



AGRONOMY PROGRESS REPORT

2019 CALIFORNIA ALFALFA VARIETY TRIAL RESULTS

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INTRODUCTION

This publication details alfalfa yield trial data for multiple-year, single harvest, and single year summaries for the year 2019. Yield trials were conducted in the Intermountain area (Tulelake), the San Joaquin Valley (Five Points and Parlier) and the Imperial Valley (El Centro). The alfalfa variety trial data from the University of California is placed online well in advance of this published report, see (<http://alfalfa.ucdavis.edu/+producing/variety>).

Choosing superior varieties of alfalfa is a significant economic factor for alfalfa growers. A large number of commercial varieties are currently available, enabling a wide range of options. These UC trials provide unbiased data from a wide range of environments related to variety performance of alfalfa. In California, alfalfa is grown from the Oregon border to the Mexican border, and throughout the Great Central Valley, which consists of the Sacramento and San Joaquin Valleys (Figure 1). These sites represent 3-4 cut systems (dormant varieties) in the **Intermountain Region**, 6-8 cut systems (dormant, semi-dormant, or non-dormant 90% varieties) in the **Northern Central Valley**, 7-8 cut systems (semi-dormant to non-dormant varieties) in the **Southern Central Valley** and 8-11 cut systems (non-dormant varieties) in the **Low Desert Environment**.

These data are frequently used by growers to choose varieties, and by breeders to help guide further selection. We test both private and public varieties, and experimental lines destined for release within the next few years. This report provides single year and over-the-year summary

California Alfalfa Acreages by Section

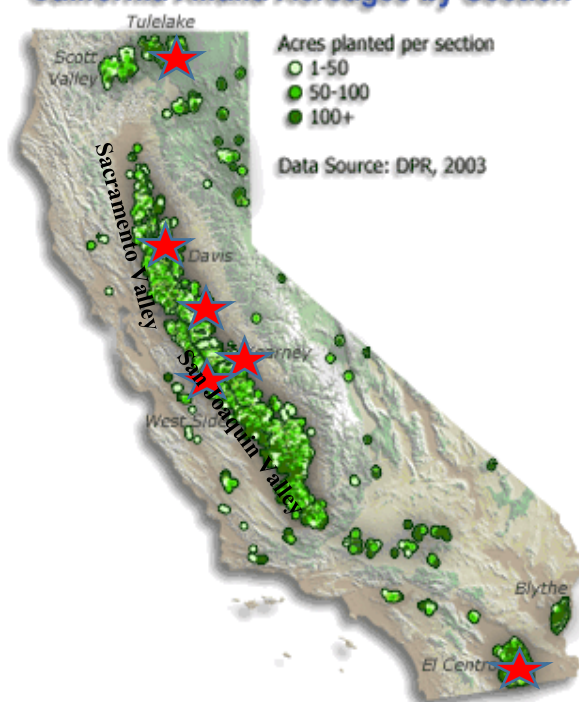


Figure 1. California alfalfa acreage. The Intermountain region is represented by Tulelake and Scott Valley, Sacramento Valley by Davis, San Joaquin Valley by Modesto, Parlier and Five Points Locations, and Low Desert by the El Centro trial.

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from alfalfa trials harvested in California in 2019.

TESTING VARIETY PERFORMANCE - METHODS

Yield Trials. The California Alfalfa Cultivar Yield, Fall Dormancy, and Forage Quality Trials are open to any certified alfalfa cultivar, which is sold or is likely to be sold in California. Blends or brands (unless they are certified blends) are not included in these trials. Experimental cultivars with a high likelihood of release within the next few years are tested as space permits. One new trial was established in the Sacramento Valley (Davis, CA) in the fall of 2019.

Two alfalfa-variety yield trials were harvested in 2019 at Tulelake and El Centro, CA. Specific planting dates for each trial are given on the results table for each trial. The plantings were at approximately 25 lbs/acre live seed. Plots were 3' to 4' wide and 18 to 20 feet long, depending upon location and specific layout. Four to six replicates of each cultivar were planted at each location, depending upon the expected variation at that site. Experimental design was a randomized complete block design. Harvests for yield estimation were obtained from approximately a 3' x 18' area per plot using a flail-type or cutter-bar type forage harvester, and dry matter yield determined by oven-drying subsamples to a constant weight. A representative group of 5-6 varieties were taken at each harvest, and the average dry matter used for yield determination. Four harvests were taken in the Intermountain Region, while nine cuttings were taken in the Imperial Valley. Cutting schedules were determined by the most common practice in that region and are the same for all varieties within a trial. The data is obtained from each of the locations and analyzed and summarized at the UC Davis campus.

Note on Statistical Inference: We have elected to analyze and report significance of variety testing data (calculation of F-test and LSD Values) based upon a probability value of 10% vs. the traditional 5%. In doing so, we are accepting a 90% confidence level vs. a 95% confidence level. This is due to the fact that growers routinely base decisions based upon degrees of confidence that are far lower than 95% confidence levels than is commonly used. A 10% probability level (the probability that the declared difference is based solely upon chance) is sufficiently conservative to prevent choosing varieties based upon false differences, yet represents good mean separation. Such decisions are always a compromise between practical factors and statistical vigor.

2019 YIELD RESULTS

Intermountain Region

2017 UC Tulelake Yield Trial -- This trial was planted with 44 entries on May 22, 2017. Four cuttings were taken during the 2019 season with the first cutting taking place on June 12, 2019. Single year results from the 2019 harvests are provided in Table 1. The average yield across all varieties was 8.6 tons/acre. The yearly yield averages between high and low varieties (9.5 t/A and 8.0 t/A respectively) varied by 1.5 tons or about 16% of the lowest yielding line. Yields for 2017-2019 averaged a little over 7.1 tons/acre, ranging from 6.4t/A -7.6t/A (Table 2). It should be pointed out that this trial was spring planted, and thus yields were understandably low for 2017, thereby reducing the three-year trial average. The CVs were relatively low; indicating control of varieties was stable over each cut in this trial.

Sacramento Valley Region

2019 UC Davis Variety Trial. This trial was planted 10/4/19 and includes 52 entries. Harvesting for yield will begin in the spring of 2020.

2017 UC Davis Low-lignin Trial- This trial was established March 3, 2017 to analyze varieties with the HarvXtra reduced-lignin trait and conventionally bred lower lignin alfalfa, and to compare with controls with same fall dormancy. This trial will evaluate forage quality with early and late-maturity cutting schedules and the interaction of these factors with variety. Results of this trial will be reported in other venues.

