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Industrial oilseed crops for Tennessee

Jason P. de Koff, *Associate Professor*; **Prabodh Illukpitiya,** *Associate Professor*; **Shivam Chawla** *Graduate Research Assistant*; **Richard Link,** *Research Assistant* **Tennessee State University**
Contact: 615-963-4929, jdekoff@tnstate.edu, @TSUBioenergy

A number of non-food oilseed crops available which can be grown for industrial purposes and can also be used to produce biodiesel. The meal remaining after the oil is removed from the seed may also be used as an animal feed. In this article, we focus on three of these winter oilseed crops and identify their potential for Tennessee based on our research trials.

Carinata

Carinata (*Brassica carinata*), also known as Ethiopian mustard, is a relatively new winter oilseed crop in the southeastern U.S. It produces oils that have a high erucic acid content (30-45%) which make them inedible to humans and animals but the oil's properties allow it to be used to produce jet fuel. Researchers in Florida recommend planting in mid-November using 14 inch row spacing and a rate of 5 lbs seed/acre (Seepaul et al., 2015; 2016). Canadian research found carinata yields to be highly responsive to increasing nitrogen application rates with no maximum threshold through 178 lbs/acre (Johnson et al., 2013).

In 2015 and 2016, carinata was planted at the Tennessee State University Agricultural Research and Education Center (TSU AREC) in Ashland City, TN on October 2nd and 4th, respectively. In the first year, the plants began to bolt and produce buds in January (Fig. 1) and in the second year, though no bolting was observed, the plants did not survive the winter. According to the National Weather Service, the average first frost for North Florida (where the Florida recommendations came from) is November 3rd whereas in middle Tennessee, it is around Oct 19th. Therefore, both the Florida and Tennessee plantings took place about 2-3 weeks before the average first frost in each area. According to the USDA Plant Hardiness zones, Northern Florida is in Zone 8b and Middle Tennessee is in 7a. There is a 15 degree difference in the average annual extreme minimum temperature between these two zones. This may cause the limitation to carinata growth identified in our research in Tennessee, however, further research is needed to substantiate this.

Fig. 1 Carinata starting to bloom in January 8th at the TSU AREC in Ashland City, TN.

Crambe

Crambe (*Crambe abssynica*) is an oilseed originally from the Mediterranean region or Ethiopia and also produces a seed with a high erucic acid content (50-60%) (Oplinger et al., 1991; Weiss, 2000). The erucic acid can be used to produce synthetic rubber, plastic products and adhesives and can be used as a corrosion inhibitor or a lubricant (Oplinger et al., 1991). Little research has been done in the southeast using Crambe as a winter crop. In North Dakota, it has been planted as a spring crop and planted at 1 inch depth with a row spacing of 6-7 inches and a seeding rate of 15-20 lbs live seeds/acre. A nitrogen application of 5 lbs. for every 100 lbs. of seed yield per acre is recommended and yield responses have been observed at phosphorus applications of 25-50 lbs./acre (Endres and Schatz, 2013).

In 2015 and 2016, crambe was planted at the TSU AREC on October 2nd and 4th, respectively. Though plants germinated in both years (Fig. 2) and there was no indication of bolting or budding, the plants did not survive in either year. Other researchers have noted that crambe does not do well under low temperatures.

In North Dakota, crambe was observed to withstand temperatures in the low 20s for a number of hours, however, temperatures below 20°F caused damage to seedlings in Nebraska (Nelson et al., 1993; Endres and Schatz, 2013). Minimum temperatures near our research site fell below 20°F on 16 and 13 different days in the 1st and 2nd years, respectively, which may have led to significant crambe mortality.

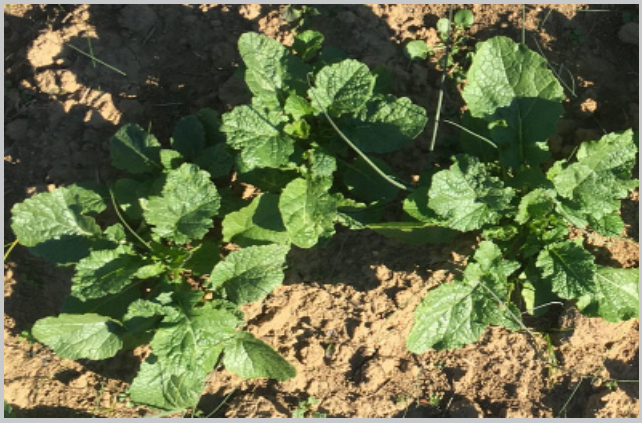

Fig. 2 Crambe on Nov. 23rd at the TSU AREC in Ashland City, TN.

Industrial rapeseed

Industrial rapeseed (*B. napus, B. rapa*) was a precursor to canola (*B. napus, B. rapa*) and has higher erucic acid and glucosinolates than canola which makes it unsuitable for human or animal consumption. The average erucic acid content of industrial rapeseed oil (also known as high erucic acid rapeseed) is about 45% (Gunstone and Harwood, 2007). It is recommended to plant rapeseed at 1/4 to 1/2 inch depth with 6 to 8 inch row spacing and a seeding rate of 4 to 8 lbs./acre (Buntin et al., 2010). Current nitrogen application recommendations for Tennessee include 30 lbs. N/acre prior to fall planting and 110 lbs N/acre before bolting in spring. If a soil test identifies low phosphorus or potassium, it is recommended to apply 30 lbs. P_2O_5/acre or 30 lbs. K_2O/acre. Sulfur is also required by the plant, particularly in coarse-textured soils, and may be applied at a rate of 10 lbs./acre. The Tennessee recommendations, however, date back to trials conducted in the 1990's and may not reflect requirements of current varieties.

In 2015 and 2016, industrial rapeseed was planted at the TSU AREC on October 2nd and 4th, respectively (Fig. 3).

Fig. 3 Industrial rapeseed in bloom on April 11th at the TSU AREC in Ashland City, TN.

Though the rapeseed survived the winter in both years, yields were surprisingly very low. The industrial rapesesed did not perform as well as winter canola that was planted in the same location in the first year, achieving less than 10% of the yield of winter canola.

Recommendations

Further research is needed to identify the viability of these industrial oilseed crops in Tennessee. Based on current results, farmers may test these crops on small acreage but large plantings are discouraged until more information is available. If you have tried these crops, we'd like to know your experiences. Please contact us using the information found on the front page.

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