Soil Health Management Systems for Tobacco Production

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U.S. Tobacco Production Acres

1895	1,000,000
1910	1,500,000
1919-1946	2,000,000
1959-1976	1,000,000
1997	840,000
2017	320,000

Kentucky Tobacco Production Acres

National	2017	320,000
	1997	840,000
Kentucky	2017	80,000
	1997	250,000

Tobacco Budgets 2017

Burley Tobacco

(Cigarette Tobacco)

- Average lbs/ac. = **2300 lbs.**
- Gross Sales = 2300 x $1.90 = **$4370.00**
- Production Cost/ac. = **$3226.33**
- Net Profit = **$1143.67/ac.**

(63,000 acres in Kentucky 2017)

Dark-Fire Tobacco

(Smokeless Products/Pipe)

- Average lbs/ac. = **3200 lbs.**
- Gross Sales **=** 3200 x $2.75 = **$8800.00**
- Production Cost/ac. = **$4937.06**
- Net Profit = **$3862.94**

(10,000 acres in Kentucky 2017)

Data attained from University of Kentucky Extension Service (2017)

Tobacco Innovations (150 Years)

- Commercial fertilizers
- Tractors and equipment changes
- Float beds and greenhouse Plants
- Tobacco bales (instead of hand tying)
- Pesticide use
- Gone from federal supported quota system to tobacco company contract system (2004)
- No Till / Strip Till

*Labor required is about the same.

- Position started in 2012 in Somerset, KY.
- Led to a Position in West KY
- Partnered with Pulaski and Christian County Conservation Districts with the Equipment

Our Goal

Assist tobacco growers in applying good conservation in tobacco production with an end result of converting to no-till.

- Reduce Soil Erosion
- Improve Water Quality
- Enhance Wildlife Habitat
- Profitability

Making Project A Success

- Take no-till transplanters to field
- Assist Growers with a test plot of no-till tobacco(5-10 ac. Plots)
- Provide technical guidance

No Till Tobacco Project Totals

2013 - 107.5 ac./19 producers

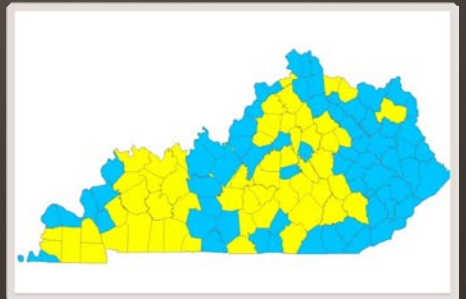
2014 - 228 ac./ 31 producers

2015 - 426 ac./ 56 producers

2016 - 475 ac./ 65 producers

2017 - 507 ac./ 56 producers

2018 – 392.25 ac./ 44 producers



Yellow counties represent where we have had no-till plots

Reasons To Grow No-Till Tobacco?

- Greatly Reduces Runoff and Erosion
- Less Disturbance to Soil Structure
- Increased Water Infiltration
- Increased Moisture Holding Capacity In Soil
- Much Less Energy Inputs

