

# Agronomic Aspects of Legume Forage Production

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# Goal in a Livestock/Forage Operation

- Uniform production of high quality forage year round so a constant stocking rate can be maintained
- Perennial forage species that do not require reseeding
- Have a grass/legume mixture that fixes enough N that no additional N would be needed
- The mixture would withstand close grazing or could be used for hay while maintaining the stand and quality
- Forage is both drought and cold tolerant
- Forage is used for grazing to minimize costs that occur from having hay equipment and storage facilities

There is a lot of low quality forage as a result of selecting grasses that are generally low in digestibility or by not timing cuttings or grazing to maintain high quality forage



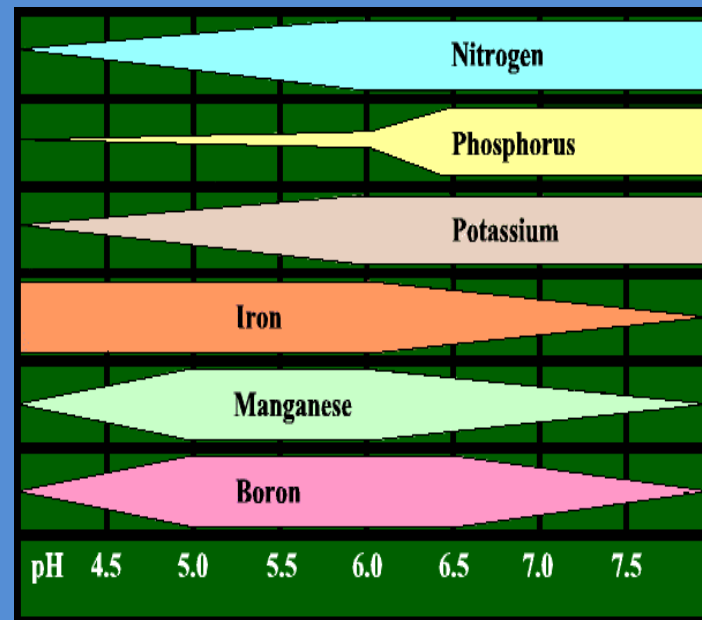
# Real World Forages

- Respond differently to grazing management in that heavy grazing may reduce stands and allow weed encroachment or result in dominance by one species over another
- Respond to weather conditions and especially frosts and droughts
- Different species have peak times of production that make stocking rate adjustments necessary
- Cost of establishing forages and especially legumes is high and cool season grasses may be of sufficient quality for many livestock operations

# Soil Testing and Fertility Needs

Soil fertility greatly effects yield

Unless soil fertility is severely limiting it has minimal effect on forage quality



## Current Mehlich-1 soil test interpretation used for agronomic crops

Element	Very low	Low	Med	High	Very high
	----- parts per million soil -----				
P	<10	10-15	16-30	31-60	>60
K	<20	20-35	36-60	61-125	>125
Mg		<15	15-30	>30	

From EDIS SL129 SS163

Remember ppm X's 2= lbs/A

Lime should be applied 5-6 months in advance of planting. However, it may be applied at any time it is needed.



<b>Crop Category</b>	<b>Crops Included</b>	<b>Target pH</b>
Bahiagrass	bahiagrass	5.5
Other improved perennial grasses	bermuda, star, rhodes, suerte, and digitgrass	5.5
	limpograss	5.0
Warm-season annual grasses	corn, sorghum, sorghum-sudans, and millets	6.0
Cool-season annual grasses	small grains and ryegrass	6.0
Warm-season legumes or legume-grass mixtures	perennial peanut, stylo, desmodiums, aeschynomene, alyceclover, hairy indigo, and other tropical legumes	6.0
Cool-season legumes or legume-grass mixtures	All true clovers (white, red, arrowleaf, crimson, subterranean), vetches, lupines, and sweet clover	6.0 – 7.0
Alfalfa	Alfalfa	7.0



