UNIVERSITY OF CALIFORNIA   COOPERATIVE EXTENSION

FIELD CROP NOTES

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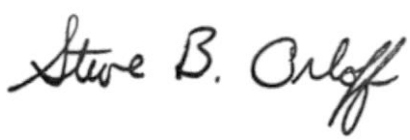

Steve Orloff
Farm Advisor

Check Soil pH Before Planting Alfalfa

Steve Orloff, Farm Advisor Siskiyou County

Alfalfa is not real tolerant of low soil pH. It's not so much that the alfalfa plant itself needs a higher pH, but that the Rhizobium bacteria that live in nodules on the alfalfa roots need a suitable pH to function well and fix atmospheric nitrogen (N). If pH is too low, the Rhizobium bacteria suffer and the alfalfa plant does not obtain enough nitrogen, turns yellow (typical N deficiency symptoms) and growth is severely stunted. Most pH issues typically occur with seedling alfalfa plants rather than established stands. What typically occurs is the alfalfa seedlings emerge well but then growth slows and the plants may turn yellow.

In the Intermountain Region we most often encounter pH problems on sandy or gravely soil, in fields near wooded areas, or in fields following potatoes. The acidic layer may only be a few inches thick. Oftentimes, upper soil layers are lower in pH and pH increases with increasing soil depth.

Because pH is so important for initial growth and development of alfalfa seedlings, University of Nebraska forage specialist Bruce Anderson recommends a "special" soil test before planting Rather than only taking a typical soil sample that is 6 to 8 inches deep, he recommends taking a shallow sample that is only 2 inches deep. This will better characterize the conditions the young seedlings will be exposed to. The laboratory should only run pH on this sample. Use the traditional deeper 6-8 inch sample for the usual analysis (pH, phosphorus, potassium, etc.).

Bruce Anderson recommends lime if the pH of the 2-inch sample is below 6.2 (same pH level where we generally recommend a lime application in California). However, if the pH of the normal 6-8 inch sample is above 6.2 and more than one-half point higher than the shallow sample, you need only about half the usually recommended amount of lime.

If the typical 6-8 inch sample also has a pH below 6.2, I would recommend deeper sampling at 6-8 inch increments down to 18-24 inches. It is important to determine if the acidic pH is just a surface phenomenon or if it persists at lower depths as well. This will help determine how much lime will be needed and how long the pH adjustment might last. Typical lime application rates are shown in the table below. Lime applications are different from fertilizer applications. With fertilizer applications, yield generally increases when more fertilizer is added until you reach a point where returns diminish and the yield improvement no longer pays for the additional fertilizer. With lime applications, yield only increases until the desirable threshold pH value is reached (6.2 pH or 6.5 at the most) and then no further yield increases can be expected with additional applications of lime. When it comes to lime more is not better. More is better only until an adequate level is reached and then there is no advantage to applying more.

Table 1: Amount of Limestone Needed to Change the Soil Reaction (Approximate)[1]

[1]A dolomitic limestone is preferable wherever there is a possible lack of magnesium.

FROM: Western Fertilizer Handbook

Change in pH Desired in Plow-Depth Layer	Pounds of Limestone per Acre					
	Sand	Sandy Loam	Loam	Silt Loam	Clay Loam	Muck
5.0 to 6.5	1,800	3,400	4,600	5,600	6,600	12,600
5.5 to 6.5	1,200	2,600	3,400	4,000	4,600	8,600
6.0 to 6.5	600	1,400	1,800	2,200	2,400	4,400

Alfalfa Variety Selection and Trial Results

Steve Orloff, Farm Advisor Siskiyou County

A common question I'm often asked this time of year is: "Which alfalfa variety is the best for this area?" This is never an easy question to answer because first off, there is no single "best" variety for all growers in the Intermountain area. Variety performance can change somewhat depending on local conditions, soil type, drainage and pest pressure (especially nematodes and diseases). In addition, no variety is definitively "The Best" in any trial. When interpreting alfalfa variety trial results, it is best to look at the top yielding group of varieties rather than focusing on the variety on the very top of the list. Statistically, there is no difference between the top variety and the ones below it with the same letter in the last column (see tables 3-5 for variety trial results).