Low Desert Region

2017 El Centro Alfalfa Variety Trial – Planted on October 19, 2016 at the Desert Research and Extension Center in Holtville, CA. The trial includes 30 entries with six replications. Single year results are shown in Table 3. Average yield in 2019 was 14.6 t/A, with a 2.6 t/A difference between lowest and highest yielding varieties, 13.1t/A – 15.8t/A, respectively. Over the years average yield for 2017-2019 is shown in Table 4.

San Joaquin Valley Region

2017 UC Kearney Low-Lignin Trial –This trial located in Parlier, CA was established Sept.20, 2017 to analyze varieties with the HarvXtra reduced-lignin trait and conventionally bred lower lignin alfalfa. This trial will evaluate forage quality with early and late-maturity cutting schedules and the interaction of these factors with variety. An additional harvest schedule called ‘staggered’ alternates early (21 day) with late (35 day) harvests. Results of this trial will be reported in other venues.

2017 UC Westside Salinity Yield Trial – This trial was established 3/29/17 with 35 varieties in 4 replications at the West Side Research and Extension Center, Five Points, CA. This trial uses subsurface drip irrigation (SDI) to supply irrigation water uniformly, and occasional sprinkling for salt leaching. Low salinity treatments (LS) were watered with salinity levels of approximately 1.0-1.5 ds/l (ECw) and high salinity (HS) irrigations were approximately 8.0-10.0 ds/l (ECw). Yield results from eight cuts taken in 2019 show an average yield of 14.4 t/A in the LS treatments and 11.6 t/A in the HS treatments, a yield penalty of 2.8 t/A (Tables 5-6). The cumulative average yield for 2017-2019 shows a yield reduction of 5.8 t/A, or a 18% yield loss for varieties in the high salinity treatment (Table 7) NOTE: Single year data should not be used to judge the performance of alfalfa varieties.

INTERPRETING YIELD TRIAL RESULTS

We suggest the following procedure for selecting varieties:

1. **Select a group of high-yielding varieties** for your region (generally the top ¼ to 1/3 of a trial which is closest to your area) from Tables 1-9 over-the year's summaries (or from our website). Since this report contains single-year summaries, we recommend that you see the over-the years summaries from the relevant locations which is on our website: <http://alfalfa.ucdavis.edu>
2. **Determine the Pest Resistance and Fall Dormancy needs** for your region. The FD scores are provided on these tables and in the Alfalfa Alliance Website (see #3).
3. **Consider the Fall Dormancy and Pest resistance Ratings** of individual varieties – available at the Alfalfa Alliance Website (www.alfalfa.org).
4. **Choose those high yielding varieties** with the best Pest Resistance package for your region.
5. **Consider evidence for high quality** if available (such information is not always widely available, but generally more dormant varieties tend to be higher in quality).
6. **Consider Biotech Traits** such as glyphosate-resistance. This should be compared as a comprehensive weed control strategy, not just a variety.
7. **Test a variety on portions of your farm** to see how it does under your soil conditions.
8. **Consider the price of seed, availability and Service.**

ACKNOWLEDGMENTS

The authors are grateful for the help of Rudy Gonzales, Dale Pattigan and staff for help with the field plots at UC Kearney Ag Center, Merf Solorio and crew for help with the field plots at Westside Research and Extension Center, Darrin Culp and Rob Wilson's crew at the Intermountain Research and Extension Center, Gilberto Magallon and Oli Bachie's crew at the Desert Research and Extension Center, and Israel Herrera for help on the U.C. Davis plots.

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Table 1. 2019 YIELDS, TULELAKE ALFALFA CULTIVAR TRIAL. TRIAL PLANTED 5/22/17

Note: Single year data should not be used to evaluate alfalfa varieties or choose alfalfa cultivars

