Fall Dormancy Effect on Three-cut Alfalfa Production

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Abstract

Alfalfa is an important crop for central Oregon. Six varieties, representing fall dormancies (FD) 1-6, were planted in August of 1998 at the Central Oregon Agricultural Research Center, Powell Butte, Oregon. The trial was conducted as a three-cut harvest management system for 5 years. The 5-year yield ranged from a high of 33.98 ton/acre (FD 2) to a low of 31.95 ton/acre (FD 5). FD had no effect on annual average third-cutting yield and only affected third-cutting yield the first year of the trial, under a three-cut harvest regime.

Introduction

Alfalfa continues to be an important crop for central and eastern Oregon. Over the years, there has been a range of perhaps 35,000 to 50,000 acres of alfalfa grown in the counties of Crook, Deschutes, and Jefferson. The alfalfa is grown in pure stands and grass/alfalfa mixtures for hay. Locally the hay produced is fed on-ranch or farm or marketed to livestock producers, dairies, and feed stores in Oregon, Washington, and California. Some alfalfa is exported to Pacific Rim countries. Alfalfa is an important rotational crop to help break disease and insect cycles, and adds nitrogen (N) to the soil for subsequent crops through nitrogen fixation.

Seed companies continue to develop and market numerous varieties. In past years, varieties with an FD rating of 1-3, and some with 4 have typically been planted, but recently some producers in central Oregon have begun planting more FD-4 varieties, with an occasional FD-5 variety planted.

"The expression of fall dormancy depends on the combination of shortening day length and cool temperatures. Under short day conditions, differences among dormant and nondormant cultivars are more pronounced at low temperatures. At cool temperatures, dormant cultivars have the greatest dormancy response and nondormant cultivars have the least response. Maximum dormancy seems to be induced at a temperature of 15.5°C and a photoperiod of 12 hours. Accordingly, a decrease in photoperiod and temperature causes a greater decrease in top growth of fall dormant cultivars than in the non fall-dormant cultivars. Under long day conditions there is little difference in regrowth between dormant and nondormant cultivars."

"In general, American alfalfa cultivars trace to nine different distinct sources of germplasm from different regions of the world. These germplasm sources are *Medicago falcate*, Ladak; *M. varia*, Turkistan; and Flemish, Chilean, Peruvian, Indian, and African varieties listed in their approximate descending order of winter hardiness and fall dormancy characteristics. A tenth source of nondormant germplasm from Saudi Arabia has generally gone unrecognized."

Fall dormancy is classified on the basis of vegetative growth observed in the autumn, particularly in northern latitudes. Dormants are northern types and nonodormants are southern types (Mckenzie, et al).

Selecting an alfalfa variety is important. Since fall dormancy and winter hardiness genes in alfalfa have been recently delinked, there has been more interest in planting alfalfa varieties with higher fall dormancy ratings because of the potential of increased yield on last cutting.

The information generated by this trial is limited because only one entry represents each fall dormancy rating. It will begin to build an information base that is important to producers, fieldmen, seed suppliers, and the seed companies who are involved in central Oregon forage production.

Materials and Methods

Soil samples were taken and analyzed by the Oregon State University Central Analytical Laboratory, Corvallis Oregon (see Table 1). Based on the soil test results, lime, phosphorus, potassium, sulfur, and boron were applied and disked into the top 6 inches of soil on April 18, 1998 (see Table 2.). The field was then leveled and rolled prior to planting.

Table 1. Soil test analyses from alfalfa variety trial soil samples taken at the Central Oregon Agricultural Research Center, Powell Butte, Oregon.

Date	Depth (in)	OM (%)	pH	P (ppm)	K (ppm)	Ca (meq/ 100g)	Mg (meq/ 100g)	B (ppm)	Zn (ppm)	Sol salts Mmhos /cm	Se (ppm)	Mn (ppm)	Total Bases
7/10/1995	0-12	3.33	5.7	40	230	6.0	2.6	0.34		0.50			
8/3/1998	0-10		5.8	47	177	6.0	2.5	0.40	0.6	--	--	15	9.0
3/2000	0-10		7.2	33	216	7.1	2.4	0.50	0.32	0.50	<0.10*		
4/2002	0-10		6.6	48	238	9.3	2.6	0.59	5.57				

* below the minimum detectable level.