# Forage Calendar

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



**Bermudagrass**



**Bahiagrass and S. Legumes**



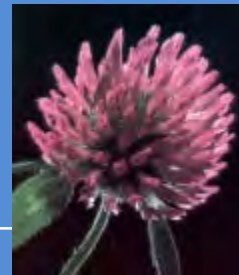
**Sorghum x Sudan**

**Pearl Millet and Crabgrass**



**Rye, Wheat, Triticale**

**Ryegrass, Pea, Clover**



**Oat**

**Vetch**

Cross-inoculation group	Inoculum type	Cross-inoculation group	Inoculum type
<b>Clover group</b>		<b>Lupine Group</b>	
Red clover	B	White lupine	H
White clover	B	Blue lupine	H
Ladino clover	B		
Ball clover	B	<b>Soybean Group</b>	
Alsike clover	B	Soybean	S
Crimson clover	R		
Berseem clover	R	<b>Bean Group</b>	
Persian clover	R	Garden bean	D
Strawberry clover	T	Kidney bean	D
Subterranean clover	WR	Pinto bean	D
Arrowleaf clover	O	Wax bean	D
		Scarlet runner bean	Phaseolus Spec.
<b>Alfalfa Group</b>		<b>Cowpea Group</b>	
Alfalfa	A	Aeschynomene	EL
Sweet clover	A	Alyceclover	EL
Black medic	N	Carpon desmodium	EL
Bur clover	N	Cowpea	EL
		Hairy indigo	EL
<b>Vetch and Pea Group</b>		Kudzu	EL
Hairy vetch	C	Lespedeza	EL
Big flower vetch	C	Partridge pea	EL
Field pea	C	Pigeon pea	EL
Austrian winter pea	C	Peanut	EL
Rough pea	C	Perennial peanut	EL
Common vetch	Vicia Spec.	Savanna stylo	EL
		Velvetbean	EL
		Vigna	EL

From EDIS SS AGR56/AG152



# Cool Season Legumes



Seed-Propagated Crops <sup>1</sup>	Planting Dates <sup>2</sup>	Seeding Rates (lb/A Broadcast)	Seeding Depth (inch)	Grazing height (in.)		Rest Period
				Begin	End	
Alfalfa	Oct. 1 - Nov. 15	12 - 20	1/4 - 1/2	10-16	3-4	Hay 35-40 Grazing 15-30
Clover, Arrowleaf	Oct. 1 - Nov. 15	8 - 10	0 - 1/2	8-10	3-5	10-20
Clover, Berseem	Oct. 1 - Nov. 15	16 - 20	1/4 - 1/2	8-10	3-5	10-20
Clover, Crimson	Oct. 1 - Nov. 15	20 - 26	1/4 - 1/2	8-10	3-5	10-20
Clover, Red	Oct. 1 - Nov. 15	6 - 12	1/4 - 1/2	8-10	3-5	10-20
Clover, Subterranean	Oct. 1 - Nov. 15	18 - 22	1/4 - 1/2	6-8	1-3	7-15
Clover, White	Oct. 1 - Nov. 15	3 - 4	0 - 1/4	6-8	1-3	7-15

