Utah IPM/SA Mini-Grant Final Report 2012

Project Title: 'Alfalfa Stem Nematode Resistance as a Tool To Ameliorate Crop Losses'

Location of Project: Weber County, Utah

Total Grant Award: $2,103

Principal Investigator: James Barnhill

Co- Principal Investigators: Claudia Nischwitz, Earl Creech, Ricardo Ramirez, Michael McClure

Cooperators: Jay Christensen

Objectives of Project: Determine the comparative level of stem nematode resistance of ten alfalfa varieties to a Utah population of nematodes and determine the economic advantage of selecting a variety with high resistance. After four years the effect of alfalfa stem nematode resistance on stand longevity would be determined.

Summary of Project:

Plots containing six replications of ten alfalfa varieties were established in a field of newly planted alfalfa in the spring of 2012. The planting date was March 27. This field had been heavily infested with alfalfa stem nematode two years ago, before it was planted to grain. Surrounding fields also exhibit high levels of alfalfa stem nematode infestation.

A soil test of the plot area indicated deficiencies in both Phosphorus (9.1 ppm) and Potassium (73.1 ppm). An application of 150 pounds/acre of P_2O_5 and 200 pounds / acre of K_2O was made on April 23.

On June 21, 2012 ten soil samples, six inches deep, were collected from the north half of the trial area and ten samples from the south half. These were sent to Arizona for analysis. The results showed only 0.48 stem nematodes per cubic centimeter (cc) in the south plot area and 0.08 stem nematodes per cc in the north plot area.

Due to heavy weed growth the field was clipped when about a foot tall. The first cutting was taken on July 20. Five alfalfa stems were collected from each of the sixty plots and analyzed for stem nematodes. Only three of the plot samples contained alfalfa stem nematode.

Stand counts were taken on 0.1 meter^2 areas in each plot after the first cutting.

Second cutting was taken on September 17, 2012. The average dry matter was 20% for the first cutting and 28% for the second.

Results of Project

The variety stem counts are in table 1. They will give us a base count to determine whether alfalfa stem nematode resistance endows some varieties to experience less stand loss over the years..

The weights from the 1st and 2nd cuttings are in tables 2. and 3. respectively. They do not show great varietal differences. After a few more years we hope to see significant differences in production that can be correlated with alfalfa stem nematode resistance.

Table 1.

2012 Alfalfa Stem Nematode Trial Stem Count/m²– July 20, 2012									
Variety	**Rep 1**	**Rep 2**	**Rep 3**	**Rep 4**	**Rep 5**	**Rep 6**	**Average**	**Ave/ft²**	**Stems/Acre**
Ranger	114	137	115	120	84	56	104.333	112.30	4891938
DKA 43-22	92	78	108	92	96	108	95.667	102.98	4485579
PC PGI 424	94	95	45	77	117	101	88.167	94.90	4133922
PC PGI 557	134	78	133	131	138	106	120	129.17	5626511
WL 363 HQ	84	110	116	83	68	85	91	97.95	4266770
Amer. Alf. 445NT	137	121	115	109	69	105	109.333	117.68	5126376
Croplan Denali 4.10 RR	109	134	103	87	81	78	98.667	106.20	4626242
Eureka 4R200 RR	64	111	68	88	104	75	85	91.49	3985445
P 54V09	129	105	142	86	84	111	109.5	117.86	513419
P 54Q25	127	112	135	139	66	136	119.167	128.27	5587438

Table 2.

2012 Alfalfa Stem Nematode Trial 1st Cut– July 20, 2012 (.00126 acres/plot)										
Variety	**Rep 1 kg/plot**	**Rep 2 kg/plot**	**Rep 3 kg/plot**	**Rep 4 kg/plot**	**Rep 5 kg/plot**	**Rep 6 kg/plot**	**Average kg/plot**	**Average kg/acre**	**Ave. Wet tons/ acre**	**Ave. Dry tons/ acre**
Ranger	13.53	12.51	14.38	10.17	13.52	12.51	13.013	10328	11.38	2.28
DKA 43-22	16.28	12.96	10.99	13.13	13.58	11.04	13.037	10347	11.41	2.28
PC PGI 424	14.59	13.74	13.24	14.05	12.48	12.27	13.042	10351	11.41	2.28
PC PGI 557	12.34	12.88	11.87	13.72	13.63	12.38	12.998	10316	11.37	2.27
WL 363 HQ	13.33	11.24	13.39	12.51	12.9	13.7	13.026	10338	11.40	2.28
Amer. Alf. 445NT	13.09	15.18	11.57	13.6	14.32	11.04	13.056	10362	11.42	2.28
Croplan Denali 4.10 RR	11.6	14.25	13.31	12.82	11.64	15.24	13.040	10349	11.41	2.28
Eureka 4R200 RR	13.31	11.97	13.08	12.82	14.21	14.85	13.015	10329	11.39	2.28
P 54V09	11.99	14.61	11.07	13.66	14.19	13.15	12.895	10234	11.28	2.26
P 54Q25	12.99	14.02	13.22	10.95	13.58	10.6	12.787	10148	11.19	2.24
Column Average	13.31	13.34	12.612	12.74	13.41	12.678	13.013	10328	11.39	2.28

Table 3.

2012 Alfalfa Stem Nematode Trial 2nd Cut– Sept. 17, 2012 (.00126 acres/plot)										
Variety	**Rep 1 kg/plot**	**Rep 2 kg/plot**	**Rep 3 kg/plot**	**Rep 4 kg/plot**	**Rep 5 kg/plot**	**Rep 6 kg/plot**	**Average kg/plot**	**Average kg/acre**	**Ave. Wet tons/acre**	**Ave. Dry tons/ acre**
Ranger	9	7.22	6.73	7.54	8.82	6.39	7.617	6044	6.66	1.87
DKA 43-22	7.63	7	8.09	8.21	7.896	8.55	7.896	6266	6.91	1.93
PC PGI 424	8.27	7.14	7.44	7.68	9.43	8.34	8.05	6388	7.04	1.97
PC PGI 557	8.65	9.6	9.48	8.89	8.95	8.35	8.987	7132	7.86	2.20
WL 363 HQ	8.88	9.74	9.3	9.41	8.3	8.37	9	7142	7.87	2.21
Amer. Alf. 445NT	10.02	9.59	7.96	8.46	7.2	8.66	8.648	6863	7.56	2.12
Croplan Denali 4.10 RR	9.35	8.7	9.84	7.7	10.19	7.62	8.9	7063	7.79	2.18
Eureka 4R200 RR	8.46	9.65	6.31	8.23	9.7	6.24	8.098	6427	7.09	1.98
P 54V09	10.66	10.2	8.67	8.39	6.74	9.81	9.078	7205	7.94	2.22
P 54Q25	10.78	6.55	9.92	8.37	6.94	9.56	8.687	6894	7.60	2.13
Column Average	9.17	8.54	8.37	8.288	8.4166	8.189	8.496	6742	7.43	2.08

Evaluation and Impact

The trial will need to be evaluated over future years before an impact can be determined.

Educational Outreach

Dennis Hinkamp assisted James Barnhill in making a video on how to recognize the field symptoms of alfalfa stem nematode and the process of analyzing alfalfa stems for nematodes in the lab. This video was posted to YouTube.