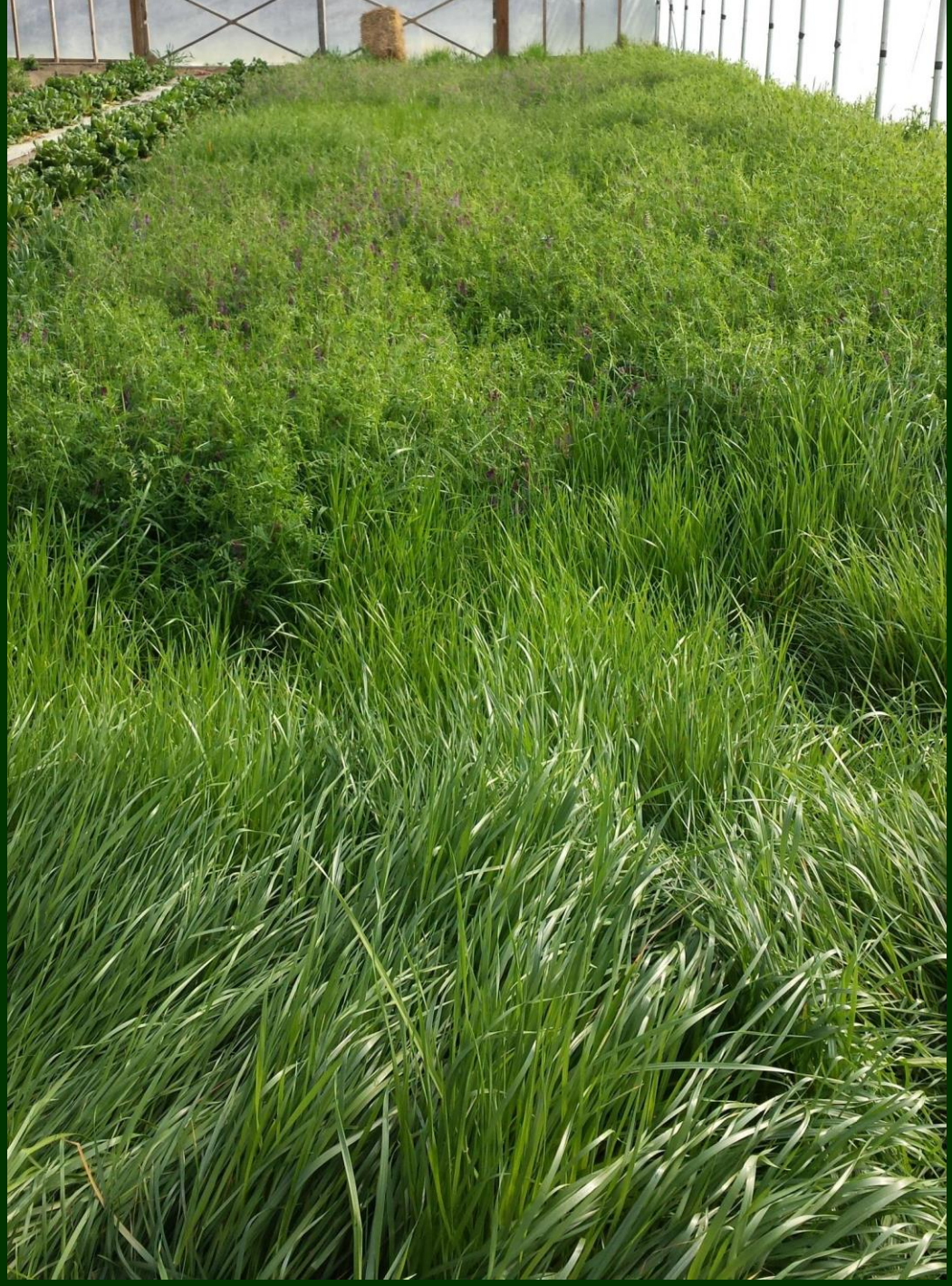

Top dress hay or straw lightly over the seedbed.


