



COVERCROP

VEGETABLE PRODUCTION TRAINING

Session 2

Cover Crop Selection

UofA DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Outline

- Cover crop groups
 - *Legume*
 - *Grass*
 - *Brassicas*
- Cover crop selection
- Winter/summer
- Seeding rate selection
- Planting date selection



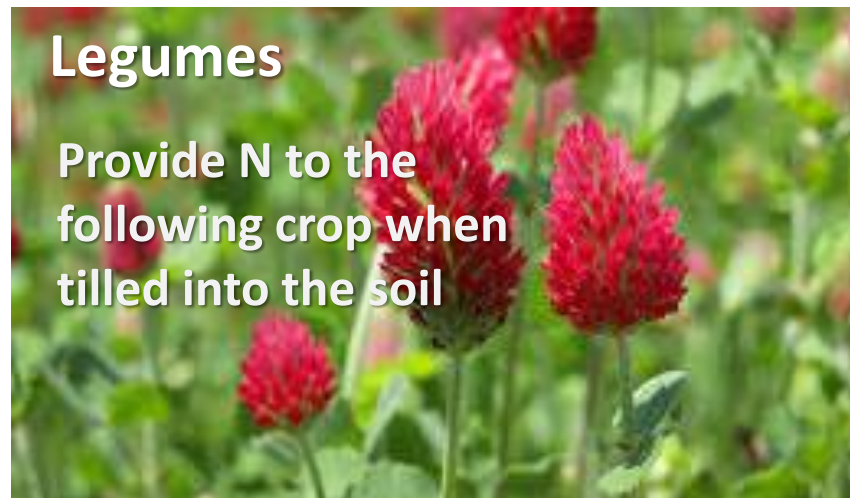
Cover Crops

Instead of harvesting as a cash crop, cover crops are grown for the benefits they have on the soil or on subsequent crops



Grasses

Produce Biomass!
Increase Soil
Organic Matter



Legumes

Provide N to the
following crop when
tilled into the soil



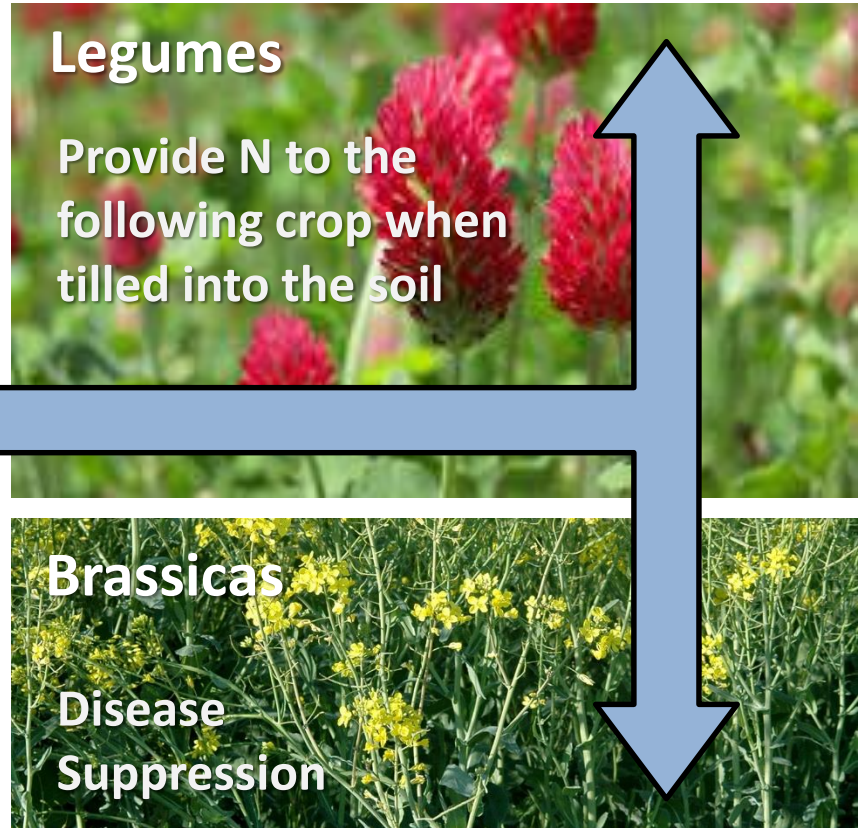
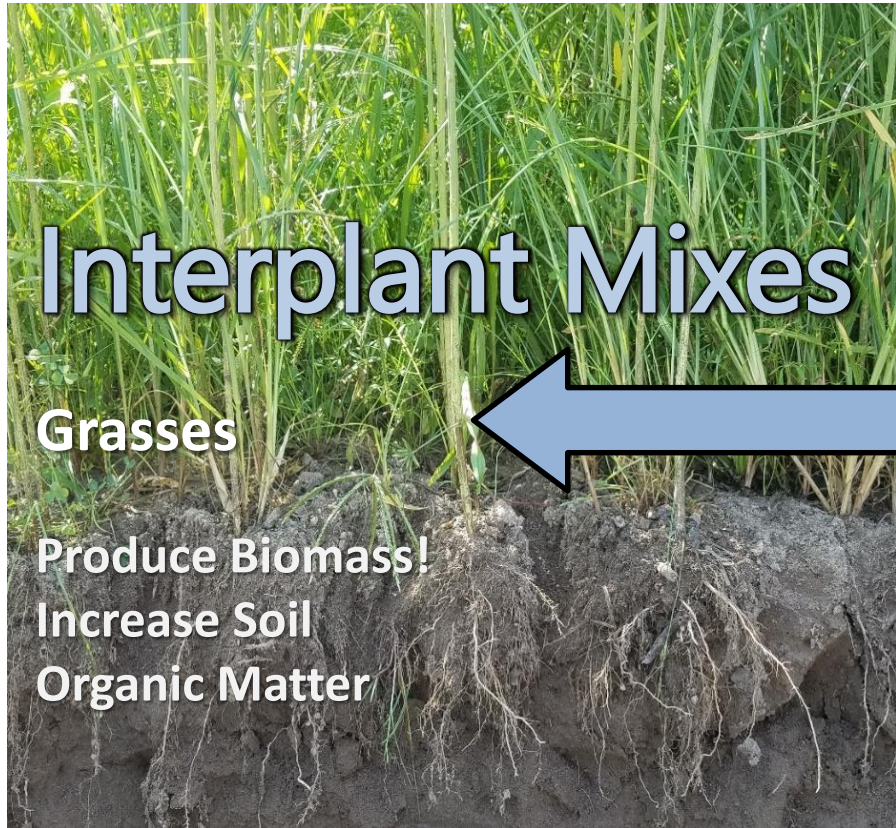
Brassicas