Table 2. Nutrient applications made to the alfalfa variety trial at the Central Oregon Agricultural Research Center, Powell Butte, Oregon.

Date applied	N	P_2O_5 (lb/ac)	K_2O (lb/ac)	Ca (lb/ac)	S (lb/ac)	B (lb/ac)	Zn (lb/ac)
4/11/1998	19	0	217	2.5 ton[1]	14	2.2	0
4/17/1998	28	0	0	172	32	0	0
3/241999	0	72	144	202	38	0	0
3/24/2000	0	72	144	202	38	0	0
3/23/2001	0	96	191	183	34	1.5	7.7
3/29/2002	0	96	191	183	34	0	0
2003	0	0	0	336	64	0	0

[1] 2.5 ton per acre of lime

Six alfalfa varieties, representing FD 1-6, were planted at the Central Oregon Agricultural Research Center (COARC) at the Powell Butte site on August 24, 1998 (Table 3). The trial site is located 7 miles west of Prineville and 12 miles east of Redmond and the elevation is 3,180 ft. Eighteen pounds/acre of inoculated seed were planted with a small plot cone-type drill with nine rows, 6-inch row spacing. The field was rolled after planting. Plot size was 5 ft by 20 ft, while the harvested area was 3.5 ft by 15 ft. The trial was laid out in a randomized complete block design with four replications.

Table 3. The fall dormancy, winter hardiness, disease, insect, and pest ratings for the 1998 planted alfalfa fall dormancy variety trial conducted at Central Oregon Agricultural Research Center, Powell Butte, Oregon.

Variety	FD[1,2]	BW[3]	VW	FW	AN	PRR	SAA	PA	BAA	SN	APH	SNKN	NRKN	RLN
Spredor III	1	4	1	4	1	1	4	2	1	3	1	1	1	1
5262	2	5	2	3	1	4	4	4	1	3	1	1	1	1
Innovator +Z	3	5	4	5	5	5	3	4	1	4	4	1	1	1
5396	4	4	4	4	5	4	4	4	1	4	1	1	3	1
Archer	5	3	3	5	4	4	5	5	4	4	1	1	4	1
Lobo	6	3	4	5	4	4	4	4	4	4	1	1	1	1

[1]FD = Fall dormancy; BW = Bacterial wilt, VW = Verticillium wilt, FW = Fusarium wilt, AN = Anthracnose race 1, PRR = Phytophthora root rot, SAA = Spotted alfalfa aphid, PA = Pea aphid, BAA = Blue alfalfa aphid, SN = StemnNematode, APH = Aphanomyces, SKN = Southern root knot nematode, NRKN = Northern root knot nematode, RLN = Root lesion nematode.

[2]Fall dormancy (FD) ratings: 1 = most dormant, 11 = least dormant.

[3]Resistance ratings: 1 = Susceptible (S) (0-5 percent of plants) or has not been tested, 2 = Low resistance (LR) (5-15 percent), 3 = Moderate resistance (MR) (15-30 percent of plants), 4 = Resistance (R) (30-50 percent of plants), 5 = High resistance (HR) (>50 percent of plants).

The alfalfa was harvested with a sickle bar forage plot harvester, and fresh wet yield was weighed directly in the field. Aftermath from the plots was swathed, raked, and baled with fairly high moisture content (rather than waiting for typical moisture to bale) to help clear the field and get the irrigation water back on the field as soon as possible. Harvest dates are listed for each cutting in the annual yield tables.

Moist samples (0.5-1.0 lb) were taken for each plot and dried at 145°F until no further change in weight occurred. Yields were calculated on an oven-dry basis. SAS statistical software program was used for analysis of variance and results are reported using Protected Least Significant Difference (PLSD) for mean separation at the P = 0.10, 0.05, and 0.01 probability levels. Discussion in the results and discussion are limited to the PLSD 0.10 level.

