Coated Canola Seed

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The application of coating materials to seed surfaces is not a new concept, in fact seed coatings have been investigated for a variety of reasons over the past 10-20 years. Attempts have been made to apply coating materials to seeds to prolong dormancy. The objective was to facilitate fall seeding of grain crops and delay germination to the following spring. Moisture absorbing coatings have also been used. These coatings were applied to either hold water on the seed when applied before seeding or to enhance moisture absorption of the seed after it was placed in the soil. Other applications of seed coatings include increasing the size and weight of small fluffy seeds making them easier to handle or to improve their ballistic properties when seeded by aircraft. Seed coatings containing fertilizers, pesticides and rhizobial bacteria have also been investigated.

Some of these seed coatings have been used successfully.

Some small grass seeds coated with fertilizer materials are being produced commercially. They are particularly useful in reclamation of wastelands and mine spoils. Such seed is often applied by aircraft onto soils of very low fertility. The coating improves distribution of the seed and the fertilizer materials contained in the coating may be helpful in aiding seedling establishment. Seed of legume forage crops pre-innoculated with rhizobia held on the seed by a mineral coating is commercially available in some areas of Canada.

Because coating adds to the cost of seed, its use is limited to special applications. Additional costs are minimal on small seeded crops that require low rates of seeding. Canola fits into this category. Interest in coated canola seed began several years ago. In 1981 and 82 limited quantities of coated canola seed were made available in Western Canada. The seed had been treated with the seed dressing Vitavax RS and coated with lime and phosphate fertilizer. This seed dressing contains the insecticide lindane, which is used to control fleabeetles on canola. It also contains the fungicides thiram and carbathiin which were effective in controlling seedling rots and blight organisms and blackleg on canola.

In 1983 a custom seed coating plant in North Battleford, Saskatchewan began operations. An estimated 100,000 ha. of canola was planted with seed coated in this plant. Field and laboratory studies have been ongoing since 1981 at the Scott Experimental Farm and the Saskatoon Research Station to compare the performance of coated canola with bare canola seed. A number of other coated seed treatments were investigated in addition to the product which is now commercially available. The coated seed was made available from Canadian Seed Coaters Limited the parent company involved in the North Battleford Plant.

Replicated field studies were conducted at Scott in 1981, 82 and 83 and in Saskatoon in 1982 using small plot equipment typical of that used for varietal yield trials. The seed treatments used were as follows:

- untreated check: bare seed without insecticide or fungicide.
- Furadan 5G: granular insecticide in furrow treatment seeded with bare seed at recommended rates for fleabeetle control on canola seedlings.
- Vitavax RS: flowable insecticide plus fungicide applied to the seed for fleabeetle control plus control of seed and seedling blights and blackleg. Applied with bare seed and coated seed.

In each test the seed treatments were applied to seed from the same seed lot of certified seed.

Counts of the numbers of established seedlings were made at approximately 30 days after seeding at Scott (Table 1). In 1981, no significant differences in numbers of established seedlings were observed between treatments. The test was seeded on May 20, 1981 and soil temperatures were adequate for rapid emergence. The fleabeetle infestation in 1981 was moderate and untreated seedlings clearly showed more damage than the insecticide treated seedlings.

Table 1. Effect of seed treatment on canola seedling establishment plants/m^2 at Scott

Yr of test	Variety	Seed treatment: Untreated check	Furadan 5G	Vitavax RS bare	Vitavax RS coated
1981	Altex	41 a*	64 a		49 a
1982	Regent	38 b	31 b	56 a	49 a
1983	Andor, Altex, Westar, Regent	60 a	59 b	62 b	76 a
1983	Tobin	27 b	27 b	34 a	39 a
3 yr average		45	50	-	56

* Values followed by the same letter in a horizontal line are not significantly different.

The 1982 test was seeded May 19 and rain began that day with showers and cool temperatures continuing for the next week. These conditions probably favored the Vitavax RS treatments. Seedling establishment from Vitavax RS treated bare or coated seed was significantly higher than from Furadan 5G treated seed or from untreated seed. In 1983 the tests were seeded May 25 and temperatures were relatively warmer. With the B.napus canola varieties seedling establishment was significantly increased with Vitavax RS treated coated seed. It appeared that coating may have enhanced the activity of Vitavax RS in this test. With the B. campestris variety Tobin, Vitavax treatment of bare or coated seed resulted in significantly higher seedling establishment than untreated or Furadan 5G treated seed at 30 days after seeding. Fleabeetle infestations were light in 1982 and moderate in 1983.

Furadan treatment of canola seed resulted in significantly higher yields than from untreated seed in 1981 (Table 2). It has been noted in other studies that Furadan 5G treatment gives better control of fleabeetle than lindane based seed treatments such as Vitavax RS. In this study with a moderate fleabeetle infestation, fleabeetle control with Furadan 5G gave increased yields over the untreated check. Yields did not differ between treatments in 1982 at Scott. Fleabeetle infestations were light and little damage was noted on seedlings in this test.

Table 2 Effect of seed treatment on canola yields (kg/ha) at Scott

Yr of Test	Variety	Untreated check	Furadan 5G	Vitavax RS bare	Vitavax RS coated
1981	Altex	1886 a*	2169 b		2073 ab
1982	Regent	2182 a	2234 a	2124 a	2239 a
1983	Altex, Andor, Westar, Regent	1484 a	1525 a	1512 a	1530 a
	Tobin	1301 a	1425 ab	1524 b	1488 b
3 yr. average		1825	1969		1965

* Values followed by the same letter in a horizontal line are not significantly different

In 1983 seed treatments did not affect average yields of the four B.napus varieties. However yields of the B. campestris variety Tobin were significantly increased by Vitavax RS treatment of bare or coated seed. Yields from Tobin seed treated with Furadan 5G were intermediate between the check and Vitavax RS treatments. The numbers of established seedlings of Tobin were about one half as high as with the B. napus varieties in 1983. Because the plant numbers were low with Tobin, the effect of Vitavax RS in increasing plant numbers probably accounts for the higher yields.

