2016 Industrial Hemp Weed Control Trial

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UNIVERSITY OF VERMONT EXTENSION

2016 INDUSTRIAL HEMP WEED CONTROL TRIAL

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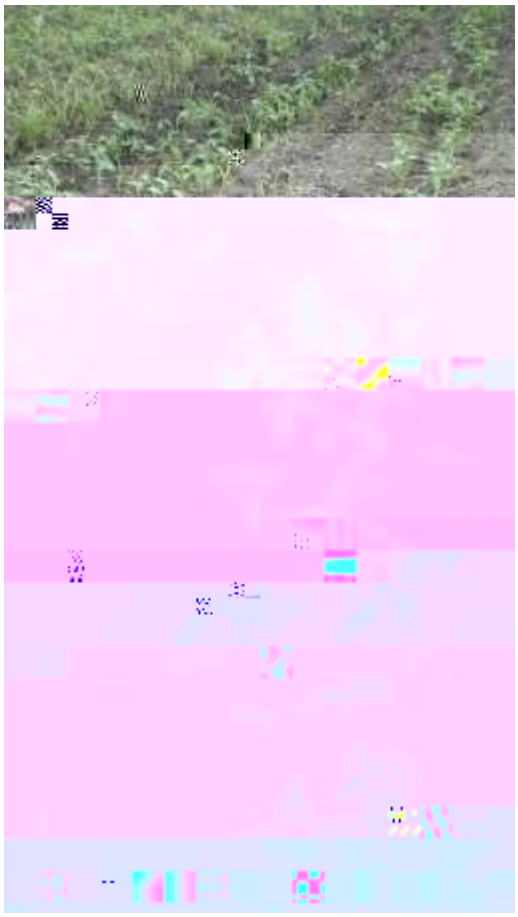
Hemp is a non-psychoactive variety of *cannabis sativa L*. The crop is one of historical importance in the U.S. and re-emerging worldwide importance as manufacturers seek hemp as a renewable and sustainable resource for a wide variety of consumer and industrial products. The crop produces a valuable oilseed, rich in Omega-3 and other essential fatty acids that are often absent in western diets. When the oil is extracted from the seed, what remains is a marketable meal co-product, which is used for human and animal consumption. The fiber has high tensile strength and can be used to create cloth, rope, building materials, and even a form of plastic. For twenty years U.S. entrepreneurs have been importing hemp from China, Eastern Europe, and Canada to manufacture travel gear, apparel and accessories, body care and cosmetics, foods like bread, beer, and salad oils, paper products, building materials and animal bedding, textiles, auto parts, housewares, and sporting equipment. Industrial hemp is poise
Vermont farms that is nutritious, versatile, and suitable for rotation with other small grains and grasses. To help farmers succeed, agronomic research on hemp is needed, as much of the production knowledge on this crop has been lost. In this trial, we investigated the impact of row spacing on yield and weed pressure.

MATERIALS AND METHODS

A trial was conducted at Borderview Research Farm in Alburgh, Vermont to



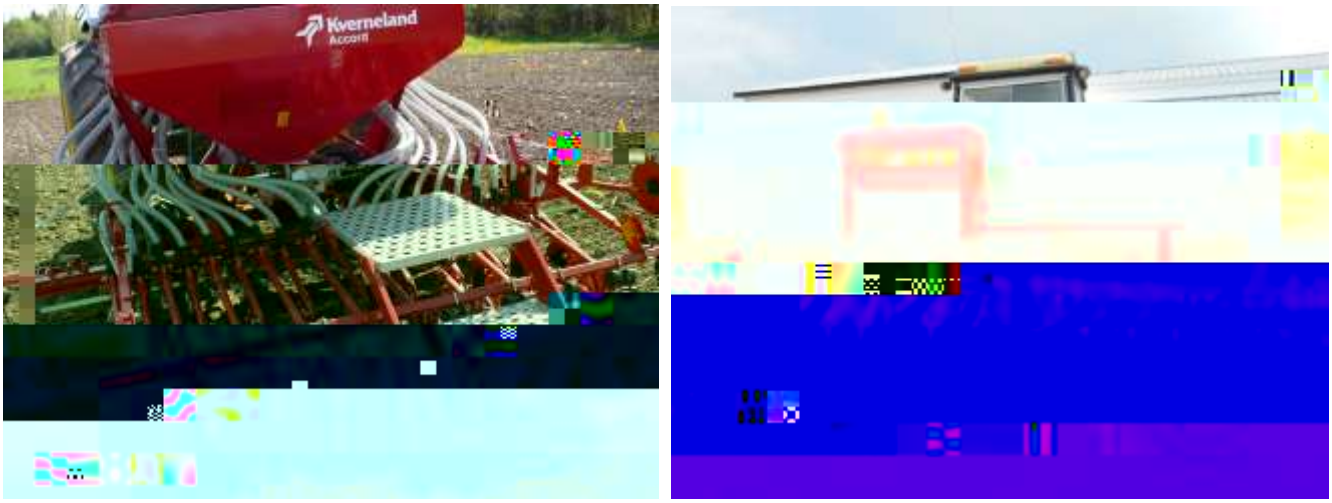


Figure 2. Kverneland grain drill (left), Gandy air seeder (right), Alburgh, VT.

