

POD SEALANT TECHNOLOGY IN TREFOIL SEED PRODUCTION

Introduction

Birdsfoot trefoil (*Lotus corniculatus* L.) is a non-bloating perennial legume that is used as a pasture legume around the world (Sareen 2004). Seed production of trefoil, especially pedigreed seed is not meeting demand and seed prices have increased substantially in recent years. The lack of seed production has been attributed to a number of reasons but seed shattering (Figure 1) can be one of the causes (Winch et al. 1985).

Pod sealants have come on the market in recent years and they have been promoted as a tool to help reduce seed shatter in a number of different crops including forage species such as alfalfa and grass. Pod sealants are made of natural (Pod Ceal DC) and synthetic (Pod-Stik) products that coat the pods reducing moisture loss which delays pod maturity allowing more immature seed to develop prior to seed shattering.

Materials & Methods

Three field experiments (Figure 2) were established to investigate the effects of pod sealants on birdsfoot trefoil seed yield and quality from 2010 to 2011.

Pod Ceal DC was applied to Leo birdsfoot trefoil at two sites (seeded in 2007 and 2009) near Carrot River, SK on August 13, 2010 (one week prior to harvest) at a rate of 0.75 L/acre in 68.4 L/acre of water on 70 acre plots. The trefoil pods were in the later stages of maturity ranging from light green to dark brown in colour when the sealant was applied. Seed shatter was determined by visual observation and by listening for the pods shattering at swathing and harvest. Pods were collected at swathing and dried at room temperature to determine visual differences in seed shatter. The fields were swathed on August 20, 2010 and seed harvest occurred on August 25, 2010.

Pod-Stik was applied to Leo birdsfoot trefoil (seeded in 2007) near Carrot River, SK on July 29 (four weeks prior to harvest) and August 5, 2011 (three weeks prior to harvest) at a rate of 0.4 L/acre in 68.4 L/acre of water on 9.6 acre plots. The pod sealant was applied at the early stage of pod development and the pods were dark green and pliable. Seed shatter was determined by visual observation and by listening for the pods shattering at harvest. Trefoil plants were harvested (2 x one meter square) from each plot on August 24 (start of seed shatter in unsprayed treatment) and on September 7, 2011. The harvested plants were dried at room temperature, threshed and seed was weighed to determine gross seed yield. A seed sub-sample of each treatment was taken to determine seed dockage, seed weight, germination and hard seed.

The 2010 growing season (April 1 to August 16, 2010) in NE Saskatchewan can be described as above normal for precipitation (115 to >200% of normal) and normal for temperature (-1 to +1 degrees C of normal) with the exception of April temperature which was above normal (+1 to +4 degrees C of normal). The 2011 growing season was normal to above normal for precipitation (85 to 150% of normal) and temperature (-1 to +2 degrees C of normal) with the exception of spring moisture (April 15 to June 13, 2011) which was below normal (<40 to 85% of normal) (http://www.agr.gc.ca/pfra/drought/drmaps_e.htm).

Treatments were not replicated so variability was not measured thus treatment differences may or may not be statistically significant. Plant population and seed yield variability as determined by visual observation was high in 2011.

Results & Discussion

Seed yield and quality were not determined in 2010 because seed shatter was low and no difference in seed shatter was detected between treatments at swathing and harvest as determined by visual observation and by listening for pod shattering. No difference in seed shatter between treatments was detected when the pods were dried at room temperature as well. Seed shatter in 2011 was once again low but seed shatter was higher in the unsprayed treatment at the August 24th harvest date as determined by the sound of pods shattering. Seed yield of the unsprayed treatment was similar between harvest dates suggesting that seed yield loss from shattering was not significant in 2011 (Table 1). High humidity levels at harvest have been determined to reduce seed shatter in birdsfoot trefoil (Metcalf et al. 1957). The above average precipitation during the summer of 2010 and 2011 may explain why seed shatter was minimal in these trials.

Pod-Stik reduced seed yield at each application date with the exception of the August 5th application (Table 1). The August 5th application of Pod-Stik increased seed yield over the unsprayed treatment for the August 24th harvest date but was substantially lower than the unsprayed treatment for the September 7th harvest date. Plant population and seed yield variability was high in 2011 which could explain why the yield response to Pod-Stik application was inconsistent. Average seed yield, size, germination and hard seed were slightly lower for the September 7th harvest date compared to the August 24th harvest date (Tables 1 and 2). Treatments that included the July 29th application date had the lowest germination rate (Table 2). The lower seed yield and germination rate for treatments that were applied four weeks prior to harvest is a concern.

Future trials should investigate the proper timing of application and the effects of pod sealants on trefoil seed yield and quality when weather conditions are more favourable for seed shatter. Treatment replication and larger sampling size should be used so variability can be reduced and measured.

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References

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Figure 1. Shattered seed pods of birdsfoot trefoil.



Figure 2. Pod sealant plots in birdsfoot trefoil near Carrot River, SK in 2010.



Table 1. The effects of Pod-Stik on birdsfoot trefoil seed yield and size near Carrot River, SK in 2011.

Application Timing	Seed Yield lbs/acre		Seed Size g/1000 seeds	
	August 24 Harvest	September 7 Harvest	August 24 Harvest	September 7 Harvest
No Pod-Stik	294.5	291.1	1.30	1.29
July 29	102.7	129.9	1.24	1.31
August 5	326.3	185.5	1.35	1.30
July 29 & August 5	239.8	264.5	1.33	1.27
Average	240.8	217.8	1.31	1.29

Table 2. The effects of Pod-Stik on birdsfoot trefoil germination and hard seed near Carrot River, SK in 2011.

Application Timing	Germination %		Hard Seed %		Germination + Hard Seed %	
	August 24 Harvest	September 7 Harvest	August 24 Harvest	September 7 Harvest	August 24 Harvest	September 7 Harvest
No Pod-Stik	12	9	86	87	98	96
July 29	9	8	87	85	96	93
August 5	12	14	85	82	97	96
July 29 & August 5	8	8	88	89	96	97
Average	10.3	9.8	86.5	85.8	96.8	95.5