2018 CANNABIDIOL HEMP PLANT SPACING X PLANTING DATE 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 medical providers and manufacturers seek hemp as a renewable and sustainable resource for a wide variety of consumer and industrial products. Hemp grown for all types of end-use (health supplement, fiber, and seed) contains less than 0.3% tetrahydrocannabinol (THC). Some hemp varieties intended to produce a health supplement contain relatively high concentrations of a compound called cannabidiol (CBD), potentially 10-15%. The compound CBD has purported benefits such as relief from inflammation, pain, anxiety, seizures, spasms, and other conditions. The CBD compound is the most concentrated in the female flower buds of the plant, however, it is also in the leaves and other plant parts as well. To grow hemp for CBD production, the crop is generally grown intensively as a specialty crop and the flowers are cultivated for maximum growth. The CBD oil is extracted and incorporated into topical products (salves, lip balm, lotion) and food and is available in pill capsules, powder form, and more, which can be found in the market today. Industrial hemp is poised to be a "new" cash crop and market opportunity for Vermont farms that is versatile and suitable as a rotation crop with other specialty crops, small grains, and grasses.

To help farmers succeed, agronomic research on hemp being grown for CBD extraction is needed in our region. We evaluated three plant spacings (1x1', 3x3', 5x5') and planting dates (14-Jun, 21-Jun, and 27-Jun) to determine best management practices for hemp grown for CBD production in this region.

MATERIALS AND METHODS

The CBD hemp was grown at Borderview Research Farm in Alburgh, Vermont (Table 1) to evaluate the impact of plant spacing and planting date on CBD flower yield. Female plants grown from clonal

‘planting date 2’, ‘planting date 2’ statistically outperformed ‘planting date 3’, etc.). Relationships between variables were analyzed using the GLM procedure.

Variations in yield and quality can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among treatments is real or whether it might have occurred due to other variations in the field. At the bottom of each table a LSD value is presented for each variable (i.e. yield). Least Significant Differences (LSDs) at the 0.10 level of significance are shown, except where analyzed by pairwise comparison (t-test). Where the difference between two treatments within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure that for 9 out of 10 times, there is a real difference between the two treatments. Treatments that were not significantly lower in performance than the top-performing treatment in a particular column are indicated with an asterisk. In this example, hybrid C is significantly different from hybrid A but not from hybrid B. The difference between C and B is equal to 1.5, which is less than the LSD value of 2.0. This means that these hybrids did not differ in yield. The difference between C and A is equal to 3.0, which is greater than the LSD value of 2.0. This means that the yields of these hybrids were significantl

Plant spacing results

Table 3. Plant spacing effect on plant weight and height, Alburgh, VT, 2018.

Plant spacing	Plant weight	Plant height
ft x ft	**lbs plant^{-1}**	**Cm**
1 x 1	0.640c‡	75.8
3 x 3	4.66b	81.2
5 x 5	**9.11a**	79.4
LSD (0.10)	**0.734**	**NS**
Trial mean	**4.80**	

Table 5. Planting date effect on plant weight and height, Alburgh, VT, 2018.

Planting date	Plant weight	Plant height
	lbs plant^{-1}	Cm
14-Jun	**5.38a**t	82.1
21-Jun	4.83ab	80.5
27-Jun	4.20b	73.8
LSD (0.10)		

Within the 21-Jun planting, the 1’x1’ spacing had the best yield and least amount of unmarketable buds, on a per acre basis (Table 8). The average yield for the 1’x1’ spacing was 4647 lbs ac^{-1} of flower bud. The 3’x3’plant spacing had a comparably low amount of unmarketable buds, on a per acre basis. On a per plant basis, the 5’x5’ spacing had the best yield, while the 1’x1’ and 3’x3’spacing had the lowest amount of unmarketable flower bud.

Table 8. Plant spacing effect on yield and plant weight for the 21-Jun planting, Alburgh, VT, 2018.

Plant spacing	Plant weight	Dry matter flower yield†	Unmarketable dry matter flower yield