Figure 3. Sunflower grain drill (left), Schmotzer hoe (right), Alburgh, VT.

Weed cover was assessed on 20-Jun as a percent of total plant cover using the web based IMAGING crop response analyzer. Digital images were taken with a compact digital camera, Canon PowerShot G12 (Melville, NY) (10.4 Megapixels). One picture covering approximately 0.25 m^2 was taken in each plot before weeding and one picture was taken after weeding. Digital images were analyzed with the automated imaging software, which was programmed in MATLAB (MathWorks, Inc., Natick, MA) and later converted into a free web-based software (www.imaging-crops.dk). The outcome of the analysis is a leaf cover index, which is the proportion of pixels in the images determined to be green. Total plant cover (1st picture) hemp cover (second picture) / total plant cover = weed cover (%).

On 1-Jul the trial was fertilized with 500 lbs ac^{-1} Pro-gro (5-3-4; North Country Organics, Brandon, VT), 500 lbs ac^{-1} Pro-booster (10-0-0; North Country Organics, Brandon, VT), and 50 lbs ac^{-1} sodium nitrate (16-0-0). These products were all approved for use in certified organic systems.

Table 1. Agronomic information for industrial hemp weed control trial 2016, Alburgh, VT.

On 9-

Yield, Weed Pressure, and Quality

Table 3. Plot characteristics and harvest yield of industrial hemp, Alburgh, VT, 2016.

Treatment	Weed cover	Height	Population	Yield	Test weight	Moisture
	%	cm	plants ft^{-2}	lbs ac^{-1}	lbs bu^{-1}	%
Banded row	17.1	199	5.77	1120	**43.4***	23.5
Standard row	7.03	**177***	5.95	1080	43.3*	24.0
Wide row	7.59	211	4.23	1150	42.6	**26.8***
LSD (0.10)	NS	28.0	NS	NS	0.40	1.70

Treatments in bold were top performers for the given variable.
NS There was no statistical difference between treatments in a particular column (p=0.10).
*Treatments marked with an asterisk did not perform statistically different than the top performing treatment (p=0.10).

Weed cover in the treatments ranged from 7.03 to 17.1 percent and there was no significant difference between treatments (Table 3). Hence, row spacing did not appear to impact weed biomass and cultivation did not appear to improve weed control. During the early growth stages of hemp, weed pressure appeared to be problematic. The hemp plants were small, weak, and had poor root development while weeds seemed to be growing much quicker. On 16-Jun plots were cultivated, which appeared to reduce weed cover or plant populations. It was certainly plausible to think that cultivating would help with weed control, however the cultivation also seemed to pull-out the tiny hemp seedlings. When the hemp was 8- tall, it grew rapidly past the weeds and became far more competitive and clearly could grow past the weed pressure. Future research needs to further evaluate early season weed control.

Currently there are no pesticides (herbicides, insecticides, fungicides, nematicides, etc.) registered for hemp in the U.S, so growers must follow best practices to reduce the impact of pests, especially weeds.

Overall, harvest went smoothly for this trial, which in large part may have been attributed to harvesting at the proper moisture. At harvest, plants were still green and approximately 70% of the seed was ripe. Row spacing did not significantly impact hemp yields. The WIDE row treatment yielded the highest, at 1150 lbs ac^{-1}, although it was not significantly different from the STANDARD or BANDED treatments. Yields from this trial were well within Canadian yield averages of 500-1200 lbs ac^{-1}. The BANDED row treatment had the highest test weight, at 43.4 lbs bu^{-1}, however this was comparable to the STANDARD row treatment. This was slightly lower than the average test weight from Canada, at 44 lbs bu^{-1}.

The STANDARD row treatment had an average height of 177 cm, which was significantly lower than other treatments. This would likely be advantageous for grain production, where taller plants increase the likelihood of lodging and also tend to be more difficult to harvest.

The WIDE row treatment had the highest percent moisture, at 26.8%, which was significantly different from the other treatments. Higher moisture at harvest may be more advantageous during harvest, as the plants may be more flexible and less likely to get caught in the combine. As recommended from growing hemp in Saskatchewan, Canada, hemp harvest can begin when field moisture is at 20%, however, seed would need to start drying within 4 hours of harvest, as it otherwise will heat up. Seed should be dried to 8-10% moisture for long-term storage.

It is important to remember that these data represent only one year of research and in only one location. Additional years of data need to be completed to determine optimal row spacing and weed control methods for hemp in the Northeast region.

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