Disease
Suppression



Cover Crops

Instead of harvesting as a cash crop, cover crops are grown for the benefits they have on the soil or on subsequent crops



Cover Crop Selection



DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

COVERCROP
VEGETABLE PRODUCTION TRAINING



Cover Crop Goal: Weed control

- Grasses produce the most **biomass** and create the most effective weed mat
 - Increase seeding rates and plant on-time to ensure a good cover crop stand
 - Long-vined legume varieties are preferred over short-vined for weed control



Cover Crop Goal: Nitrogen

- Legumes fix nitrogen
 - Termination timing and crop stand influence nitrogen credits.
 - *Consider seed costs and potential lbs. N/ acre fixed.*
- Legumes tend to be poor competitors against weeds



Cover Crop Goal: Pest Control

- Nematodes
 - Pearl Millet *Poor or non-host to root knot and lesion nematodes*
 - Cereal Rye *Poor or Non-host to root knot, lesion and dagger nematodes*
 - Cowpea 'Iron Clay' *Poor or Non-host to root knot nematode*
- Diseases
 - Mustard and brassica cover crops have *glucosinolate* compounds in their leaves. After mowing and soil incorporation these compounds breakdown and release *isothiocyanates* (biological fumigant)



Cover Crop Goal: Easing Soil Compaction

- Oilseed or daikon radish types
 - *Ex. GroundHog radish™, Nitro radish, Sodbuster, and Bio-till radish*
- May winter kill
- Soil texture will impact rooting depth
- Good at taking up and rapidly releasing nutrients as biomass decomposes



Cover Crop Chart

GROWTH CYCLE	PLANT ARCHITECTURE	RELATIVE WATER USE
A = Annual	Y = Upright	● = Low
B = Biennial	* = Upright-Spreading	●● = Medium
P = Perennial	≡ = Prostrate	●●● = High

-----COOL-----

-----WARM-----

--GRASS--

-----BROADLEAF-----

--GRASS--

Source: <https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/>

--GRASS--			-----BROADLEAF-----						--GRASS--	
			-----LEGUME-----							
A ANNUAL FESCUE										A BROWNTOP MILLET
A BARLEY									A AMARANTH	A FOXTAIL MILLET
A OAT	A/B CAMELINA	A/P MUSTARD	A BALANSA CLOVER	A CHICKPEA	A/P MEDIC	A COWPEA	A CLUSTER BEAN	A BUCKWHEAT	A PEARL MILLET	
A SPELT	A PHACELIA	A/B CANOLA	A BERSEEM CLOVER	A PEA	A LUPIN	A/P LABLAB	A/P JACK BEAN	A QUINOA	A PROSO MILLET	
A WHEAT	A FLAX	A RADISH	A CRIMSON CLOVER	A LENTIL	A FABA BEAN	A/P FENUGREEK	A VELVET BEAN	P CHICORY	A GRAIN SORGHUM	
A CEREAL RYE	A KALE	B TURNIP	B/P RED CLOVER	A/P LESPEDEZA	A/B SWEET CLOVER	A/P PIGEONPEA	A MUNG BEAN	A CUCURBITA	A SUDAN GRASS	
A TRITICALE	A SPINACH	B BEET	P WHITE CLOVER	P BIRDSFOOT TREFOIL	P ALFALFA	A PARTRIDGE PEA	A SOYBEAN	A SAFFLOWER	A TEFF	
P SALINE TOLERANT	A/B CHARD	A/B CARROT	P KURA CLOVER	A/B VETCH	P SAINFOIN	A SUNNHEMP	A/P PEANUT	A SUNFLOWER	A CORN	