The trial was sprinkler irrigated with solid set sprinklers with a 30- by 40-ft spacing as needed for establishment and during the season. Nelson rotating head Windfighter 2000 nozzles were used. Irrigation was determined by crop water use prediction by the Agrimet weather station program and by probing the soil with a soil probe and using the

feel test method. There is an Agrimet weather station located at the COARC. The trial was usually irrigated twice per week, depending upon time of year.

Between the second and third cutting in 2001, the irrigation heads/nozzles were changed from 7/64-inch to 9/64-inch Nelson rotating head wind fighter 2000 nozzles. We saw no problems with irrigation coverage up to the switch, even though the smaller size head had been used since the start of the trial.

Pursuit® (1 DG Eco Pak bag), Poast® (0.47 lb ai/acre) and 2 quarts of crop oil were applied for weed control September 17, 1998 of the establishment year. The first winter dormant weed control included applying Velpar L® (0.75 lb ai/acre), Gramoxone Extra® (0.5 lb ai/acre), and Kerb® (1 lb ai/acre) on February 9, 2000. Velpar L (0.75 lb ai/acre), Kerb (1 lb ai/acre), and Gramoxone Extra (0.5 lb ai/acre) were applied on December 6, 2000 for the third production year. Velpar (0.5 lb ai/acre),Gramoxone Extra (0.5 lb ai/acre), and Spredor® 90 (1 pint/100gal) were applied in January 15, 2002 for the fourth production year. On June 30, 2000, Baythroid® (2.88 oz/acre) was applied by aerial application to control alfalfa weevil.

Results

Weed control was excellent and winters were relatively mild for the 5 years of the trial. Exremely cold winter weather was not a factor in the trial.

It is important to note that that the results are only from a single variety representing an FD level. Other varietal genetic factors could be modifying the results.

Total Cumulative Yield

There were significant differences among varieties (FD) for total cumulative yield at the PLSD 0.10 level or higher (Table 4.). Total yield ranking was FD 2 = 3 = 4 > 1 = 6 = 5. Variety '5262' (FD 2) had the highest yield at 33.98tons/acre and 'Archer' (FD 5) had the lowest total yield at 31.93 tons/acre. There were approximately 2 tons/acre difference between the entries after 5 years of production. The middle dormants (FD 2-4) appear to be better choices for planting under the climatic conditions of Powell Butte, Oregon, for the 5 year period of this trial.

Table 4. Total cumulative yield results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1999 total yield (ton/acre)	1999-2000 total yield (ton/acre)	1999-2001 total yield (ton/acre)	1999-2002 total yield (ton/acre)	1999-2003 total yield (ton/acre)
2	6.33	13.84	22.32	28.69	33.98
3	6.39	13.92	22.25	28.56	33.83
4	6.27	13.79	21.93	28.03	33.39
1	6.34	13.26	21.24	27.37	32.61
6	6.18	12.99	20.76	26.75	32.03
5	6.19	13.08	20.94	26.77	31.95
Mean	6.28	13.48	21.57	27.69	32.97
PLSD 0.01	*NS*	0.86	1.01	1.16	1.63
PLSD 0.05	*NS*	0.63	0.75	0.87	1.22
PLSD 0.10	*NS*	0.53	0.62	0.72	1.02
CV %	4.9	4.7	3.4	3.1	3.6
Pr. > F	0.6635	0.0109	0.0002	0.0001	0.0032

Annual Average Yield

There were significant differences among varieties (FD) for annual average yield for first and second cutting, and total yield at the PLSD 0.10 level or higher (Table 5). Total yield ranking was FD 2 = 3 = 4 > 1 = 6 = 5, which was the same as total 5 year cumulative yield.
Average annual first cutting yield ranking was FD 2 = 1 = 3, 2 and 1 > 4, 3 = 4 > 5 = 6 (PLSD 0.10). It is interesting that the lower FD varieties were higher yielding on the first cutting than the higher-FD-rated varieties.
Average annual second cutting yield ranking was FD 2 = 3 = 4 = 6, 2 > 5, 4 = 6 = 5, 4 and 6 > 1, 5 = 1 (PLSD > 0.10), which was significantly different. We do not believe that FD had any effect on second-cutting yield.
Average annual third-cutting yield ranking was FD 3 = 6 = 5 = 4 = 2 = 1 (not significant [NS]).