Breeding companies have come a long way in their efforts to produce high yielding, high quality varieties with good pest resistance. In the past, it was somewhat difficult to find a single variety that had a high level of resistance to all the pests we can encounter in this area. Nowadays many varieties have an excellent pest resistance package and are listed as HR (high resistance) for the primary pests in this area. First, it is important to select a variety with the proper fall dormancy. A fall dormancy score of 3 to 5 is best for this area. In the past, a variety with a fall dormancy score of 5 might have been considered too non-dormant for this area and there would be concern about winter injury or winter survival. However, through breeding efforts fall dormancy and winter hardiness are not so closely linked. There are varieties with a fall dormancy rating of 5 that have performed very well in our area and have not had a problem with winter injury.

Next, it is important to select a variety with the proper pest resistance ratings for your field. General guidelines for minimum varietal pest resistance ratings for the Intermountain Region are shown in table 2 below. These would be considered minimum values. Actually, many of the newer varieties have better resistance levels than those outlined in the table. Desired resistance levels can vary by area and even individual fields, but this table provides a general guideline.

A word of caution is necessary. These ratings are based on standardized tests that are done on seedling alfalfa plants in a greenhouse. How a variety reacts to a pest when it is a seedling may be different than how an established plant responds in your field. In addition, even a variety that is rated to have high resistance (HR) only has to have >50 percent resistant plants. This level of resistance may not be high enough for some pests. For example, stem nematode has been an increasing problem in the Intermountain area. In some areas even an HR rating may not be sufficient to avoid having injury symptoms. Stem nematode infestation levels have been serious in some fields in Scott and Shasta Valleys and the pest is becoming more prevalent in Butte Valley and Tulelake as well.

https://www.alfalfa.org/pdf/2014%20NAFA%20Variety%20Leaflet.pdf

Insect or Disease	Resistance Rating	Comments
Bacterial wilt	Resistance (R)	
Verticillium wilt	Resistance (R)	
Fusarium wilt	High resistance (HR)	
Southern anthracnose	Resistance (R)	Rare problem but can occur
Phytophthora root rot	Resistance (R)	High resistance needed for heavy soils or poorly drained sites
Spotted alfalfa aphid	Susceptible (S)	Generally not seen in this area
Pea aphid	Resistance (R)	Most common aphid species seen here
Blue alfalfa aphid	Moderate resistance (MR)	
Stem nematode	High resistance	Increasing problem in many areas. Even an HR rating is not enough to avoid symptoms with high pressure
Root-knot nematode	Resistance (R)	May need HR in areas where root nematodes are known to be a problem

Table 2: General guidelines for minimum varietal pest resistance ratings for the Intermountain Region

We in UC Cooperative Extension regularly conduct alfalfa variety trials in Tulelake at the Intermountain Research and Extension Center (IREC) and in Scott Valley to help identify which varieties perform best in the Intermountain area. The following pages (tables 3-5) show the results for trials planted in 2010 in Tulelake and harvested in 2010, 2011 and 2013. A new trial was just planted at IREC in late summer of last year (yet to be harvested). A new variety trial was planted in Scott Valley in a producer's field (Brandon Fawaz). It is in a Roundup Ready (RR) field and all of the entries are RR. Most of the varieties are the new generation of RR lines and only had experimental numbers when the trial was first planted. The trial has 30 different alfalfa varieties, but only data for the released varieties with commercial names are presented in the tables.

Data from previous trials can be seen by going to the following website http://alfalfa.ucdavis.edu/ When selecting a variety, choose one amongst the upper group of varieties (approximately upper one third or so) in the tables with the pest resistances needed for your area.