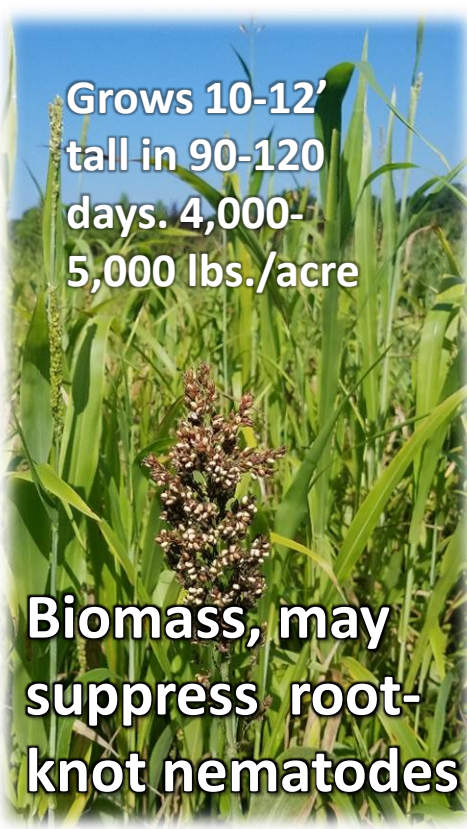
Common Summer Cover Crops



Grows 4-6' tall
in 90-120 days.

Biomass

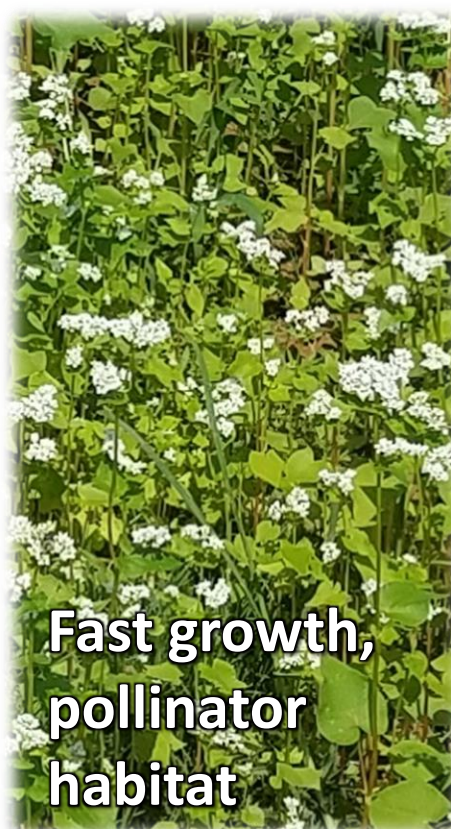
Pearl Millet



Grows 10-12'
tall in 90-120
days. 4,000-
5,000 lbs./acre

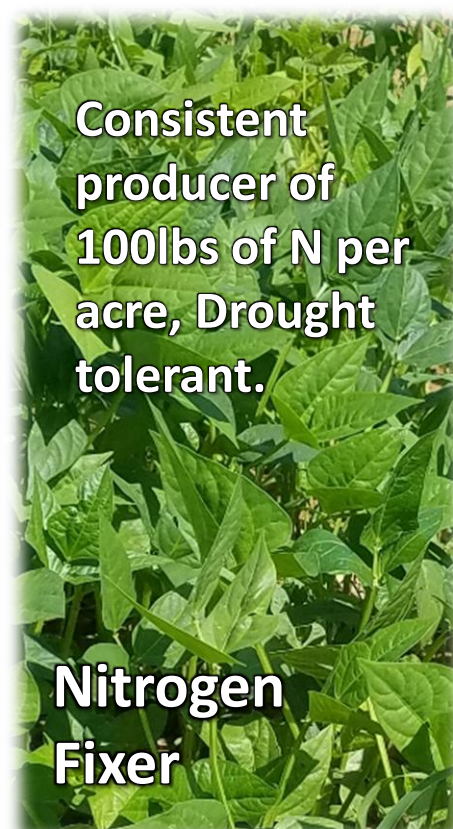
**Biomass, may
suppress root-
knot nematodes**