At Saskatoon in 1982 Vitavax RS treatment of bare or coated seed of Westar canola resulted in significantly higher seedling establishment than untreated or Furadan 5G treated seed (Table 3). Under the relatively cool soil conditions at the time of seeding (May 1) the fungicidal activity of Vitavax RS probably aided seedling establishment. Fleabeetle populations were very high at Saskatoon in 1982 and differences in fleabeetle control probably accounted for differences in seedling fresh weights at 30 days after emergence and seed yields. Yields and seedling weights were lowest for the untreated seed and were both significantly higher where Vitavax RS was applied to bare or coated seed. With the high level of fleabeetle control provided by Furadan 5G both seedling weights and yields were higher than for other treatments.

Table 3 Effect of seed treatment on canola seedling emergence and growth at Saskatoon

Yr. of test	Variety	Seed Treatment: Untreated check	Furadan 5G	Vitavax RS bare	Vitavax RS coated
		Seedling Establishment (plants/m^2)			
1982	Westar	52 b	52 b	59 a	58 a
1983	Westar	70 a	74 a	73 a	61 b
1983	Tobin	60 a	49 b	55 a	56 a
		Fresh wt. (g) of 10 seedlings			
1982	Westar	6.4 c	20.2 a	11.1 b	11.7 b
1983	Westar	32.7 a	28.5 ab	27.3 ab	24.2 b
1983	Tobin	32.2 b	41.9 a	29.3 b	26.7 b
		Yield (kg/ha)			
1982	Westar	1449 c	1998 a	1772 b	1726 b

* Values followed by the same letter in a horizontal line are not significantly different.

In 1983 at Saskatoon the test was seeded later under relatively warmer conditions (May 15) and Vitavax RS treatment of Westar or Tobin canola did not increase seedling establishment. Coated seed with Vitavax RS resulted in significantly lower plant numbers than the other treatments applied to Westar. With Tobin, Furadan 5G treatment of bare seed reduced stablishment compared to the other treatments. Fresh weights of Westar seedlings were reduced by the Vitavax RS treated coated seed compared to untreated seed. Furadan 5G treatment of Tobin seed resulted in significantly higher seedling fresh weights than untreated or Vitavax RS treated seed. The plots of Saskatoon were badly flooded by a July rain and yield data was not collected in 1983.

From these and other related studies with canola seed treatments it can be concluded that Furadan 5G provides better protection for canola seedlings against fleabeetle damage than does Vitavax RS. However, where seedling blights cause reductions in canola stands, higher yields may be obtained from Vitavax RS treated seed. To provide optimal control of fleabeetles and reduce seedling disease the ideal seed treatment chemical would combine the insecticidal properties of Furadan 5G with fungicides for control of seedling diseases. An experimental chemical (Furadan 300) containing the insecticide from Furadan 5G (carbofuran) plus two fungicides (thiram and MBC) was tested at Scott in 1983. This chemical was applied to bare seed and to seed that was coated after application. Results with Westar canola indicated that

seedling establishment and yields were similar to Furadan 5G or Vitavax RS treated Westar (Table 4). However with Tobin this treatment when combined with coating of the seed resulted in a very large reduction in seedling establishment. Maturity of this treatment was delayed by several days and yields were much lower than from conventional treatments. It is apparent that more work needs to be done to determine the nature of the phytotoxicity of this treatment on Tobin seed.

Table 4 Effect of seed treatments on canola emergence and yields at Scott 1983.

	Emergence (plants/m^2)		Yield (kg/ha)	
	Westar	Tobin	Westar	Tobin
Untreated check	63 a*	27 b	1220 b	1301 b
Furadan 5G	67 a	27 b	1693 a	1425 ab
Vitavax RS bare	61 a	34 a	1557 a	1524 a
Vitavax RS coated	68 a	39 a	1675 a	1488 a
Furadan 300 bare	52 a	28 b	1544 a	1374 b
Furadan 300 coated	73 a	13 c	1604 a	510 c

* Values followed by the same letter in a vertical line are not significantly different.

Overall it appears that the performance of Vitavax RS treated coated seed is very similar to the performance of Vitavax RS treated bare seed. The benefits of using coated seed can be summarized as follows:

- coated canola seed is convienient to use because it eleminates the need for on farm treatment of seed.
- encapsulation of the seed dressing in the coating reduces the exposure of growers to the pesticides used.
- the increased seed size of coated canola may improve seeding accuracy as many of the drills used were designed to sow larger seeds.
- the pesticide is less likely to be dusted-off from the seed than where pesticides are applied to seed and not coated.

A number of other factors need to be considered when using coated canola:

- the additional costs of coated seed
- seeding rates need to be increased to compensate for the larger seed size and maintain a seeding rate of 26-30 seeds per meter of row
- Vitavax RS treated seed, whether bare or coated should be seeded within 90 days of treatment and should never be carried over from one year to the next because seedling vigor from such seed may be significantly reduced.
- the amount of phosphate in the coating will provide less than one kg of $P_2 O_5$ per ha. at recommended seeding rates and is of no significance in correcting soil phosphate deficiencies.