# Ball, Berseem, Hop, and Rose clovers and Vetch, Winter Pea and Medic low production, broadly adapted

Berseem



Hop



Rose



Vetch



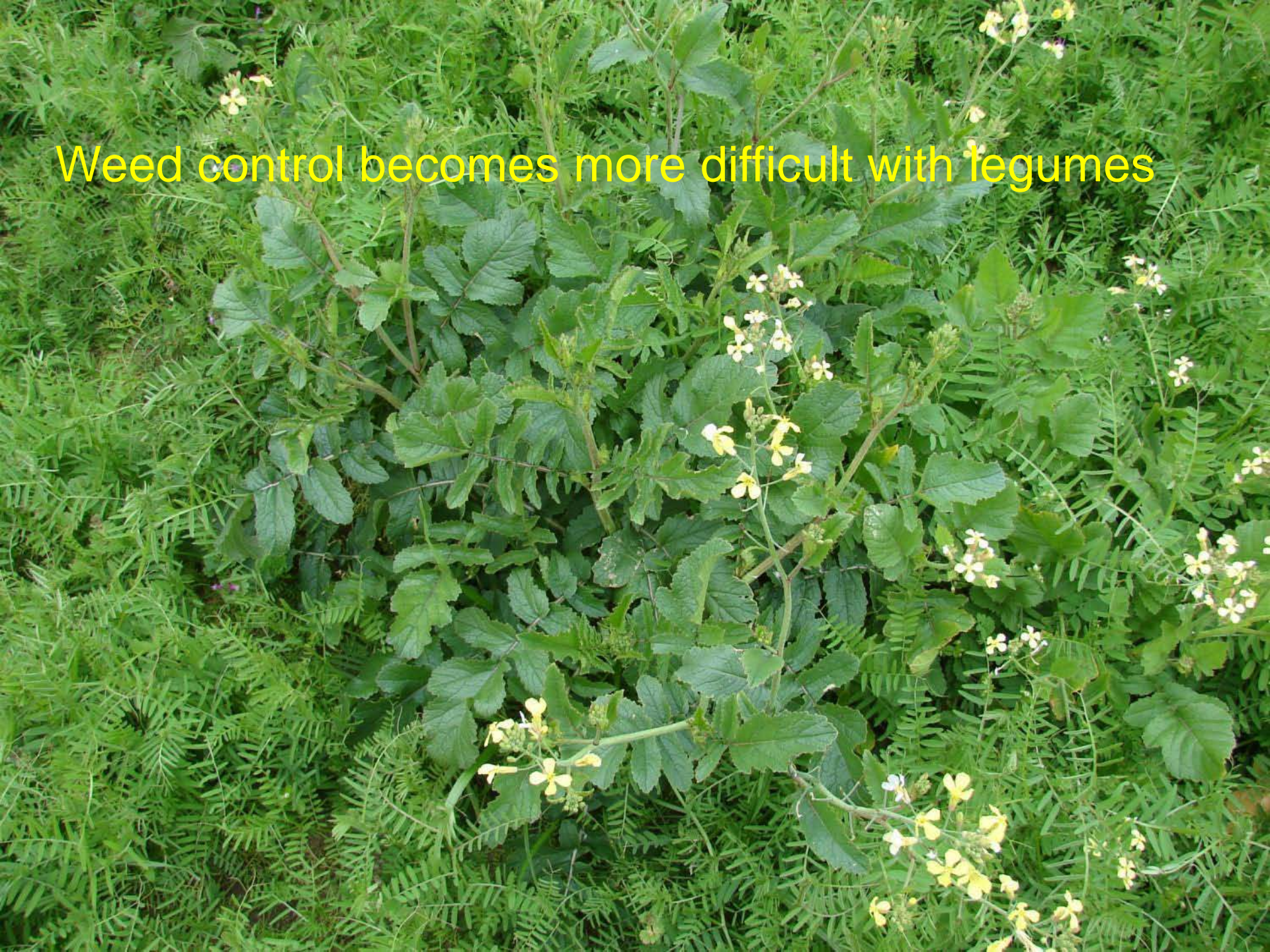
# Cool-Season Legumes:

- **White clover**-does well in wetter years or soils and may grow year round in wetter sites that are high in pH
- **Crimson clover**-grows well on sandy soils and is the earliest of the legumes in growth and maturity
- **Red clover**-lasts longer into the spring and early summer and can extend high quality grazing
- **Vetch**-is intermediate in growth and is a high quality forage in mixtures with grasses
- **Alfalfa**-is a perennial legume that is planted at the same time as other cool season legumes, it is high quality and can be used successfully with intensive management
- **Arrowleaf clover**-has been widely used and does well in heavier soils of Florida
- **Sweet clover**-widely grown north of here on high pH soils

# Cool Season Legume Production

- Planted in the fall in the Oct-Nov period alone or with cool season grasses
- Most production of cool season legumes occurs from mid February until late May.
- Peak production for cool season legumes occurs from April to May depending on the legume but is a good time since warm season grasses or legumes production is low and cool season grass production is slowing down
- Nitrogen produced by the cool season legume will be available as a flush of N for the first 30 days after the legume dies or is killed for the next crop

Weed control becomes more difficult with legumes







# Warm Season Grasses and Legumes



## Warm-Season Legumes:

- **Perennial peanut**-slow and expensive to establish and is a high quality perennial that takes less management after establishment (intensive management)
- **Soybean**-annual high quality legume crop that can be planted from March until August after winter crops or after a corn or forage sorghum crop or vegetables
- **Annual peanut**-expensive to plant and manage with varieties being developed that require less input. Most of the peanut hay is made after peanut harvest which is a lower quality than if cut prior to digging
- **Cow pea**-is easy to grow and is the most heat tolerant legume used in the U.S. and can be grown on sandier soils than most legumes. It is a good N fixer and can be used ahead of vegetables or planted almost any time after the last frost until about 9 weeks before the first fall frost. Volunteer plants can be a weed in soybean or peanut fields since it tolerates similar herbicides
- **Pigeon pea**-seed availability can be a problem and it has a very distinct main stem that is not very digestible. Good browsing crop for cattle.