Table 5. Average annual yield of each cutting, across 1999-2003, and average total annual yield of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield annual 5-year mean (ton/acre)	2nd cut yield annual 5-year mean (ton/acre)	3rd cut yield annual 5-year mean (ton/acre)	Total yield annual 5-year mean (ton/acre)
1	2.61	2.11	1.81	6.52
2	2.71	2.23	1.86	6.80
3	2.60	2.21	1.96	6.77
4	2.58	2.19	1.91	6.68
5	2.32	2.15	1.92	6.39
6	2.26	2.19	1.95	6.41
Mean	2.51	2.18	1.90	6.59
PLSD 0.01	0.18	*NS*	*NS*	*NS*
PLSD 0.05	0.13	0.08	*NS*	0.24
PLSD 0.10	0.11	0.06	*NS*	0.20
Pr. > F	0.0001	0.0411	0.1966	0.0032
CV %	5.2	3.5	6.8	3.6

1999 Results

There was a significant difference among varieties (FD) only on third-cutting yield (Table 6). This was the only third cutting out of the 5 years that FD affected its yield. , FD 3 yield equaled yields of FD 5 and 6, perhaps due to cultivar factors and harvest management unrelated to FD.

First-cutting ranking was FD 1 = 2 = 3 = 6 = 5 = 4 (NS).
Second-cutting ranking was FD 2 = 3 = 5 = 6 = 4 = 1 (NS).
Third cutting ranking was FD 3 = 6 = 5 > 4 > 2 = 1 (S).
Total yield ranking was FD 3 = 1 = 2 = 4 = 5 = 6 (NS).
There were no moisture differences among varieties at harvest.

Table 6. 1999 yield results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield (ton/acre)	1st cut moisture (%)	2nd cut yield (ton/acre)	2nd cut moisture (%)	3rd cut yield (ton/acre)	3rd cut moisture (%)	Total yield (ton/acre)
1	3.18	80.8	1.76	83.2	1.40	77.7	6.34
2	3.02	80.8	1.91	82.2	1.41	77.9	6.33
3	3.00	79.8	1.83	82.7	1.56	77.7	6.39
4	2.65	83.2	1.80	82.8	1.48	78.0	6.27
5	2.81	79.9	1.81	82.4	1.56	77.9	6.19
6	2.82	80.8	1.81	83.0	1.55	77.5	6.18
Mean	2.91	80.9	1.82	82.7	1.49	77.8	6.28
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	0.10	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	0.07	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	0.06	*NS*	*NS*
Pr. > F	0.2861	0.2190	0.7304	0.3502	0.0001	0.2419	0.6635
CV %	16.2	3.5	10.1	1.2	4.9	0.6	4.9
Harvest date	6/18		8/3		9/30		

2000 Results

There were significant differences among varieties (FD) on first cutting, second cutting, total yield, and third-cut moisture in 2000 (Table 7).
First-cutting yield ranking was FD 2 = 4 = 3, 2 and 4 > 1, 3 > 5 and 6, 3 = 1, 1 > 6, 5 = 6 (S). The middle-FD-rated varieties yielded the highest.
Second-cutting yield ranking was FD 3 = 4, 3 > 2, 4 = 2 = 6, 2= 6 = 5, 6 = 5 = 1 (S).
Third-cutting yield ranking was FD 3 = 5 = 6 = 2 = 1 = 4 (NS).
Total yield ranking was FD 3 = 2 = 4 > 1 = 5 = 6 (S).