Soil Savings Using No-till Tobacco

2016 Tobacco Plots (475 ac.)
Tons of soil loss using
Conv. Tillage
Practices = 9,334 tons
19.7 tons/ac. soil loss

Save 73% of your soil by doing No-till Tobacco

2016 Tobacco Plots (475 ac.)
Tons of soil loss using
No-till
Practices = 2,502 tons
5.3 tons/ac. soil loss

Conventional Tillage Tobacco

No-till Tobacco

*Soil Loss was determined by using the RUSLE2 program through USDA-NRCS

Soil Loss Equivalent

No-Till = 5 tons

Vs

Conv-Till = 20 tons

Impact on Soil Structure

Conventional

No-till

Water Infiltration

Conventional

No-till

Energy Inputs

Conventional

No-till

No-Till Tobacco	
Spray - 1 pass	$7.00
Chemical (Glyphosate - 2 qt/ac)	$7.38
Spray - 1 pass	$7.00
Chemical (Spartan - 10 oz/ac)	$42.70
Chemical (Command - 2 pt/ac)	$40.00
Chemical (Prowl - 3pt/ac)	$16.50
Liquid Fertlizer - Knife	$11.00
Spray - 1 pass	$7.00
Chemical (Poast - 2 pt/ac)	$24.50
No-Till Drill - 1 pass	$13.50
Total Input =	$176.58
Conventional Tillage	
Moldboard Plow - 1 pass	$17.50
Disk - 3 passes	$40.50
Spray - 1 pass	$7.00
Chemical - (Spartan - 10 oz/ac)	$42.70
Chemical - (Command - 2 pt/ac)	$40.00
Chemical - (Prowl - 3 pt/ac)	$16.50
Cultivate - 1 pass	$13.00
Spray - 1 pass	$7.00
Chemical - (Poast - 2 pt/ac)	$24.50
Disk - 1 pass	$13.50
Broadcast Seed w/ Tractor - 1 pass	$9.50
Disk - 1 pass	$13.50
Total Input =	$245.20
Figures were taken from the following resources: Custom Machinery Rates Applicable to Kentucky (2017) UK Cooperative Extension Service	
Approximate 2013 Retail Costs of Herbicides, Harvest Aids, and Adjuvants	

$68 per acre Savings
When Switching to No-till!

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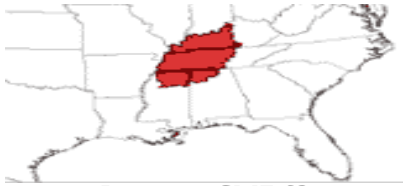
Energy Tools
- How were estimates made?
- Why are some of the estimates blank?
- What are the assumptions?
- Want a more accurate estimation?
- Tillage definitions

Other Resources
- Link to your Local NRCS Office
- NRCS Programs in KY
- NRCS Energy Information
- USDA Energy Information
- Energy in Agriculture
- Conservation Technology Information Center
- Private Land Owner Network

Feedback
- Comment on Energy Estimator: Tillage



Location: CMZ 63
Madisonville, KY 42431

Step 3: Fuel Consumption and Cost

The fuel use estimates are based on per acre fuel uses found in the literature on typical cropping & tillage systems in your area. These estimates are based on field conditions that existed in test trials cited in the literature. An example of the literature which supplied fuel consumption usage is "Estimating Farm Fuel Requirements" by H.W. Downs and R.W. Hansen (http://www.ext.colostate.edu/PUBS/FARMMGT/05006.html)

Total Diesel Fuel Consumption Estimate (in gallons per year)

	Crop	Acres	Conventional Till	Mulch Till	No Till
[Details]	Tobacco - burley	1	5	5	2
	Total Fuel Use		5	5	2
	Potential Annual Fuel Savings over Conventional Tillage				3
	Savings				60%

Fuel use estimates are based on average field and equipment conditions, average fertilizer and pesticide applications, and normal crop yields. They do not include: fuel use associated with trips to your fields and farm-to-market transport, irrigation, and, grain drying. They also do not consider differences in fuel use associated with crop yields, soil texture, slope, field size and shape, implement width, tractor size, tire inflation or driving techniques. Your actual fuel use may vary significantly from the value presented.

To see a differenct cost estimate, change the diesel fuel cost per gallon and click the **Recalulate** button.

Diesel fuel cost per gallon: $ 2.50 [Recalculate]

Total Diesel Fuel Cost Estimate (in dollars per year) based on $2.50/gallon

	Crop	Acres	Conventional Till	Mulch Till	No Till
[Details]	Tobacco - burley	1	$14	$14	$5
	Total Fuel Cost		$13	$13	$5
	Potential Annual Fuel Savings over Conventional Tillage				$8

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60% fuel savings Equaling to $8/ac. When going to no-till

Other Benefits of No-Till Tobacco

- Much Cleaner Product at Harvest
- Better Ground Conditions for Management Practices
- Less Disease Spread
- Compliance
- Wildlife Benefits

Producer Apprehensions Converting to No-Till System

- Changing Traditions
- Equipment Cost / Upgrades
- Market Uncertainty
- Yield

Planning for No-Till Tobacco

Start Early with Site Selection

Know Your Soil Type

No-Till works best on medium textured soil (silt loam to sandy loam)

Can perform and do well in clay soils, however takes longer drying time for transplanting

Fertilization

- SOIL TEST EARLY
- CAN ALL BE APPLIED PRE PLANT OR AS SPLIT APPLICATION.
- APPLY LIME, PHOSPHORUS, AND POTASSIUM IN FALL IF POSSIBLE WHEN USING NO-TILL.