		Cut 1	Cut 2	Cut 3	Cut 4	YEAR		% of
		12-Jun	12-Jul	9-Aug	26-Sep	TOTAL		VERNAL
	FD			Dry t/a				
Released Varieties								
SW4107	4	3.54 (1)	2.55 (2)	1.89 (8)	1.52 (4)	9.50 (1)	A	117.3
WL365HQ	5	3.34 (10)	2.52 (4)	2.06 (1)	1.50 (6)	9.42 (2)	A	116.3
Nexgrow 6422Q	4	3.37 (7)	2.54 (3)	1.99 (2)	1.37 (26)	9.27 (3)	A B	114.4
SW5210	6	3.48 (4)	2.40 (14)	1.75 (25)	1.42 (11)	9.05 (4)	B C	111.8
Integra 8450	4	3.27 (15)	2.56 (1)	1.81 (17)	1.38 (21)	9.03 (5)	B C D	111.4
WL377HQ	5	3.10 (29)	2.43 (9)	1.94 (4)	1.51 (5)	8.98 (6)	B C D E	110.8
FG R513W227S	5	3.17 (22)	2.46 (6)	1.88 (10)	1.45 (8)	8.96 (8)	B C D E F	110.6
54Q29	4	3.49 (3)	2.39 (15)	1.66 (37)	1.41 (15)	8.95 (9)	B C D E F	110.5
WL363HQ	5	3.15 (23)	2.43 (8)	1.83 (16)	1.52 (3)	8.94 (11)	B C D E F	110.3
FG R513W224S	5	3.13 (26)	2.49 (5)	1.88 (11)	1.43 (10)	8.92 (12)	B C D E F G	110.1
Xtra-3	4	3.04 (34)	2.37 (17)	1.93 (6)	1.55 (2)	8.89 (13)	C D E F G H	109.8
AmeriStand 545NT RR	5	3.09 (30)	2.41 (13)	1.93 (5)	1.40 (17)	8.83 (14)	C D E F G H I	109.0
Nexgrow 6585Q	5	3.15 (24)	2.42 (11)	1.84 (14)	1.43 (9)	8.83 (15)	C D E F G H I	109.0
SW5213	5	3.25 (19)	2.44 (7)	1.74 (28)	1.39 (19)	8.82 (16)	C D E F G H I	108.9
Genuity-RR	4	3.27 (17)	2.36 (20)	1.81 (18)	1.37 (24)	8.81 (17)	C D E F G H I	108.8
Dekalb 43-13	4	3.27 (16)	2.30 (27)	1.78 (23)	1.36 (28)	8.71 (19)	C D E F G H I J	107.6
FG R513M225S	5	2.98 (36)	2.41 (12)	1.90 (7)	1.41 (16)	8.69 (20)	D E F G H I J	107.3
FG R410W253	4	3.00 (35)	2.37 (18)	1.96 (3)	1.34 (31)	8.67 (21)	E F G H I J K	107.0
PG459	4	3.34 (9)	2.22 (35)	1.68 (36)	1.40 (18)	8.64 (23)	E F G H I J K	106.7
Hi-Gest 360	3	3.35 (8)	2.32 (24)	1.62 (42)	1.33 (32)	8.63 (26)	E F G H I J K L	106.5
Archer III	5	3.27 (18)	2.30 (28)	1.64 (39)	1.41 (13)	8.62 (27)	F G H I J K L	106.4
WL 372HQ-RR	5	3.09 (31)	2.39 (16)	1.73 (30)	1.35 (30)	8.56 (29)	G H I J K L M	105.7
Integra 8420	4	3.04 (33)	2.32 (25)	1.72 (31)	1.37 (23)	8.44 (33)	J K L M N	104.2
Integra 8444R	4	2.87 (39)	2.34 (22)	1.84 (13)	1.38 (22)	8.42 (34)	J K L M N	104.0
4R200	4	2.94 (38)	2.20 (38)	1.78 (24)	1.36 (29)	8.29 (37)	L M N O	102.3
Ameristand 427TQ	4	3.33 (11)	2.08 (43)	1.63 (40)	1.20 (44)	8.24 (38)	M N O	101.7
Ameristand 445-NT	4	3.21 (20)	2.12 (42)	1.54 (44)	1.25 (40)	8.12 (40)	N O	100.2
Vernal	2	3.29 (12)	2.03 (44)	1.54 (43)	1.25 (42)	8.10 (41)	N O	100.0
Experimental Varieties								
SW4466	4	3.53 (2)	2.35 (21)	1.69 (34)	1.41 (14)	8.98 (7)	B C D E F	110.8
Hybriforce-4400	4	3.47 (5)	2.37 (19)	1.74 (26)	1.37 (27)	8.95 (10)	B C D E F	110.5
msSunstra-143146	3	3.28 (13)	2.32 (26)	1.65 (38)	1.47 (7)	8.73 (18)	C D E F G H I J	107.7
Hybriforce-3430	3	3.44 (6)	2.21 (37)	1.63 (41)	1.38 (20)	8.66 (22)	E F G H I J K	106.9
RRL414M104	4	3.18 (21)	2.42 (10)	1.79 (21)	1.24 (43)	8.63 (24)	E F G H I J K L	106.6
H0415ST202	4	3.13 (25)	2.29 (31)	1.89 (9)	1.32 (33)	8.63 (25)	E F G H I J K L	106.5
RRL514W209	5	3.11 (28)	2.29 (30)	1.87 (12)	1.31 (34)	8.57 (28)	G H I J K L M	105.8
Hybriforce-3420/Wet	4	3.28 (14)	2.22 (36)	1.68 (35)	1.37 (25)	8.55 (30)	H I J K L M	105.6
RRL414M377	4	3.12 (27)	2.33 (23)	1.79 (22)	1.28 (36)	8.52 (31)	I J K L M	105.1
H0415A3144	4	3.07 (32)	2.29 (29)	1.81 (20)	1.27 (37)	8.45 (32)	J K L M N	104.3
H0515QT102	5	2.95 (37)	2.28 (32)	1.81 (19)	1.29 (35)	8.33 (35)	K L M N O	102.8
msSunstra-155203	6	2.84 (41)	2.17 (39)	1.73 (29)	1.58 (1)	8.32 (36)	K L M N O	102.7
RRL414W208	4	2.78 (44)	2.28 (33)	1.83 (15)	1.26 (39)	8.15 (39)	N O	100.6
msSunstra-155202	6	2.79 (43)	2.14 (41)	1.70 (32)	1.42 (12)	8.04 (42)	O	99.3
RRL514W201	5	2.84 (40)	2.15 (40)	1.74 (27)	1.27 (38)	8.01 (43)	O	98.9
H0415QT111	4	2.82 (42)	2.23 (34)	1.70 (33)	1.25 (41)	8.00 (44)	O	98.7
MEAN		3.17	2.33	1.78	1.38	8.66		
CV		5.44	4.78	5.52	5.84	3.47		
LSD (0.1)		0.20	0.13	0.12	0.10	0.36		

Trial seeded at 25 lb/acre viable seed at Intermountain Research and Extension Center, Tullake, CA.

Entries followed by the same letter are not significantly different at the 10% probability level according to Fisher's (protected) LSD.

FD = Fall Dormancy reported by seed companies.

