Final Report for NDSU
Seed Treatments for Flea Beetle Control in Spring Canola, 2024

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Table 1. Experimental and agronomic information.

	Langdon
Trial Latitude (LLC)	48.75539
Trial Longitude (LLC)	-98.34080
Canola Variety	DK400TL
Previous Crop	HRSW
Planting Date	May 22
Emergence Date	June 4
Plot Size	3.5 ft x 20 ft
Row Spacing	6 inches
Seeding Depth	0.75 inch
Seeding Rate	14 seeds/ft^2
Experimental Design	RCBD, 4 reps
Harvest Date	September 25

Materials and Methods

The trial was conducted at the Langdon Research Extension Center in Langdon, ND. See Table 1 for planting dates, trial design, seeding rates and other information.

Seed treatment efficacy was examined for control of crucifer and striped flea beetles in spring canola. Treatments, rates and active ingredients are listed in Table 2. Dekalb DK400TL canola seed was treated prior to planting. Two neonicotinoid seed treatments, Helix Vibrance (thiamethoxam) and Prosper Evergol (clothianidin) were tested alone and in combination with either Lumiderm or Fortenza (cyantraniliprole). Prosper Evergol also was tested in combination with two rates of Buteo Start (flupyradifurone), and in combination with the commercial rates of Lumiderm and Buteo Start. Lastly, we included two treatments using a second hybrid, InVigor L350, treated commercially with Helix Vibrance and Lumiderm. InVigor L350 was included because we had second-hand reports of this hybrid having less severe feeding injury compared to other hybrids with the same seed treatment package.

Table 2. Treatments, active ingredients and rates used in the trial.

Treatment No.	Treatment Name	Product Rate(s)	Active Ingredient(s)	AI Rate (s)
1	Fungicide Check			
2	Helix Vibrance	23 fl oz/cwt	Thiamethoxam	400 g/100 kg
3	Helix Vibrance Fortenza[1]	23 fl oz/cwt 10.2 fl oz/cwt	Thiamethoxam Cyantraniliprole	400 g/100 kg 400 g/100 kg
4	Prosper Evergol	21.5 fl oz/cwt	Clothianidin	400 g/100 kg
5	Prosper Evergol Lumiderm	21.5 fl oz/cwt 9.8 fl oz/cwt	Clothianidin Cyantraniliprole	400 g/100 kg 400 g/100 kg
6	Prosper Evergol Buteo Start[2]	21.5 fl oz/cwt 9.6 fl oz/cwt	Clothianidin Flupyradifurone	400 g/100 kg 300 g/100 kg
7	Prosper Evergol Buteo Start	21.5 fl oz/cwt 16 fl oz/cwt	Clothianidin Flupyradifurone	400 g/100 kg 500 g/100 kg
8	Prosper Evergol Lumiderm Buteo Start[2]	21.5 fl oz/cwt 9.8 fl oz/cwt 9.6 fl oz/cwt	Clothianidin Cyantraniliprole Flupyradifurone	400 g/100 kg 400 g/100 kg 300 g/100 kg
9	Hybrid L350 Helix Vibrance Lumiderm	23 fl oz/cwt 9.8 fl oz/cwt	Thiamethoxam Cyantraniliprole	400 g/100 kg 400 g/100 kg

[1]Fortenza substituted for Lumiderm, rate(s) adjusted to match commercial Lumiderm rate and cyantraniliprole concentration.
[2]Commercial Buteo Start rate when used in combination with a neonicotinoid.

Sampling activities, dates and crop stages are given in Table 3. Plots were rated for flea beetle feeding injury using the 0-6 scale developed by Dr. Janet Knodel, with 0 = no feeding and 6 = dead plant. Within each plot, 10 randomly selected seedlings were rated. For analysis, the 10 ratings were averaged for a single rating value per plot. We attempted to rate feeding injury at 3, 7, 10 and 14 days after emergence (DAE), but this was not possible for the last rating due to weather. Plant stand was measured after the last injury ratings were made by counting the number of live plants in three square feet at two locations within each plot, and calculating the number of plants per square foot. Plots were harvested at maturity by straight combining with a research plot combine. Grain weight and percent moisture content were collected with the Harvest Master weigh system on the combine. Yields were adjusted to 10% standard grain moisture. All data were analyzed using the GLIMMIX procedure in SAS version 9.4 statistical software. The Tukey HSD post-hoc test ($P<0.05$) was used to test for significance among treatment means.