Fertility Issues

Soil Test Recommendations:

250-120-400 apply

2 tons lime per acre (not incorporated here)

Soil pH = 5.8

Follow Recommended Herbicide Program

- Must follow preventative weed control protocol.
- Choose sites that have low weed pressure (avoid pastures, feed areas, and sparse cover sites)
- For hard to kill weeds spray timely application the year prior to transplanting.

Weed Control Options

A. Pre-plant Herbicides

Burndowns

1. Glyphosate
2. Paraquat

Residuals

1. Spartan
2. Command
3. Prowl

B. Post-plant Herbicides

1. Command
2. Devrinol

C. Few Rescue Options

1. Poast for grass
2. Shield sprayers
3. Mechanical (garden hoe, weedeater, cultivator)

Bad Weed Control

Soil Condition at Transplanting

Good quality Set

Bad quality Set

Avoid transplanting in wet conditions

- no-till can take up to 2-3 days longer to dry than conventional tillage.
- Use of heavy thick cover crops can prevent drying during early season.
- can greatly reduce yields due to sidewall compaction.

No-Till Transplanters

SETUP AND DESIGN

Old Style No-till Setter

- Modified conventional transplanters
- Lacked weight
- Poor quality transplant compared to newer machines

CM Transplanters

Comparing Ripper Shanks

- Left is factory CM Shank.
- Right is modified after market boot style shank

RJ Transplanters

Mechanical Transplanter

Transplanting Scenarios

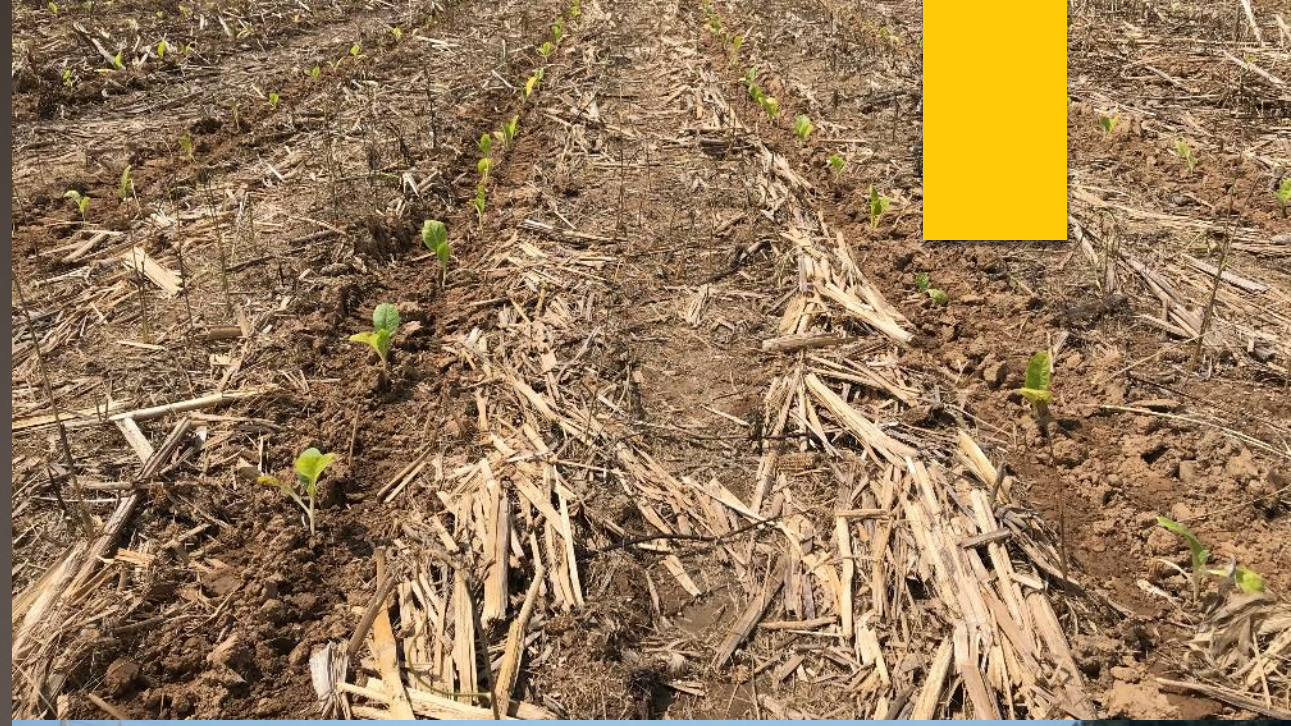
TERMINATION, TRANSPLANTING EXPERIENCES

Transplanting into Ryegrass cover crop

- Really like the ryegrass influence on the soil and easy setting conditions.
- Spray before seed heads start to appear and maybe more ideally about 8’-12’ tall. Terminates easily.
- Annual Rye Grass does leave residue on surface nearly as long as the cereal grain.

Transplanting into Crop Residues

- Makes for a very nice rotation. Usually good weed control because of prior year herbicide program.
- Bean Stubble sets the best, residue cover doesn't last long. Ideal to follow bean harvest with a cover crop, but doesn't happen a lot due to timing.
- Spring Oats can be planted in early spring to produce more cover residue.