**Sorghum
Sudangrass**



**Fast growth,
pollinator
habitat**

Buckwheat



**Consistent
producer of
100lbs of N per
acre, Drought
tolerant.**

**Nitrogen
Fixer**

Cowpea

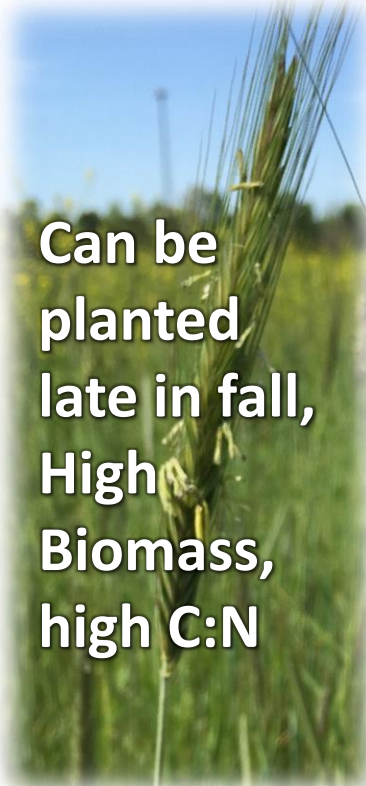


Common Winter Cover Crops



Fine root system, enhances nutrient cycling, good weed suppression

Winter wheat



Can be planted late in fall, High Biomass, high C:N

Cereal Rye



Reliable establishment, good amount of N for seed costs

Austrian Pea



Plant early to establish, May winter kill

Mustard



Cover Crop Mixes

Cover crop mixes mimic plant diversity found in nature and can maximize the benefits of using cover crops

- Individual species in a mix should compliment one another
 - Vines that can use grasses as a ladder
 - Avoid combining species with dense canopies with something low growing
 - Combine a slow growing grass species with a cover known to winter kill
 - Combine a high C:N grass with a legume
 - Chose covers that have similar maturation timelines
- A good mixture has 3-5 species.
- Be aware of differences in seeding depth requirements



Black oats, crimson clover and mustard cover crop



Seeding Rates



Refer to local Extension publication and university research for the production system

Seeding rate will affect stand and characteristics of the crop

(i.e. High grass seeding rate results in thinner stems, lower rates result in thicker stems)

• Examples:

Standard rate per acre x % of standard rate = Mix rate

• Austrian pea & Cereal Rye

Aust. Peas: 50 lbs. x 0.85 = 42.5 lbs. ;

Cereal Rye: 120 lbs. x 0.50 = 60 lbs.

• Triticale, Cereal Rye & Crimson Clover

Triticale and cereal rye are redundant (divide by 2)

Triticale, 120 lbs. x 0.50 = 60 / 2 = 30 lbs.

Cereal Rye 120 lbs. x 0.50 = 60 / 2 = 30 lbs.

Crim. Clover 12lbs. x 0.90 = 10.8 lbs.

Seeding Rates for Mixes:

- Change seeding rates based on species with competitive growth rates and desired crop mix.
 - **Grasses reduce rate 75-50%**
 - **Legumes reduce rate 25%**
 - **Brassicas reduce rate 25%**
- Functional redundancy
 - *divide each seeding rate by number of species that are redundant*



Take home message

- Cover crops selection is goal, cropping system and farm specific
- Cover crop mixes are desirable because they mimic nature and combine the benefits of multiple types of cover crops
 - *Mixes should be a goal, but not necessarily a starting point*



Authors and Acknowledgements

This presentation was prepared by Drs. Amanda McWhirt and Jackie Lee with support from a **Southern SARE Professional Development Program Grant (RD309-137 / S001419 – ES17-135)** and are provided by the USDA-SARE program to educators and producers for outreach and educational purposes. These presentations were further reviewed by Dr. Trent Roberts and Dr. Bill Robertson.



Resources and Sources

- **USDA. The Cover Crop Chart (v. 3.0).** <https://www.ars.usda.gov/plains-area/mandand/ngprl/docs/cover-crop-chart/>
- **FSA2156. Understanding Cover Crops.** <https://www.uaex.edu/publications/pdf/FSA-2156.pdf>
- **Making the Most of Mixtures: Considerations for Winter Cover Crops in Temperate Climates** <https://articles.extension.org/pages/72973/making-the-most-of-mixtures:-considerations-for-winter-cover-crops-in-temperate-climates>
- **Clark, A., editor. 2012. *Managing Cover Crops Profitably, 3rd Edition*. Sustainable Agriculture Research and Education. Handbook Series Book 9.** <https://www.sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition/Text-Version/Printable-Version>