Table 2. 2017-2019 YIELDS, TULELAKE ALFALFA CULTIVAR TRIAL. TRIAL PLANTED 5/22/17

		2017	2018	2019	Average		% of
	FD	Yield	Yield	Yield			Vernal
		Dry t/a					
Released Varieties							
WL365HQ	5	3.80 (9)	9.64 (9)	9.42 (2)	7.62 (2)	A	115.3
Integra 8450	4	3.76 (11)	9.72 (7)	9.03 (5)	7.50 (4)	A B	113.6
SW4107	4	3.04 (29)	9.84 (2)	9.50 (1)	7.46 (6)	A B C D	113.0
SW5210	6	3.74 (12)	9.51 (12)	9.05 (4)	7.44 (7)	A B C D E	112.6
Nexgrow 6422Q	4	3.03 (35)	9.89 (1)	9.27 (3)	7.40 (9)	A B C D E F	112.0
FG R513W224S	5	3.64 (18)	9.50 (13)	8.92 (12)	7.35 (10)	B C D E F G	111.4
WL363HQ	5	3.78 (10)	9.26 (21)	8.94 (11)	7.32 (11)	B C D E F G	110.9
Xtra-3	4	3.54 (21)	9.41 (15)	8.89 (13)	7.28 (12)	B C D E F G	110.3
SW5213	5	3.51 (22)	9.51 (11)	8.82 (16)	7.28 (13)	B C D E F G	110.2
Nexgrow 6585Q	5	3.74 (13)	9.25 (22)	8.83 (15)	7.28 (15)	B C D E F G	110.2
PG459	4	4.16 (3)	9.01 (31)	8.64 (23)	7.27 (16)	B C D E F G	110.1
Dekalb 43-13	4	3.81 (8)	9.27 (19)	8.71 (19)	7.27 (17)	B C D E F G H	110.0
54Q29	4	3.04 (30)	9.76 (5)	8.95 (9)	7.25 (18)	C D E F G H	109.8
Genuity-RR	4	3.74 (14)	9.20 (25)	8.81 (17)	7.25 (19)	C D E F G H	109.8
WL377HQ	5	3.04 (27)	9.66 (8)	8.98 (6)	7.23 (21)	D E F G H I	109.4
FG R513M225S	5	3.71 (16)	9.19 (27)	8.69 (20)	7.20 (22)	E F G H I J	109.0
AmeriStand 545NT RR	5	3.41 (23)	9.35 (17)	8.83 (14)	7.20 (23)	E F G H I J	109.0
FG R410W253	4	3.61 (20)	9.20 (24)	8.67 (21)	7.16 (24)	F G H I J K	108.4
FG R513W227S	5	3.27 (24)	9.20 (26)	8.96 (8)	7.14 (25)	G H I J K	108.1
Integra 8444R	4	3.72 (15)	9.27 (20)	8.42 (34)	7.14 (26)	G H I J K L	108.1
Archer III	5	3.03 (38)	9.41 (16)	8.62 (27)	7.02 (27)	H I J K L M	106.3
Hi-Gest 360	3	3.03 (39)	9.30 (18)	8.63 (26)	6.99 (28)	I J K L M N	105.8
Integra 8420	4	3.03 (34)	9.42 (14)	8.44 (33)	6.97 (30)	J K L M N O	105.5
WL 372HQ-RR	5	3.02 (42)	9.19 (28)	8.56 (29)	6.92 (31)	K L M N O	104.8
4R200	4	3.67 (17)	8.72 (37)	8.29 (37)	6.89 (32)	L M N O P	104.3
Ameristand 427TQ	4	3.04 (25)	8.95 (32)	8.24 (38)	6.74 (37)	N O P Q R	102.1
Ameristand 445-NT	4	3.04 (26)	8.86 (35)	8.12 (40)	6.67 (39)	P Q R S	101.0
Vernal	2	3.03 (32)	8.68 (39)	8.10 (41)	6.60 (40)	Q R S T	100.0
Experimental Varieties							
msSunstra-143146	3	4.30 (1)	9.83 (3)	8.73 (18)	7.62 (1)	A	115.4
msSunstra-144110	4	4.14 (4)	9.74 (6)	8.95 (10)	7.61 (3)	A	115.2
msSunstra-143147	3	3.98 (6)	9.79 (4)	8.66 (22)	7.48 (5)	A B C	113.2
msSunstra-144109	4	4.09 (5)	9.57 (10)	8.55 (30)	7.40 (8)	A B C D E F	112.1
msSunstra-155203	6	4.28 (2)	9.25 (23)	8.32 (36)	7.28 (14)	B C D E F G	110.2
SW4466	4	3.62 (19)	9.13 (29)	8.98 (7)	7.24 (20)	C D E F G H	109.7
msSunstra-155202	6	3.86 (7)	9.03 (30)	8.04 (42)	6.98 (29)	I J K L M N O	105.7
H0415ST202	4	3.03 (37)	8.87 (33)	8.63 (25)	6.84 (33)	M N O P Q	103.6
RRL414M377	4	3.04 (28)	8.86 (34)	8.52 (31)	6.81 (34)	M N O P Q	103.1
RRL414M104	4	3.03 (40)	8.69 (38)	8.63 (24)	6.79 (35)	M N O P Q	102.7
RRL514W209	5	3.03 (31)	8.63 (40)	8.57 (28)	6.75 (36)	N O P Q R	102.1
H0415A3144	4	3.03 (36)	8.73 (36)	8.45 (32)	6.74 (38)	O P Q R S	102.0
H0515QT102	5	3.02 (41)	8.43 (42)	8.33 (35)	6.59 (41)	Q R S T	99.8
RRL414W208	4	3.02 (43)	8.42 (43)	8.15 (39)	6.53 (42)	R S T	98.9
H0415QT111	4	3.02 (44)	8.46 (41)	8.00 (44)	6.49 (43)	S T	98.3
RRL514W201	5	3.03 (33)	8.20 (44)	8.01 (43)	6.41 (44)	T	97.1
MEAN		3.44	9.20	8.66	7.10		
CV		8.16	3.66	3.47	2.96		
LSD (0.1)		0.33	0.40	0.36	0.25		

Trial seeded at 25 lb/acre viable seed at Intermountain Research and Extension Center, Tulelake, CA.

Entries followed by the same letter are not significantly different at the 10% probability level according to Fisher's (protected) LSD.

FD = Fall Dormancy reported by seed companies.

Table 3. 2019 Yields. El Centro Alfalfa Cultivar Trial (Trial planted 10/19/16)

Note: Single year data should not be used to evaluate alfalfa varieties or choose alfalfa cultivars