Transplanting into Standing Cereal Rye/Legume Cover

- Cover in picture was a medium density cereal rye/legume mixture terminated a couple days prior to transplanting.
- Sprayed with gramoxone and left standing.
- Advantage here is more air flow to soil to allow for some extra dry time. Plus the green cover was still up taking moisture to help dry soil.
- Transplanting more difficult because of more dirt bound in roots. No breakdown time.

Transplanting into Sod

- It is recommended to spray in the fall and then again in spring to help break down root mass, especially with older fescue stands.

- Picture is 2 yr. old Orchard Grass Sod. Set very well.

- Weed control has been more of an issue in sod situations.

Transplanting Into Wheat Stubble

- Can be difficult to set (tough conditions most of the time)
- Usually set to close to wheat harvest due to time factor and plant roots no breakdown time
- Ground dries out very hard. Seems to do better in wetter years due to lack of residue.
- Hay harvest equipment can cause compaction.
- Have had some success with this method even though not recommended.

Transplanting into rolled cover crop mixes

- Most preferred method for soil health, however can present some challenges at transplanting.
- Transplanters do fine in these conditions as long as cover is dry and crunchy.
- Moist soil underneath can present undesirable setting conditions.
- This field was rolled with cultipacker and sprayed with Glyphosate

Transplanted Tobacco in Heavy Rolled Cover Mix

- Producer was concerned that cover crop was too thick for plant survival
- Row cleaners were removed for this particular field
- Don’t generally recommend cover this thick on a large scale due to the challenges it can present.

Rite Way Roller Crimper

- In a ideal situation you would want to crimp when legumes are in bloom stage to get most benefit from them.
- Unless cereal grains are mature, likely will need herbicide application to terminate.
- With tobacco termination depends on desired transplant timing and soil type.
- Planting covers early the fall before for most benefit