The importance of selecting a well-adapted variety should not be underestimated. It is a decision you must live with for at least five to seven years (although it could be shorter if you select the wrong variety). The difference in annual yield between varieties multiplied over the life of the stand can be quite significant. In the Tulelake trial (Table 1), the difference between the top variety and the lowest yielding variety, Vernal, averaged 0.8 tons. That difference over a 7 year stand life is 5.6 tons. Fortunately, most growers have long ago realized that Vernal is such a low yielding variety and no longer plant it. (I chose not to pick on other low-yielding varieties.) 5.6 tons at $200 per ton equates to a $1,120 per acre difference just for selecting a high-yielding variety.

The yields reported for the RR trial are extremely high. First, this field is a very high yielding field that was cut four times last year and the trial is in perhaps the best yielding area of the field. Additionally, sometimes yields in alfalfa variety test plots are significantly higher than grower field yields. Our plots are harvested with a flail-type plot harvester and we collect subsamples to determine the moisture content and calculate the hay yield. Therefore, because of the way these plots are harvested, there is no windrow effect or traffic damage from a rake, baler or bale wagon running over the field. Just because these yield levels are higher than typical grower yields does not mean that the information does not apply to your conditions. Don't focus on the yield values presented in the table—what matters is the relative ranking of the varieties.

2011-2013 YIELDS, TULELAKE ALFALFA CULTIVAR TRIAL. TRIAL PLANTED 8/17/10

	FD	2011 Yield	2012 Yield	2013 Yield	Average		% of VERNA
			Dry t/a				%
Integra 8400	4	8.2 (8)	8.9 (1)	9.0 (2)	8.7 (1)	A	110
Archer III	5	8.0 (14)	8.9 (2)	8.9 (3)	8.6 (2)	A B	109
DG4210	4	8.2 (5)	8.4 (20)	9.1 (1)	8.6 (3)	A B	109
WL 363 HQ	5	8.2 (10)	8.7 (8)	8.8 (4)	8.6 (4)	A B	108
WL 357 HQ	4	8.2 (7)	8.7 (7)	8.7 (9)	8.6 (5)	A B C	108
R57M129 FG	5	8.3 (2)	8.5 (17)	8.7 (10)	8.5 (6)	A B C	108
Syngenta 6422Q	4	8.0 (17)	8.7 (5)	8.8 (7)	8.5 (7)	A B C	108
MS Sunstra 803	4	8.8 (1)	8.2 (23)	8.5 (19)	8.5 (8)	A B C	108
R46Bx162	4	8.0 (13)	8.6 (11)	8.8 (5)	8.5 (9)	A B C	108
HybriForce 2400	4	8.3 (3)	8.6 (12)	8.5 (18)	8.5 (10)	A B C	107
R57M130 FG	5	8.3 (4)	8.8 (4)	8.4 (23)	8.5 (11)	A B C	107
AmeriStand407TQ	4	8.1 (12)	8.6 (13)	8.6 (14)	8.4 (12)	B C D	107
GrandStand	4	8.2 (6)	8.3 (22)	8.7 (11)	8.4 (13)	B C D	107
Lightening IV	4	7.7 (25)	8.8 (3)	8.7 (12)	8.4 (14)	B C D	107
R46Bx163	4	7.9 (20)	8.7 (6)	8.6 (17)	8.4 (15)	B C D	107
PGI 459	4	8.2 (9)	8.5 (16)	8.4 (21)	8.4 (16)	B C D	106
Rebound 6.0	4	7.9 (19)	8.5 (18)	8.7 (8)	8.4 (17)	B C D	106
R47M120 FG	4	7.8 (24)	8.6 (10)	8.7 (13)	8.4 (18)	B C D E	106
Syngenta 6422Q-EMD	4	7.8 (23)	8.7 (9)	8.6 (16)	8.4 (19)	B C D E	106
MasterPiece II	4	7.9 (21)	8.5 (19)	8.6 (15)	8.3 (20)	B C D E	106
Integra 8300	3	7.8 (22)	8.4 (21)	8.8 (6)	8.3 (21)	B C D E	106
R47M312 FG	4	8.0 (15)	8.5 (15)	8.4 (22)	8.3 (22)	C D E	105
R48M153 FG	4	7.6 (29)	8.6 (14)	8.5 (20)	8.2 (23)	D E F	104
R56Bx212	5	7.9 (18)	8.2 (25)	8.3 (24)	8.1 (24)	E F G	103
Dura 512	5	8.1 (11)	7.9 (29)	8.1 (29)	8.1 (25)	F G H	102
Xtra-3	4	7.7 (26)	8.2 (24)	8.2 (27)	8.0 (26)	F G H	102
Mountaneer II	5	8.0 (16)	8.0 (28)	8.1 (30)	8.0 (27)	F G H	102
R48W224 FG	4	7.7 (27)	8.2 (26)	8.2 (28)	8.0 (28)	F G H	101
Minerva	5	7.4 (31)	8.1 (27)	8.3 (25)	7.9 (29)	G H	100
Vernal	2	7.6 (28)	7.8 (30)	8.2 (26)	7.9 (30)	H	100
Rugged	3	7.4 (32)	7.4 (31)	7.8 (31)	7.6 (31)	I	95.8
R65BD278	6	7.4 (30)	7.2 (32)	7.5 (32)	7.4 (32)	I	93.3
MEAN		7.96	8.41	8.50	8.29		
CV		4.0	4.1	3.8	2.7		
LSD (0.1)		0.34	0.37	0.35	0.24		