	FD	Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Cut 6	Cut 7	Cut 8	Cut 9	YEAR	% of CUF101
		29-Jan	19-Mar	24-Apr	31-May	27-Jun	23-Jul	27-Aug	9-Oct	18-Nov	TOTAL	
Dry T _a												
Released Varieties												
106T701	10	0.98 (18)	1.49 (7)	2.10 (19)	2.37 (8)	3.12 (2)	2.00 (2)	1.51 (3)	1.06 (11)	1.14 (5)	15.76 (4)	A B C D 127.8
6906N	10	0.96 (20)	1.38 (18)	2.16 (9)	2.39 (6)	3.02 (11)	1.73 (17)	1.39 (14)	0.94 (23)	0.95 (22)	14.93 (16)	C D E F G 121.0
UC-mpalo	9	1.07 (8)	1.39 (15)	2.15 (12)	2.14 (26)	2.95 (16)	1.69 (21)	1.35 (18)	1.04 (13)	1.07 (11)	14.86 (18)	D E F G 120.5
Fertilac 11	11	0.95 (22)	1.42 (14)	2.13 (15)	2.25 (17)	2.96 (14)	1.71 (19)	1.32 (22)	0.95 (22)	1.03 (16)	14.71 (19)	D E F G 119.3
UC-Highline	9	1.01 (15)	1.45 (11)	2.12 (17)	2.29 (12)	2.83 (23)	1.64 (23)	1.32 (21)	0.87 (26)	0.97 (20)	14.50 (21)	E F G H 117.6
AFX 1060	10	0.85 (28)	1.19 (29)	2.03 (22)	2.22 (21)	2.94 (18)	1.80 (10)	1.40 (13)	0.97 (20)	0.83 (28)	14.24 (22)	F G H I 115.4
Fertilac 10	10	0.97 (19)	1.35 (22)	2.13 (16)	2.28 (13)	2.86 (22)	1.53 (24)	1.25 (25)	0.87 (25)	0.88 (25)	14.12 (24)	F G H I J 114.5
59N49	9	1.00 (16)	1.26 (26)	1.94 (27)	2.22 (23)	2.56 (28)	1.36 (28)	1.19 (27)	0.77 (30)	0.74 (30)	13.03 (28)	J K L 105.7
UC-Obola	9	0.79 (30)	1.13 (30)	1.88 (29)	2.16 (25)	2.67 (26)	1.43 (27)	1.18 (29)	0.82 (27)	0.83 (27)	12.89 (29)	K L 104.5
CUF101	9	0.81 (29)	1.26 (28)	1.84 (30)	2.00 (30)	2.40 (30)	1.35 (30)	1.11 (30)	0.80 (28)	0.77 (29)	12.33 (30)	L 100.0
Experimental Varieties												
118T816	11	1.11 (3)	1.55 (2)	2.24 (3)	2.37 (9)	3.18 (1)	2.01 (1)	1.59 (1)	1.17 (2)	1.17 (4)	16.37 (1)	A 132.7
1014T552	10	1.23 (1)	1.58 (1)	2.15 (11)	2.47 (1)	2.97 (12)	1.84 (7)	1.45 (9)	1.17 (3)	1.27 (2)	16.12 (2)	A B 130.7
1014T549	10	1.12 (2)	1.52 (4)	2.11 (18)	2.26 (15)	2.96 (15)	1.88 (5)	1.57 (2)	1.32 (1)	1.28 (1)	16.03 (3)	A B C 129.9
108T813	10	1.10 (6)	1.51 (5)	2.20 (5)	2.41 (3)	3.03 (8)	1.79 (12)	1.49 (4)	1.09 (6)	1.10 (8)	15.73 (5)	A B C D 127.5
1011T105	10	1.10 (5)	1.48 (8)	2.14 (13)	2.25 (16)	3.04 (7)	1.87 (6)	1.46 (7)	1.16 (4)	1.13 (7)	15.63 (6)	A B C D E 126.7
1012T408	10	1.01 (14)	1.53 (3)	2.25 (2)	2.42 (2)	3.05 (6)	1.74 (15)	1.44 (11)	1.07 (9)	1.03 (13)	15.54 (7)	A B C D E 126.0
105T286	10	1.11 (4)	1.47 (10)	2.21 (4)	2.39 (7)	2.97 (13)	1.78 (14)	1.48 (5)	1.03 (14)	1.08 (10)	15.51 (8)	A B C D E 125.8
1012T402	10	0.94 (23)	1.36 (20)	2.19 (7)	2.40 (5)	3.12 (3)	1.91 (3)	1.39 (14)	1.07 (10)	1.06 (12)	15.45 (9)	A B C D E 125.2
1014T013	10	0.96 (21)	1.44 (12)	2.29 (1)	2.41 (4)	3.06 (5)	1.82 (9)	1.44 (10)	0.97 (19)	1.03 (15)	15.42 (10)	A B C D E 125.0
1111T108	11	1.04 (9)	1.48 (9)	2.20 (6)	2.32 (10)	3.08 (4)	1.80 (11)	1.38 (17)	0.97 (20)	0.98 (19)	15.24 (11)	A B C D E F 123.5
1013M185	10	0.98 (17)	1.34 (23)	2.17 (8)	2.29 (11)	3.02 (9)	1.88 (4)	1.47 (6)	1.05 (12)	1.01 (18)	15.22 (12)	A B C D E F 123.4
UCExp-HD	9	1.02 (12)	1.43 (13)	2.14 (14)	2.24 (18)	2.88 (21)	1.83 (8)	1.40 (12)	1.14 (5)	1.10 (9)	15.17 (13)	B C D E F 123.0
109T901	10	1.07 (7)	1.50 (6)	2.00 (24)	2.12 (28)	2.91 (19)	1.72 (18)	1.45 (8)	1.09 (7)	1.20 (3)	15.06 (14)	B C D E F 122.1
UC-2705	9	1.02 (11)	1.39 (17)	2.06 (21)	2.23 (19)	2.94 (17)	1.78 (13)	1.35 (19)	1.08 (8)	1.13 (6)	14.97 (15)	B C D E F G 121.4
1013T184	10	1.03 (10)	1.39 (16)	2.07 (20)	2.22 (22)	3.02 (9)	1.73 (16)	1.39 (16)	1.02 (15)	1.02 (17)	14.90 (17)	C D E F G 120.8
1114T010	11	0.90 (27)	1.37 (19)	2.16 (10)	2.26 (14)	2.90 (20)	1.71 (20)	1.28 (23)	1.00 (18)	0.93 (23)	14.51 (20)	E F G H 117.7
1113T186	11	1.01 (13)	1.29 (24)	2.00 (23)	2.13 (27)	2.79 (24)	1.65 (22)	1.32 (20)	1.02 (16)	0.97 (21)	14.19 (23)	F G H I J 115.0
UC-2693	9	0.93 (24)	1.35 (21)	1.95 (26)	2.23 (19)	2.68 (25)	1.46 (26)	1.23 (26)	1.00 (17)	1.03 (14)	13.87 (25)	G H I J K 112.5
1114T012	11	0.92 (25)	1.26 (27)	1.94 (28)	2.10 (29)	2.56 (29)	1.49 (25)	1.27 (24)	0.93 (24)	0.90 (24)	13.37 (26)	H I J K L 108.4
UC-2671	9	0.91 (26)	1.27 (25)	1.99 (25)	2.17 (24)	2.65 (27)	1.35 (29)	1.18 (28)	0.78 (29)	0.85 (26)	13.14 (27)	I J K L 106.6
MEAN		1.00	1.39	2.10	2.27	2.90	1.71	1.37	1.01	1.02	14.76	
CV		14.33	9.12	10.68	9.71	10.36	13.77	12.91	11.67	9.36	8.02	
LSD (0.1)		0.14	0.12	0.22	0.22	0.30	0.23	0.17	0.12	0.09	1.16	

Trial seeded at 25 lb/acre viable seed on Yolo clay loam soil at the Univ. of California Agronomy Farm, Davis, CA.

Entries followed by the same letter are not significantly different at the 10% probability level according to Fishers (protected) LSD.

FD = Fall Dormancy reported by seed companies.

Table 4. 2017-2019 YIELDS. EI CENTRO ALFALFA CULTIVAR TRIAL. TRIAL PLANTED 10/19/16.