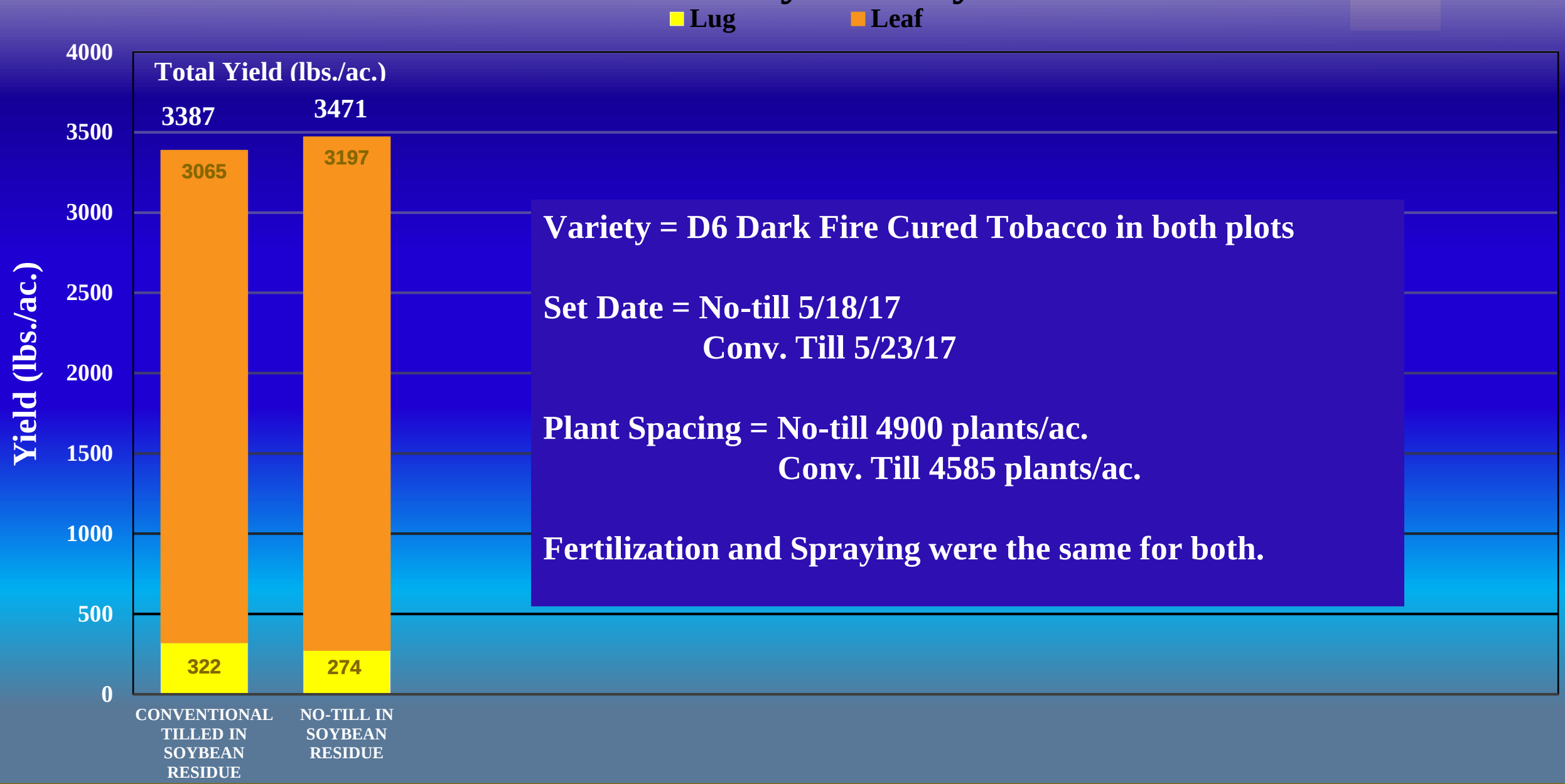
Cover Crop Research

- Ongoing Study with University of Kentucky Tobacco Research to determine the effects cover crops have on soil and no-till tobacco
- Study originated because a group of no-till tobacco growers desired to know more about using cover crop mixes in tobacco.
- Monitoring soil OM, aggregate stability, bulk density, soil moisture, bio-mass sampling, weed pressure, etc...