Table 3. Sampling activities, sampling dates, and crop stages.

Activity	Date	DAE	Crop Stage
Injury Rating 1	June 7	3 DAE	Cotyledon
Injury Rating 2	June 11	7 DAE	2-leaf
Injury Rating 3	June 14	10 DAE	3-leaf
Injury Rating 4	June 19	15 DAE	4-leaf
Stand Counts	June 19	15 DAE	4-leaf

Results and Discussion

Flea beetle activity and seedling feeding was unusually light due to cold, wet conditions from mid-May through June. These conditions favored canola growth but not flea beetle activity. Flea beetles

are most active and destructive to canola seedlings when warm, dry conditions exist during the susceptible seedling stages from emergence through the 6-leaf stage. Consequently, seedling injury was relatively low regardless of the seed treatment package tested.

Treatment means are presented in Table 4. There were no significant differences among treatments for plant stand, yield, and feeding injury at 3, 7, and 10 DAE. Treatment 9, InVigor L350 with the commercial Helix Vibrance and Lumiderm seed treatment package, was not significantly different from Treatment 3 (DK400TL with the equivalent seed treatment package) for plant stand, yield, and feeding injury at 3, 7 and 10 DAE. However, Treatment 9 had significantly less feeding injury than all other treatments at 15 DAE. This may be due to better seedling vigor compared to DK400TL where InVigor L350 was able to grow through earlier feeding injury more quickly than DK400TL. While not statistically significant, Treatment 9 had the highest yield of all treatments, which seems to support a hybrid performance difference rather than a seed treatment efficacy difference. With the increased availability of many new straight-cut hybrids, hybrid performance using the most commonly available commercial seed treatments should be examined in more rigorous detail.

Table 4. Treatment means for seed treatments for flea beetle injury, plant stand, and grain yield at Langdon, 2024.

Trt. No.	Treatment	Injury 3 DAE	Injury 7 DAE	Injury 10 DAE	Injury 15 DAE	Plant Stand (plants/ft^2)	Grain Yield (lbs/acre)
1	Fungicide Check	2.4	3.7a	3.8a	2.7abc	7.2a	2,384.7a
2	Helix Vibrance @ 23	2.2	3.4a	3.9a	3.3a	9.5a	2,481.8a
3	Helix Vibrance @ 23 Fortenza @ 10.2	1.4	2.6a	3.3a	3.1ab	8.8a	2,566.0a
4	Prosper Evergol @ 21.5	1.7	2.9a	3.7a	2.9abc	9.3a	2,496.5a
5	Prosper Evergol @ 21.5 Lumiderm @ 9.8	1.1	2.3a	3.5a	2.9abc	7.9a	2,535.4a
6	Prosper Evergol @ 21.5 Buteo Start @ 9.6	1.0	2.9a	3.7a	2.8abc	8.3a	2,491.9a
7	Prosper Evergol @ 21.5 Buteo Start @ 16	1.3	2.9a	3.4a	2.4bc	8.1a	2,684.8a
8	Prosper Evergol @ 21.5 Lumiderm @ 9.8 Buteo Start @ 9.6	0.8	2.1a	3.4a	2.4c	8.8a	2,652.5a
9	Hybrid L350 Helix Vibrance @ 23 Lumiderm @ 9.8	1.6	3.0a	3.2a	1.6d	7.8a	3,002.1a
	F-value	**1.94**	**1.17**	**1.08**	**12.03**	**0.92**	**2.01**
	P-value	**0.10**	**0.35**	**0.41**	**<0.0001**	**0.52**	**0.09**

Means within a column that share the same letter are not significantly different (Tukey's HSD at P<0.05).

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