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

2013 YIELDS, UC SCOTT VALLEY ALFALFA CUTIVAR TRIAL. TRIAL PLANTED 5/04/2012

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	
		31-May	8-Jul	12-Aug	1-Oct	TOTAL	
	FD			Dry t/a			
Released Varieties							
RRALF 4R200	5	3.6 (1)	2.9 (2)	2.3 (2)	1.6 (2)	10.4 (1)	A
6547R	5	3.6 (2)	2.8 (4)	2.3 (1)	1.6 (1)	10.4 (2)	A B
Denali 4.10RR	4	3.6 (3)	2.7 (7)	2.2 (3)	1.5 (4)	10.1 (3)	A B C
RR Stratica	3	3.4 (7)	2.7 (6)	2.2 (4)	1.5 (5)	9.9 (5)	C D E
WL 372HQ.RR	5	3.4 (8)	2.7 (8)	2.2 (9)	1.5 (7)	9.8 (6)	C D E F
AmeriStand 415NT RR	4	3.4 (15)	2.8 (3)	2.2 (12)	1.5 (8)	9.8 (7)	C D E F
RR Tonnica	4	3.5 (5)	2.6 (21)	2.2 (5)	1.5 (6)	9.8 (8)	C D E F G
6516R	5	3.4 (14)	2.7 (9)	2.2 (8)	1.5 (10)	9.8 (9)	C D E F G
Mutiny	4	3.4 (10)	2.7 (15)	2.1 (19)	1.5 (3)	9.7 (11)	D E F G
WL 356HQ.RR	4	3.4 (11)	2.7 (18)	2.2 (11)	1.4 (19)	9.7 (14)	D E F G H
DK44-16RR	4	3.3 (20)	2.8 (5)	2.1 (25)	1.4 (15)	9.6 (16)	E F G H I
RR AphaTron	4	3.4 (12)	2.7 (14)	2.1 (26)	1.4 (16)	9.6 (17)	E F G H I
RR Presteez	5	3.3 (17)	2.6 (24)	2.2 (13)	1.4 (24)	9.5 (19)	F G H I J K
WL 355.RR.HQ	4	3.4 (13)	2.6 (22)	2.0 (27)	1.3 (28)	9.4 (21)	G H I J K L
AmeriStand 455TQ RR	4	3.3 (22)	2.6 (28)	2.1 (23)	1.4 (17)	9.3 (22)	H I J K L
Integra 8444RR	4	3.2 (28)	2.6 (25)	2.1 (21)	1.4 (18)	9.3 (23)	I J K L
Consistency 4.10RR	4	3.1 (29)	2.7 (11)	2.1 (22)	1.4 (26)	9.3 (26)	I J K L
6497R	4	3.2 (26)	2.6 (23)	2.0 (30)	1.3 (30)	9.1 (27)	J K L
RR NemaStar	4	2.9 (30)	2.7 (19)	2.1 (15)	1.4 (21)	9.1 (28)	J K L
WL 367.RR.HQ	4	3.3 (21)	2.5 (30)	2.0 (29)	1.4 (27)	9.1 (29)	K L
Integra 8401RR	4	3.2 (27)	2.5 (29)	2.0 (28)	1.3 (29)	9.1 (30)	L
MEAN		3.35	2.68	2.14	1.44	9.61	
CV		6.4	4.8	4.2	4.3	3.7	
LSD (0.1)		0.23	0.14	0.10	0.07	0.38	