Side by Side Comparisons

COMPARING YIELDS UNDER VARIOUS GROWING CONDITIONS

2017 No-till Tobacco Yield Plot in Calloway County



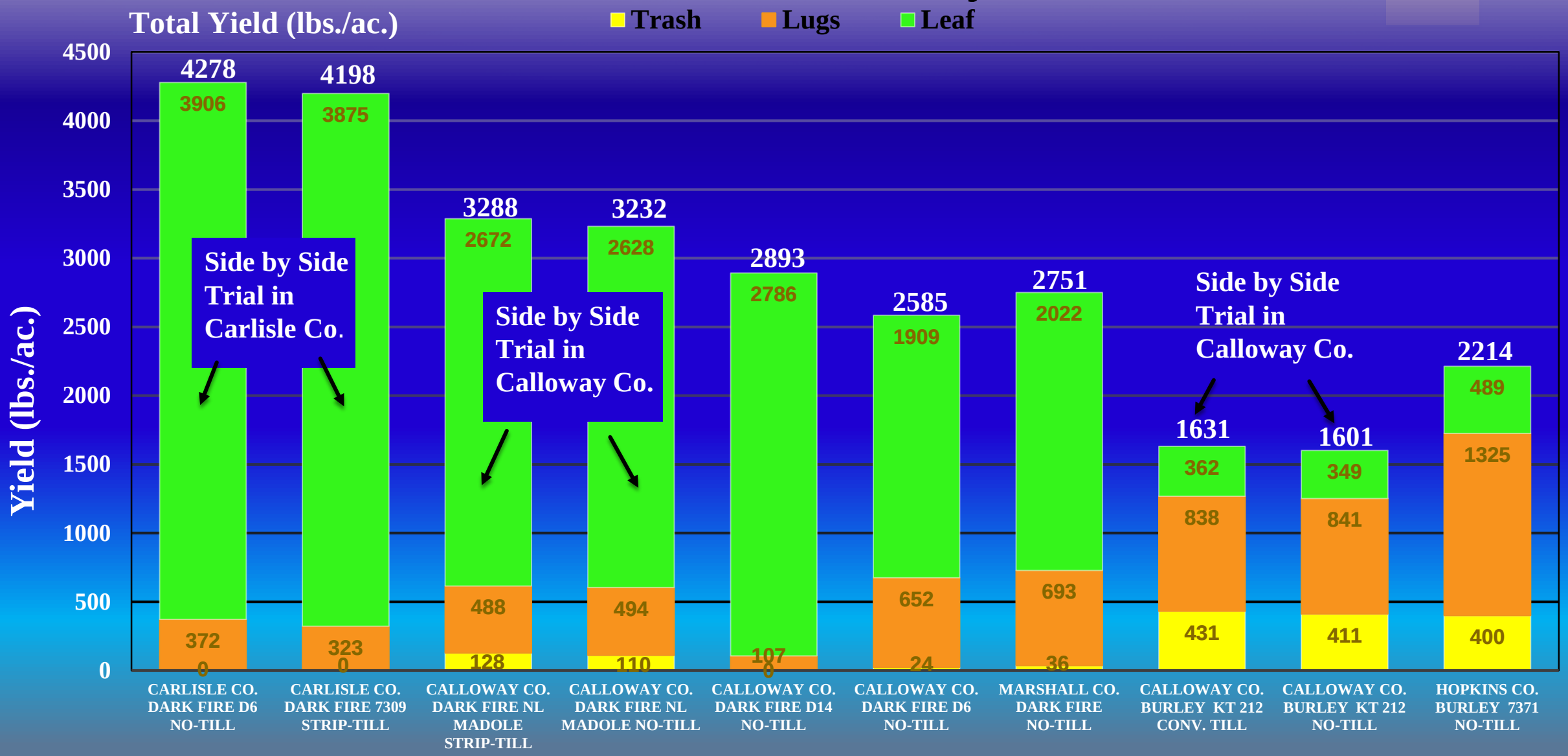
Variety = D6 Dark Fire Cured Tobacco in both plots

Set Date = No-till 5/18/17
Conv. Till 5/23/17

Plant Spacing = No-till 4900 plants/ac.
Conv. Till 4585 plants/ac.

