NO-TILL OPTIONS FOR
HEMP PRODUCTION

Jon Anderson
KY Fish and Wildlife Resources
KY NO-TILL TOBACCO PROJECT

Partnered with Pulaski and Christian County Conservation Districts with the Equipment
Partner with UK to do research related to project
Received Funding from Burley Tobacco Growers Cooperation, Council For Burley Tobacco, and KY Farm Bureau for portion of equipment
PROJECT GOAL

Implement Best Management Practice (No-Till) on working tobacco farms throughout KY.

- Reduce Soil Erosion
- Improve Soil Health
- Water Quality
NO TILL TOBACCO PROJECT TOTALS

- Acres Set = 2507 acres (2013-2019)
- 6 No-Till Transplanters
2012 KY Tobacco Breakdown (According to 1193 Surveys)

- No Till: 3%
- Strip Till: 15%
- Conv Till: 82%

2017 KY Tobacco Breakdown (According to 1193 Surveys)

- No Till: 62%
- Strip Till: 26%
- Conv Till: 12%
WHY DO NO-TILL?

- **Greatly Reduces Runoff and Erosion**
- **Less Disturbance to Soil Structure**
- **Increased Water Infiltration**
- **Increased Moisture Holding Capacity In Soil**
- **Much Less Labor Inputs**
- **Reduced Weed Pressure**
Hemp In KY

• KY was a hemp leader in the 1800 – 1900's
• KY has well suited climate and soil for Hemp
• Infrastructure in place from tobacco
<table>
<thead>
<tr>
<th>Production Year</th>
<th># University Projects</th>
<th>Approved Processors</th>
<th>Approved Growers</th>
<th>KY Counties with Hemp</th>
<th>Approved Acres</th>
<th>Planted Acres</th>
<th>Harvested Acres</th>
<th>% Grain or Seeds</th>
<th>% Fiber</th>
<th>% CBD</th>
<th>% Grain &amp; CBD</th>
<th>% Seed &amp; Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>7</td>
<td>9</td>
<td>20</td>
<td>14</td>
<td>-</td>
<td>33</td>
<td>-</td>
<td>47%</td>
<td>32%</td>
<td>21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>8</td>
<td>29</td>
<td>99</td>
<td>41</td>
<td>1,742</td>
<td>922</td>
<td>500</td>
<td>47%</td>
<td>6%</td>
<td>47%</td>
<td></td>
<td></td>
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<tr>
<td>2016</td>
<td>17</td>
<td>45</td>
<td>137</td>
<td>60</td>
<td>4,600</td>
<td>2,300</td>
<td>2,000</td>
<td>34%</td>
<td>6%</td>
<td>60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>17</td>
<td>49</td>
<td>204</td>
<td>71</td>
<td>12,800</td>
<td>3,200</td>
<td>2,300</td>
<td>36%</td>
<td>5%</td>
<td>27%</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>14</td>
<td>72</td>
<td>210</td>
<td>73</td>
<td>16,100</td>
<td>6,700</td>
<td>6,000</td>
<td>18%</td>
<td>4%</td>
<td>61.5%</td>
<td>14%</td>
<td>2.5%</td>
</tr>
<tr>
<td>2019</td>
<td>12</td>
<td>200</td>
<td>978</td>
<td>102</td>
<td>60,000</td>
<td>26,500</td>
<td>24,900</td>
<td>2%</td>
<td>4%</td>
<td>92%</td>
<td>0</td>
<td>2%</td>
</tr>
</tbody>
</table>

National: 2018: 100,000 2019: 500,000 (250,000 Harvested)
PLANT COMPARISON

TOBACCO TRANSPLANT

HEMP TRANSPLANT
TRAY COMPARISON

TOBACCO TRAY

HEMP TRAY
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.
* Yields were greatly affected by heavy amounts of rain and the presence of disease in many areas during the 2016 growing season.
PLANNING FOR NO-TILL
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
CONSIDER WEED CONTROL OPTIONS

- Limited Options for hemp
- 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 (check with purchaser)
PLANT A COVER CROP

- **Best Weed Control**
- **Plant Cover Crop or Use Previous Crop Residues**
- **Keep transplanting time frame in mind when choosing and terminating covers**
- **Consider C:N Ratio (24:1 for best residue decomposition and nitrogen cycling)**
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.

Termination depends on desired transplant timing and soil type.