		2017	2018	2019	Average		% of
	Yield	Yield	Yield				CUF101
	FD			Dry t/a			
Released Varieties							
106T701	10	13.80 (6)	15.73 (2)	15.76 (4)	15.10 (3)	A B	125.2
6906N	10	13.03 (19)	14.73 (14)	14.93 (16)	14.23 (16)	C D E F G	118.0
UC-Impalo	9	13.31 (16)	14.05 (24)	14.86 (18)	14.07 (17)	D E F G H	116.7
Fertilac 10	10	13.32 (15)	14.35 (19)	14.12 (24)	13.93 (19)	F G H	115.6
Fertilac 11	11	12.33 (27)	14.60 (17)	14.71 (19)	13.88 (21)	F G H I	115.2
UC-Highline	9	12.52 (25)	14.34 (20)	14.50 (21)	13.79 (23)	F G H I	114.4
AFX 1060	10	12.46 (26)	14.66 (16)	14.24 (22)	13.78 (24)	F G H I	114.3
59N49	9	13.02 (21)	13.67 (26)	13.03 (28)	13.24 (26)	H I J	109.8
UC-Cibola	9	13.06 (18)	13.25 (27)	12.89 (29)	13.06 (27)	I J	108.4
CUF101	9	11.26 (30)	12.58 (30)	12.33 (30)	12.06 (30)	K	100.0
Experimental Varieties							
118T816	11	14.44 (1)	16.13 (1)	16.37 (1)	15.65 (1)	A	129.8
1014T549	10	13.84 (5)	15.52 (4)	16.03 (3)	15.13 (2)	A B	125.5
1014T552	10	13.71 (8)	15.16 (8)	16.12 (2)	15.00 (4)	A B C	124.4
1011T105	10	13.87 (4)	15.42 (5)	15.63 (6)	14.97 (5)	A B C	124.2
1012T408	10	14.05 (2)	15.16 (7)	15.54 (7)	14.92 (6)	A B C D	123.7
1012T402	10	13.42 (13)	15.59 (3)	15.45 (9)	14.82 (7)	A B C D E	122.9
108T813	10	13.46 (12)	15.24 (6)	15.73 (5)	14.81 (8)	A B C D E	122.9
1013T184	10	14.01 (3)	14.89 (12)	14.90 (17)	14.60 (9)	B C D E F	121.1
1014T013	10	13.54 (9)	14.74 (13)	15.42 (10)	14.57 (10)	B C D E F	120.8
105T286	10	13.53 (10)	14.57 (18)	15.51 (8)	14.54 (11)	B C D E F	120.6
UCExp-HD	9	13.49 (11)	14.95 (11)	15.17 (13)	14.54 (12)	B C D E F	120.6
109T901	10	13.75 (7)	14.68 (15)	15.06 (14)	14.50 (13)	B C D E F	120.3
1111T108	11	13.17 (17)	15.06 (9)	15.24 (11)	14.49 (14)	B C D E F	120.2
1013M185	10	12.92 (22)	14.97 (10)	15.22 (12)	14.37 (15)	B C D E F	119.2
UC-2705	9	12.83 (24)	14.25 (21)	14.97 (15)	14.02 (18)	E F G H	116.3
1113T186	11	13.34 (14)	14.13 (22)	14.19 (23)	13.89 (20)	F G H I	115.2
1114T010	11	12.91 (23)	14.08 (23)	14.51 (20)	13.84 (22)	F G H I	114.8
1114T012	11	13.03 (20)	13.79 (25)	13.37 (26)	13.40 (25)	G H I J	111.1
UC-2671	9	12.02 (28)	13.14 (28)	13.14 (27)	12.77 (28)	J K	105.9
UC-2693	9	11.40 (29)	13.02 (29)	13.87 (25)	12.76 (29)	J K	105.9
MEAN		13.16	14.55	14.76	14.16		
CV		6.24	7.26	8.02	6.22		
LSD (0.1)		0.81	1.04	1.16	0.86		

Trial planted at 25 lb/acre viable seed in Imperial clay loam soil at the UC Desert Research and Extension Center, Holtville, CA.
 Entries followed by the same letter are not significantly different at the 10% probability level according to Fisher's (protected) LSD.
 FD = Fall Dormancy reported by seed companies.

Table 5. 2019 Westside Alfalfa Salinity Trial, Five Points, CA (planted 3/29/17). High salinity treatment yields of 8 harvests.

Variety	26-Mar yield t/A	1-May yield t/A	30-May yield t/A	25-Jun yield t/A	25-Jul yield t/A	22-Aug yield t/A	30-Sep yield t/A	6-Nov yield t/A	Season total yield t/A
UC Salton	2.1	1.8	1.8	2.4	1.8	1.1	1.3	1.1	13.4
SW9573	2.0	1.7	1.9	2.3	1.9	1.1	1.3	1.0	13.3
SW9106M	1.9	1.6	1.9	2.3	1.9	1.2	1.3	1.0	13.2
AZ-88NDC	1.9	1.7	1.8	2.4	1.8	1.1	1.4	0.9	13.0
PGI 908-S	1.9	1.5	1.8	2.3	1.9	1.2	1.4	1.0	13.0
H0916ST223	2.0	1.6	1.9	2.4	1.8	1.1	1.3	0.9	12.8
CUF101	1.9	1.7	1.7	2.3	1.7	1.1	1.2	1.0	12.6
9R100	1.9	1.7	1.8	2.2	1.8	1.0	1.2	0.8	12.5
SW9577	1.9	1.6	1.8	2.3	1.8	1.0	1.2	0.8	12.4
Integra 8810S	1.9	1.5	1.8	2.1	1.7	1.1	1.3	1.0	12.3
UC Impalo	1.9	1.5	1.6	2.1	1.8	1.1	1.2	1.0	12.3
R814W257S	2.0	1.6	1.8	2.2	1.7	0.9	1.1	0.7	12.0
R814W258S	1.9	1.5	1.6	2.1	1.7	1.0	1.1	1.0	11.9
C0916ST232	1.9	1.4	1.6	2.0	1.6	1.0	1.2	1.0	11.8
SW8421RRS	1.8	1.6	1.6	2.2	1.6	1.0	1.1	0.7	11.7
AZ-90NDC-ST	1.8	1.6	1.8	2.0	1.8	1.0	1.1	0.7	11.6
SW9215RRS	1.7	1.4	1.6	2.2	1.7	1.0	1.1	0.8	11.5
H0915ST214	1.7	1.3	1.7	2.2	1.7	1.1	1.1	0.8	11.5
SW8476	1.7	1.5	1.6	2.0	1.7	1.0	1.2	0.8	11.5
H0916ST216	1.6	1.3	1.5	2.1	1.7	1.1	1.2	0.9	11.4
R914W259S	1.9	1.6	1.7	2.0	1.6	0.9	0.9	0.7	11.3
H0916ST218	1.6	1.4	1.6	2.1	1.5	1.0	1.0	0.9	11.2
AFX149092	1.9	1.4	1.6	1.9	1.5	0.9	1.0	0.8	11.1
SW8409	1.8	1.4	1.6	1.8	1.6	1.1	1.1	0.7	11.0
FGR814W275	1.7	1.3	1.6	1.9	1.7	0.9	1.0	0.7	10.9
H0715ST209	1.6	1.2	1.5	2.1	1.6	0.9	1.1	0.9	10.8
H0716ST222	1.8	1.5	1.6	2.0	1.4	0.9	0.8	0.7	10.7
H0716ST227	1.7	1.3	1.6	2.0	1.5	0.9	1.0	0.6	10.5
H0815ST210	1.6	1.3	1.5	1.9	1.6	0.9	0.9	0.7	10.5
H0715ST211	1.8	1.4	1.6	2.0	1.4	0.7	0.9	0.6	10.2
H0915ST212	1.6	1.3	1.4	1.9	1.5	0.8	1.0	0.7	10.1
SW8412	1.7	1.3	1.3	1.6	1.5	0.9	1.1	0.7	10.0
H0916ST217	1.5	1.3	1.5	1.9	1.4	0.8	0.9	0.7	9.9
SW9576	1.7	1.5	1.5	1.8	1.4	0.6	0.8	0.5	9.9
Mean	1.8	1.5	1.6	2.1	1.7	1.0	1.1	0.8	11.6
CV%	8.4	11.0	11.1	11.7	13.6	19.2	25.9	28.3	11.0
LSD (p=0.05)	0.21	0.23	0.26	0.34	0.32	0.27	0.40	0.33	1.79