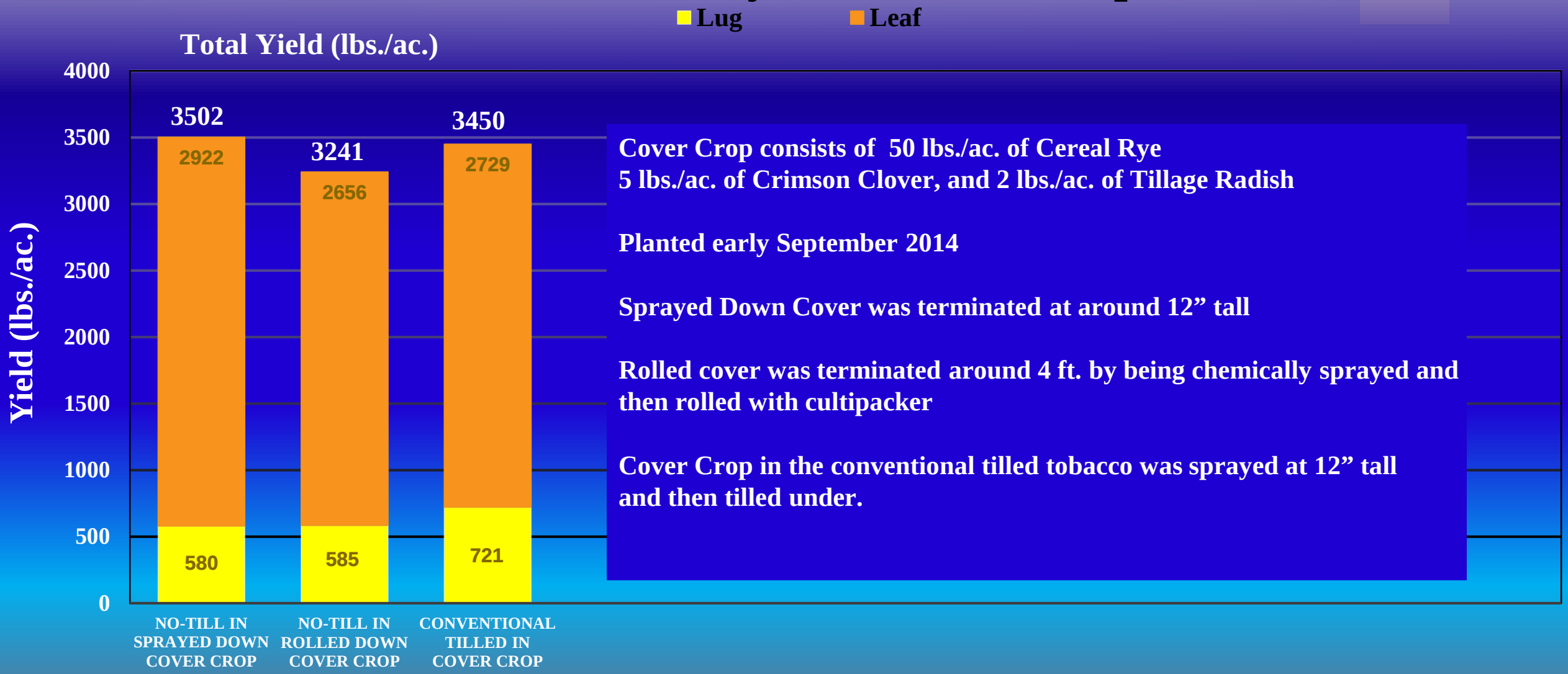
Fertilization and Spraying were the same for both.

2016 No-till Tobacco Yield Plot Data
Western Kentucky



* Yields were greatly affected by heavy amounts of rain and the presence of disease in many areas during the 2016 growing season.

2015 No-till Tobacco Yield Plot in Webster County with Cover Crops



Cover Crop consists of 50 lbs./ac. of Cereal Rye
5 lbs./ac. of Crimson Clover, and 2 lbs./ac. of Tillage Radish

Planted early September 2014

Sprayed Down Cover was terminated at around 12” tall

Rolled cover was terminated around 4 ft. by being chemically sprayed and then rolled with cultipacker

Cover Crop in the conventional tilled tobacco was sprayed at 12” tall and then tilled under.


Questions ?