Table 7. 2000 yield and moisture content by cuttings results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield (ton/acre)	1st cut moisture (%)	2nd cut yield (ton/acre)	2nd cut moisture (%)	3rd cut yield (ton/acre)	3rd cut moisture (%)	Total yield (ton/acre)
1	2.59	79.8	2.10	83.4	2.23	78.9	6.92
2	2.95	79.4	2.28	83.3	2.28	78.7	7.51
3	2.77	79.5	2.44	83.0	2.33	78.9	7.53
4	2.94	79.0	2.37	82.9	2.11	79.2	7.42
5	2.38	79.8	2.20	82.9	2.33	77.9	6.90
6	2.26	79.5	2.23	82.8	2.32	78.0	6.81
Mean	2.65	79.5	2.27	83.0	2.26	78.6	7.20
PLSD 0.01	0.36	*NS*	0.26	*NS*	*NS*	*NS*	0.65
PLSD 0.05	0.27	*NS*	0.18	*NS*	*NS*	0.9	0.49
PLSD 0.10	0.22	*NS*	0.15	0.4	*NS*	0.7	0.41
Pr. > F	0.0001	0.4233	0.0066	0.0928	0.5264	0.0281	0.0033
CV %	10.0	1.0	7.6	0.6	11.8	1.1	6.6
Harvest date	6/6		7/19		9/13		

2001 Results

There were significant differences among varieties (FD) on first-cutting and second-cutting yield, only, in 2001 (Table 8).

First-cutting ranking was FD 2 = 3, 2 > 1, 3 = 1, 1 = 4 > 5 = 6 (S).
Second-cutting ranking was FD 1 = 2 = 4 = 6 = 3 = 5 (NS).
Third-cutting ranking was FD 3 = 6 = 5 = 2 = 4 = 1 (NS).
Total yield ranking was FD 2 = 3 = 1 = 4 = 6 = 5 (NS).

Table 8. 2001 yield and moisture content by cuttings results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield (ton/acre)	1st cut moisture (%)	2nd cut yield (ton/acre)	2nd cut moisture (%)	3rd cut yield (ton/acre)	3rd cut moisture (%)	Total yield (ton/acre)
1	3.12	77.8	3.20	78.4	1.81	79.4	8.12
2	3.29	77.5	3.11	79.8	2.07	79.8	8.47
3	3.16	78.0	3.03	79.5	2.14	79.4	8.33
4	2.98	77.3	3.06	79.2	1.99	80.3	8.03
5	2.76	77.4	3.00	79.5	2.10	79.3	7.86
6	2.76	76.0	3.04	79.4	2.13	79.0	7.94
Mean	3.01	22.7	3.08	79.3	2.03	79.6	8.12
PLSD 0.01	0.25	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	0.22	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	0.16	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Pr. > F	0.0029	0.3479	0.8350	0.5794	0.2090	0.7760	0.2207
CV %	9.9	8.3	10.4	1.8	14.4	2.3	6.7
Harvest date	6/13		8/1		9/19		

2002 Results

There were significant differences among varieties (FD) on first-cutting yield, and second- and third-cutting moisture in 2002 (Table 9).
First-cutting ranking was FD 2 = 1 = 3 = 4 > 5 = 6 (S). The higher yields seemed to be correlated to the lower FD ratings, and yield decreased as the dormancy number increased. There probably were other factors affecting yield as well.
Second-cutting ranking was FD 2 = 6 = 3 = 5 = 4 = 1 (NS).
Third-cutting ranking was FD 6 = 3 = 5 = 1 = 2 = 4 (NS).
Total yield ranking was FD 2 = 3 = 1 = 4 = 6 = 5 (NS).

Table 9. 2002 yield and moisture content by cuttings results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield (ton/acre)	1st cut moisture (%)	2nd cut yield (ton/acre)	2nd cut moisture (%)	3rd cut yield (ton/acre)	3rd cut moisture (%)	Total yield (ton/acre)
1	2.34	80.2	1.75	83.0	2.04	81.7	6.13
2	2.40	79.8	1.95	82.7	2.02	81.9	6.38
3	2.28	79.6	1.89	82.7	2.13	81.3	6.31
4	2.25	79.3	1.85	81.7	1.99	81.2	6.10
5	1.91	79.8	1.86	82.2	2.05	81.1	5.83
6	1.90	79.3	1.94	81.6	2.15	80.6	5.99
Mean	2.18	79.7	1.87	82.3	2.07	81.3	6.12
PLSD 0.01	0.35	*NS*	0.13	0.9	*NS*	*NS*	*NS*
PLSD 0.05	0.26	*NS*	0.10	0.6	*NS*	0.9	*NS*
PLSD 0.10	0.22	*NS*	0.08	0.5	*NS*	0.7	*NS*
Pr. > F	0.0005	0.2825	0.0023	0.0003	0.2359	0.0464	0.4297
CV %	11.8	1.0	5.2	0.8	7.2	1.0	9.3
Harvest date	6/12		7/17		9/3		