Table 6. 2019 Westside Alfalfa Salinity Trial, Five Points, CA (planted 3/29/17). Low salinity treatment yields of 8 harvests.

Variety	26-Mar yield t/A	1-May yield t/A	30-May yield t/A	25-Jun yield t/A	25-Jul yield t/A	22-Aug yield t/A	30-Sep yield t/A	6-Nov yield t/A	Season total yield t/A
SW8421RRS	2.2	1.9	1.9	2.9	2.3	1.6	2.1	1.4	16.2
R814W257S	2.3	1.9	2.0	2.8	2.3	1.6	1.9	1.3	16.1
9R100	2.5	2.0	2.0	2.7	2.1	1.6	1.8	1.3	16.0
PGI 908-S	2.3	2.0	2.1	2.9	2.2	1.4	1.8	1.4	15.9
SW9215RRS	2.4	1.9	2.0	2.8	2.2	1.5	1.7	1.3	15.8
Integra 8810S	2.7	1.9	2.1	2.6	2.2	1.4	1.6	1.2	15.6
H0915ST214	2.2	1.8	1.9	2.8	2.2	1.6	1.8	1.2	15.5
SW8476	2.2	2.0	2.0	2.7	2.1	1.5	1.7	1.2	15.4
UC Impalo	2.2	1.8	1.8	2.6	2.1	1.6	1.9	1.4	15.4
R914W259S	2.4	2.0	2.1	2.6	2.2	1.4	1.5	1.3	15.4
SW9106M	2.3	1.8	2.1	2.6	2.0	1.3	1.7	1.5	15.2
UC Salton	2.5	1.9	2.0	2.6	2.0	1.4	1.4	1.2	15.0
R814W258S	2.4	1.9	2.0	2.6	1.9	1.5	1.5	1.2	15.0
SW9577	2.2	1.9	1.8	2.7	2.0	1.4	1.6	1.2	14.8
AZ-90NDC-ST	2.1	1.9	1.9	2.6	2.1	1.4	1.6	1.1	14.8
SW9573	2.3	1.9	1.9	2.4	2.1	1.3	1.3	1.2	14.4
AZ-88NDC	2.4	1.9	1.9	2.7	1.9	1.2	1.4	1.0	14.4
H0815ST210	1.9	1.7	2.0	2.5	2.1	1.4	1.5	1.2	14.3
H0916ST218	2.0	1.7	1.8	2.6	2.1	1.4	1.5	1.1	14.2
AFX149092	2.0	1.8	1.8	2.5	1.9	1.4	1.6	1.1	14.1
H0716ST222	2.3	1.9	1.8	2.5	2.0	1.2	1.4	0.9	14.0
FGR814W275	2.5	1.9	2.0	2.4	1.8	1.1	1.2	0.9	14.0
SW8409	2.1	1.8	1.9	2.5	1.8	1.2	1.4	1.1	13.8
H0915ST212	2.1	1.7	1.9	2.5	1.9	1.1	1.3	1.2	13.8
H0916ST223	2.1	1.8	1.9	2.5	1.8	1.2	1.3	1.1	13.8
CUF101	2.3	1.7	2.0	2.5	1.8	1.1	1.2	1.1	13.7
C0916ST232	2.5	1.7	1.8	2.3	1.7	1.1	1.3	0.9	13.4
SW8412	2.1	1.7	1.8	2.4	1.8	1.3	1.4	1.0	13.3
H0715ST211	2.4	1.7	1.7	2.4	1.8	1.1	1.3	1.0	13.2
H0916ST216	1.8	1.5	1.8	2.5	1.7	1.1	1.2	0.9	12.6
H0715ST209	2.1	1.4	1.8	2.2	1.8	1.0	1.3	0.9	12.5
H0916ST217	2.1	1.5	1.8	2.3	1.8	0.9	1.1	0.8	12.4
H0716ST227	2.3	1.5	1.7	2.2	1.6	1.0	1.2	0.9	12.4
SW9576	2.1	1.7	1.7	2.0	1.5	0.8	0.9	0.7	11.4
Mean	2.2	1.8	1.9	2.5	2.0	1.3	1.5	1.1	14.4
CV%	11.5	10.9	11.3	12.9	17.8	29.9	35.5	27.8	13.8
LSD (p=0.05)	0.36	0.27	0.30	0.46	0.49	0.55	0.74	0.44	2.77

Table 7. Westside Alfalfa Salinity Trial (planted 3/29/17 Five Points, CA). 2017-2019 Cumulative Yield of alfalfa grown under low and high saline conditions.