Rye (early-flowering stage)

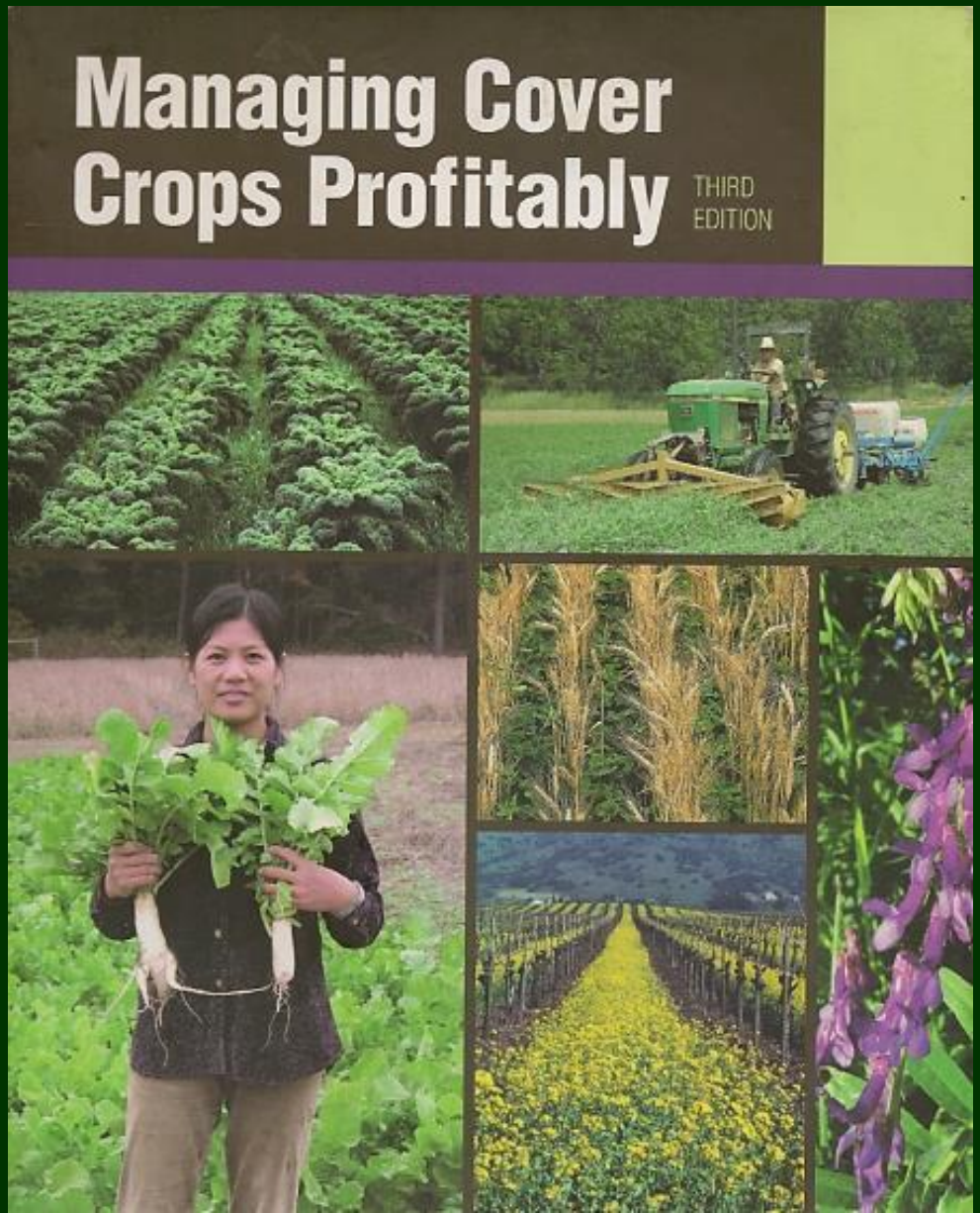

Cover crop is mowed in early-mid-March


Silage tarp

No-till by rolling/crimping




A useful reference:




Questions?