2003 Results

There were no significant differences among varieties (FD) for yield, but there were significant differences between varieties (FD) for first and third-cutting moisture in 2003 (Table 10).
First-cutting ranking was FD 2 = 3 = 1 = 6 = 4 = 5 (NS).
Second-cutting ranking was FD 6 = 5 = 2 = 1 = 3 = 4 (NS).
Third-cutting ranking was FD 4 = 3 = 6 = 1 = 5 = 2 (NS).
Total yield ranking was FD 4 = 2 = 6 = 3 = 1 = 5 (NS).

Table 10. 2003 yield and moisture content by cuttings results of the fall dormancy alfalfa trial planted on August 24, 1998 at the Central Oregon Agricultural Research Center at Powell Butte, Oregon.

Fall dormancy	1st cut yield (ton/acre)	1st cut moisture (%)	2nd cut yield (ton/acre)	2nd cut moisture (%)	3rd cut yield (ton/acre)	3rd cut moisture (%)	Total yield (ton/acre)
1	1.80	81.3	1.86	82.3	1.58	78.9	5.24
2	1.88	80.7	1.88	81.8	1.53	78.3	5.29
3	1.80	80.7	1.85	81.9	1.62	78.8	5.27
4	1.73	79.9	1.84	81.3	1.79	77.4	5.36
5	1.72	79.6	1.89	81.6	1.57	78.7	5.18
6	1.74	79.7	1.94	81.6	1.61	77.7	5.29
Mean	1.77	80.4	1.88	81.8	1.62	78.3	5.27
PLSD 0.01	*NS*	1.0	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	0.7	*NS*	*NS*	*NS*	1.0	*NS*
PLSD 0.10	*NS*	0.6	*NS*	*NS*	*NS*	0.9	*NS*
CV %	8.5	0.9	6.5	0.9	25.2	1.3	10.1
Pr. > F	0.2763	0.0001	0.6475	0.1484	0.8493	0.0305	0.9917
Harvest date	6/16		7/25		9/16		

Discussion

Selecting an alfalfa variety for an individual field is important. Part of that process is selecting a variety for its yield and quality potential, pest resistance ratings, as well as for its FD rating. How the variety yields on each cutting over the years may be important, or perhaps only the total yield at the end of its production cycle is the biggest justification.

There was a yield disadvantage for the higher-rated nondormants on first cutting at this location under our harvest management regime. Variety genetics and pest resistance could also be just as responsible for the differences between varieties than FD.

The mid-rated FD varieties were, in general, the highest yielding. One would expect more differences between the different FD varieties yield on the third (last) cutting, but this occurred only 1 year out of the 5 years (first year, Table 6.). Because of the date of the second cutting and the long third-cutting growing interval, the varieties were not intensively managed. Any advantage that higher-rated nondormants are purported to offer on last cutting was not realized in this trial, under this management regime.

Perhaps the most surprising aspect of the trial results is that the FD-1 and 2 entries were not the lowest yielding in the fifth year. Most of the time (but not always), the varieties with little or no resistance to Verticillium wilt tend to be the lowest yielding in the later years of production (Table 10). That was not the case in this trial. The FD-2 entry, 5262, has a two or low resistance rating (LR) for Verticillium wilt while Spredor III has a one, or susceptible resistance (S) rating, (or has not been adequately tested) (Table 3).

It is important to note that only one variety was used to represent each FD rating, because these results show that FD is not very important under the management and weather conditions that this trial was conducted. The trial does begin to add to the information data base for the production of alfalfa in central Oregon.

Acknowledgements

Seed for the trial was provided by ABI Alfalfa and America's Alfalfa, Eureka Seeds, Inc., Northrup King, and Pioneer Hi-bred International. Mark Smith, Breeder for Pioneer Hibred Intl. and Don Miller, Breeder for ABI, are acknowledged for their help in selecting the varieties for this trial.

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