Variety	2017 Season Yield (ton/A)		2018 Season Yield (ton/A)		2019 Season Yield (ton/A)		Cumulative Average (t/A)	
	Low Salinity	High Salinity	Low Salinity	High Salinity	Low Salinity	High Salinity	Low Salinity	High Salinity
UC Salton	5.2	5.2	12.0	12.2	15.0	13.4	32.2	30.8
SW9573	5.5	5.1	12.0	11.3	14.4	13.3	32.0	29.7
SW9106M	4.7	5.5	12.9	10.4	15.2	13.2	32.8	29.1
AZ-88NDC	6.0	4.7	13.7	10.9	14.4	13.0	34.0	28.7
9R100	5.5	5.0	14.6	11.1	16.0	12.5	36.1	28.7
SW8421RRS	5.0	5.5	13.5	11.3	16.2	11.7	34.7	28.5
Integra 8810S	4.9	4.6	12.9	11.3	15.6	12.3	33.5	28.2
H0916ST223	4.5	4.9	10.8	10.5	13.8	12.8	29.1	28.2
PGI 908-S	5.4	5.0	14.3	9.8	15.9	13.0	35.7	27.8
SW9577	5.2	5.0	13.7	10.2	14.8	12.4	33.7	27.6
CUF101	4.9	4.6	12.9	10.4	13.7	12.6	31.5	27.6
C0916ST232	5.3	4.8	12.9	10.7	13.4	11.8	31.6	27.2
UC Impalo	4.5	4.9	12.7	9.9	15.4	12.3	32.7	27.1
SW9215RRS	4.8	5.2	13.3	10.1	15.8	11.5	34.0	26.8
H0715ST209	4.5	5.0	10.2	10.4	12.5	10.8	27.2	26.2
R814W257S	5.2	4.6	13.7	9.4	16.1	12.0	35.1	26.0
R814W258S	4.8	4.7	11.8	9.1	15.0	11.9	31.6	25.7
H0916ST218	4.9	4.9	12.1	9.4	14.2	11.2	31.1	25.5
AZ-90NDC-ST	4.8	4.4	12.5	9.3	14.8	11.6	32.1	25.4
SW8476	4.5	4.8	13.1	9.1	15.4	11.5	33.1	25.4
SW8409	4.9	5.0	11.7	9.0	13.8	11.0	30.5	24.9
R914W259S	4.2	4.5	11.5	9.0	15.4	11.3	31.0	24.8
H0915ST214	4.3	4.0	11.3	8.9	15.5	11.5	31.1	24.5
SW9576	4.9	4.6	11.5	9.5	11.4	9.9	27.8	24.0
H0716ST227	4.2	4.4	10.6	9.0	12.4	10.5	27.2	23.9
FGR814W275	3.5	3.6	10.5	9.2	14.0	10.9	28.0	23.6
H0916ST216	4.5	3.7	11.5	8.5	12.6	11.4	28.5	23.6
AFX149092	4.7	4.0	13.5	8.3	14.1	11.1	32.3	23.4
H0815ST210	4.7	4.0	11.8	8.4	14.3	10.5	30.8	23.0
H0716ST222	4.9	4.3	12.9	7.9	14.0	10.7	31.8	22.9
H0715ST211	5.0	4.0	11.5	8.6	13.2	10.2	29.7	22.8
H0916ST217	4.0	4.2	10.4	8.6	12.4	9.9	26.7	22.7
H0915ST212	4.8	3.9	11.1	8.4	13.8	10.1	29.7	22.5
SW8412	4.9	3.7	12.3	8.4	13.3	10.0	30.6	22.1
Average	4.8	4.6	12.3	9.6	14.4	11.5	31.5	25.7
Yield loss	4%		22%		20%		18%	
Treatment Mean	4.7		11.0		13.0		28.7	
CV%	16.3		16.5		12.8		8.3	
LSD (p=0.05)	0.2		1.8		1.6		0.6	

SUGGESTED FALL DORMANCY RANGE AND MINIMUM ALFALFA CULTIVAR PEST RESISTANCE RATINGS FOR SIX CALIFORNIA CLIMATE ZONES. Growers selecting varieties from different regions should emphasize the pests that are most important for their area.

Production Zone	Rating Factor										
	FD	SAA	PA	BAA	PRR	BW	FW	An	Stn	RKN	VW
Intermountain	2--4	S	R	MR	R	R	HR	R	R	R	R
Sacramento Valley	4--8	MR	HR	HR	HR	MR	HR	R	R	R	R
San Joaquin Valley	7--9	R	HR	HR	HR	MR	HR	R	HR	HR	R
Coastal	5--7	MR	HR	HR	HR	MR	HR	R	HR	HR	R
High Desert	4--7	R	R	R	R	MR	HR	MR	HR	HR	R
Low Desert	8--9	HR	HR	HR	HR	S	HR	HR	R	HR	S

NOTE: These pest resistance recommendations were originally developed by Dr. Vern Marble, Extension Agronomist, UC Davis, based upon decades of experience with alfalfa varieties in various locations in California. Zones correspond to the principle regions of alfalfa production in California.

EXPLANATION OF PEST RESISTANCE. Alfalfa varieties consist of a population of plants which have varying degrees of resistance to an insect or disease. Since alfalfa fields can sustain considerable loss of individual plants without reducing productivity, alfalfa varieties with 51% or over are considered to be highly resistant, since resistant plants will make up for losses from other plants.

Resistance Level	Abbreviation	Percent resistance ¹
Highly Resistant	HR	>51%
Resistant	R	31-50%
Moderately Resistant	MR	15-30%
Low Resistance	LOW	6-14%
Susceptible	S	<5%
Tolerant	T	(see definition)

¹ Percent of plants in a population resistant to a given pest

Definitions

I - Immune -- Not subject to attack for a specified pest. Immunity is absolute, and seldom occurs in alfalfa.

R - Resistant -- The ability of plants to withstand pest attack. Resistance is not absolute but varies by degree. Even highly resistant varieties will have some plants that are susceptible (see above percentages). NOTE: Very high insect populations or very severe disease conditions can overwhelm pest resistance in alfalfa.

S - Susceptible -- Damage commonly occurs when in the presence of a specified pest. Inability of a variety to withstand adverse disease or insect conditions.

T - Tolerant -- Ability of plants to sustain yields when confronted with a pest attack or environmental condition (e.g. salt or grazing). Tolerant varieties are affected by the condition, but still maintain yields at high levels relative to less tolerant varieties.