Planting covers early the fall before for most benefit.
ROLLER CRIMPER
SEVERAL WEEKS LATER
**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**
- **Soil pH Was 5.8 and Lime Not Incorporated**
- **Nutrient Availability**
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
COMPARING SHANKS

- **Left** is factory CM Shank.
- **Right** is modified after market boot style Shank.
NEW CM TRANSPLANTER OPTIONS
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. (C:N = 20.5:1)
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.
COVER CROPS IN NO-TILL TOBACCO RESEARCH UK

Research performed by Bob Pearce, Erin Haramoto, and Ben Goff

- What is the “value” of mixed cover?
  - Nutrient addition/immobilization?
  - Weed suppression?
- How should we manage cover crops?
  - Termination timing
- Can we extract economic value from cover crop without putting cash crop at risk?
**2015 No-till Tobacco Yield Plot in Webster County with Cover Crops**

Total Yield (lbs./ac.)

<table>
<thead>
<tr>
<th>Total Yield (lbs./ac.)</th>
<th>Lug</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO-TILL IN SPRAYED DOWN COVER CROP</td>
<td>2922</td>
<td>580</td>
</tr>
<tr>
<td>NO-TILL IN ROLLED DOWN COVER CROP</td>
<td>2656</td>
<td>585</td>
</tr>
<tr>
<td>CONVENTIONAL TILLED IN COVER CROP</td>
<td>2729</td>
<td>721</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Variety</th>
<th>Hybrid 404LC or HB 4488 PLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing</td>
<td>40”x 22” (7128 Plants/Ac)</td>
</tr>
<tr>
<td>Set Date</td>
<td>Mid-Late May</td>
</tr>
<tr>
<td>Strip Date</td>
<td>Dec 6 2019</td>
</tr>
<tr>
<td>Cover Crop Plant Date</td>
<td>Nov 4 2018</td>
</tr>
<tr>
<td>Cover Crop Kill Date</td>
<td>April 23 2019</td>
</tr>
</tbody>
</table>
McClard Cover Crop Plot
**McClard Cover Crop Plot - 2018**

- **Variety**: PD 7318LC
- **Spacing**: 40”x 32” (4901 Plants/Ac)
- **Set Date**: May 17 2018 Conv-Till
  - May 18 2018 No-Till
- **Strip Date**: Nov 19 2018
- **Cover Crop Plant Date**: Oct 26 2017
- **Cover Crop Kill Date**: N/A
**McClard Cover Crop Plot - 2019**

- **Variety** – D17
- **Spacing** – 40”x30” (5227 Plants/Ac)
- **Set Date** – June 13 2019
- **Strip Date** – Dec 4 2019
- **Cover Crop Plant Date** – Sept 6 2018
- **Cover Crop Kill Date** – May 6 2019
  - Bush Hogged, Sprayed w/ Roundup on May 13 2019, Sprayed with Gramaxone on June 5 2019 (Approx.. 36” tall)

* Set under heavy soil conditions in 2019
LIQUID APPLICATOR W/ SPIKE WHEEL INJECTORS

(PURCHASED WITH FUNDS PROVIDED BY THE BURLEY TOBACCO GROWERS COOPERATIVE ASSOCIATION)
The advantages of the spike wheel is that it injects the fertilizer below the surface making it less prone to losses from volatilization or surface runoff.
RANKIN LIQUID FERTILIZER TRIAL
Variety – Hybrid 404

Spacing – 40”x20” = 7841 Plants/Ac

Set Date – June 9

Soil Test – 250-0-300

* Applied full rate dry bulk fertilizer preplant to all strips with exception to wheat, applied 75-0-150 preplant
  • Applied 147 lb/ac N (UAN 32%) and 173 lb/ac K on wheat plot on June 29
  • Patch did have areas of black shank
THURBY LIQUID FERTILIZER TRIAL
**Variety** – KTD8

**Spacing** – 40’x32” (4901 Plants/Ac)

**Set Date** – June 3 2018

**Strip Date** – Jan 2 2019

**Liquid Application Date** – July 2 2018

**Soil Test** – 250-50-125

- Applied 76 gal/ac 32% UAN, 5 gal/ac P, 10 gal/ac K
- Applied 54 gal/ac High NRGN, 5 gall/ac P, 10 gal/ac K
- Granular applied preplant
- Tobacco green at weighing (weather related)