# Other Warm Season Legumes

- **Aeschynomene**
- **Alycelover**
- **Capon Desmodium**
- **Hairy indigo**
- **Stylo**

These are generally seeded into grasses and may do better with prepared seedbeds or short grazed grass stands

# Summer annual legumes for use in Florida. From EDIS SS AGR66/AA217

<b>Crop</b>	<b>Yield - Biomass<sup>1</sup> (lbs/acre)</b>	<b>Yield - N<sup>1</sup> (lbs/acre)</b>	<b>Seeding Rate(lbs/acre)</b>	<b>Seeding Date</b>
<b>ANNUAL SUMMER COVER CROPS</b>				
<b><u>Leguminous Crops</u></b>				
Aeschynomene	2000 - 4000	50-100	6-8 <sup>2</sup>	Mar. 1 - June 30
Alyce clover	1500-3500	20-65	15-20	Mar. 1 - June 30
Cowpeas	2000 - 4500	50-90	6-8 <sup>2</sup>	Mar. 1 - June 30
Hairy Indigo	4500-9000	80-150	6 - 10	Mar. 1 - July 15
Sesbania	2000-8000	35-80	25-30	Mar. 1 - July 15
Sunhemp	4500-10,000	90-180	30 - 50	Mar. 1 - June 30
Velvetbeans	2200 - 4000	50-85	30-50	Mar. 1 - June 30

Invasive warm season legume




Legumes can be an important part of any rotation in increasing forage quality as well as supplying N for the following crops. Here are 4 crops that require high rates of N that a forage legume could aid in helping reduce N applications.



Sod-based Rotation- Our goal has been to rotate perennial grass through row crop land and winter legumes can play a part in supplying N for the row crops





Annual peanut seed is expensive and the crop is expensive to maintain if disease resistant varieties are not chosen. There is very little resistance to leaf spot



There is currently no way to harvest hay and get maximum peanut yields too. Peanut inverting is hindered as well as drying so there are more nut losses without tops.



Hay after peanut harvest is often used for cattle feed but is lower quality than hay cut before harvest



Winter legumes can be planted along with small grain for grazing after peanut harvest and forage quality will be higher as well as supplying some N for the following corn or cotton crop. Small grain can take advantage of N released from peanut vines



Soybeans can easily be strip till planted or no till drilled into old crop residue or winter grazing and is one of the cheapest and easiest crops to grow



# **Forage Soybean Tyrone and Hinson Long-Juvenile**



Soybeans require little insecticide or other pesticide but should have a good rotation for nematodes and make a good rotation with corn or cotton but not peanut. Hay should be cut in September for better weather and may need to use later maturity soybeans



# Effect of harvest date on soybean forage quality and yield

Days of age	Growth stage	Dry matter yield		Crude protein		Fat	NDF	IVDOM*	
		%DM	lb/acre	%DM	lb/A	%DM	%DM	%DM	lb/A
75	50% bloom	24	3664	17.8	64/	2.1	54.5	59.0	2162
82	75% bloom	27	4000	17.0	675	2.2	53.9	58.2	2328
89	95% bloom	27	4501	16.7	749	2.4	56.7	59.8	2692
96	Pods .5 full	26	5216	18.4	960	2.9	50.8	60.3	3145
103	Pods .66 full	26	5061	19.4	982	3.7	50.2	61.4	3107
110	Pods .75 full	26	5520	20.8	1147	5.4	48.9	60.2	3323
117	Pods .90 full	27	7105	20.9	1483	6.2	46.6	60.8	4320
124	30% leaf drop	29	6129	21.3	1307	7.4	43.0	61.0	3738

Less stems at this stage but less yield and soybean quality does not decrease as many forages do with age





If going to the expense of putting up hay, it should be high quality.  
It is too costly to put up low quality hay.



Perennial peanut planted with sprigs so will be out of production for a year or so



Planting perennial peanut. Peanut does not get into full production until the second year and several herbicide applications will be needed the first year to control weeds.



Yields of 2-5 tons of high quality hay can be made after establishment depending on soil type and fertility



Have to be timely to put up high quality forage



When buying hay make sure it is weed free



“We are ready to be fed and it had better be good”

Questions or Comments?