Trial seeded at 25 lb/acre viable seed at Scott Valley, CA.

Entries follow ed 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.

Nine experimental lines w ere omitted from this table

Table 4

2012 YIELDS, UC SCOTT VALLEY ALFALFA CUTIVAR TRIAL. TRIAL PLANTED 5/04/2012

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

		Cut 1	Cut 2	YEAR
		30-Jul	21-Sep	TOTAL
	FD		Dry t/a	
Released Varieties				
Consistency 4.10RR	4	1.6 (5)	1.9 (2)	3.4 (3)
6547R	5	1.6 (6)	1.8 (5)	3.4 (4)
RRALF 4R200	5	1.6 (7)	1.8 (6)	3.4 (5)
RR Stratica	3	1.6 (4)	1.8 (8)	3.4 (6)
Mutiny	4	1.5 (11)	1.9 (1)	3.4 (7)
6516R	5	1.6 (3)	1.7 (21)	3.4 (8)
WL 367.RR.HQ	4	1.6 (9)	1.8 (11)	3.4 (10)
Denali 4.10RR	4	1.6 (10)	1.8 (14)	3.3 (11)
RR Presteez	5	1.6 (8)	1.7 (23)	3.3 (13)
RR Tonnica	4	1.5 (13)	1.8 (13)	3.3 (14)
RR NemaStar	4	1.5 (17)	1.8 (16)	3.3 (16)
WL 356HQ.RR	4	1.5 (22)	1.8 (12)	3.2 (17)
Integra 8444RR	4	1.5 (16)	1.7 (25)	3.2 (19)
AmeriStand 415NT RR	4	1.5 (15)	1.7 (27)	3.2 (20)
WL 372HQ.RR	5	1.4 (25)	1.8 (15)	3.2 (21)
DK44-16RR	4	1.5 (18)	1.7 (26)	3.2 (22)
WL 355.RR.HQ	4	1.4 (24)	1.7 (22)	3.2 (23)
Integra 8401RR	4	1.4 (26)	1.8 (18)	3.2 (24)
RR AphaTron	4	1.4 (28)	1.8 (17)	3.2 (25)
6497R	4	1.5 (23)	1.6 (29)	3.1 (28)
AmeriStand 455TQ RR	4	1.4 (30)	1.7 (28)	3.0 (30)
MEAN		1.51	1.76	3.28
CV		11.4	7.7	8.1
LSD (0.1)		NS	NS	NS

Trial seeded at 25 lb/acre viable seed at Scott Valley, CA.

Entries follow ed 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.

Nine experimental lines w ere omitted from this table.

Table 5

Getting the Most Out of Sprinkler Irrigation

Steve Orloff, Farm Advisor Siskiyou County (adapted from Sprinkler Irrigation of Row Crops by Hanson, Schwankl, Orloff and Hanson)

Irrigation water is obviously at a premium this year. The amount of moisture stored in the root zone is far less than what occurs in a "normal" year making efficient irrigation that much more critical. And, without the help of deep soil moisture we don't have the buffer or "cushion" we normally have. Therefore, it is essential to get the most out of every bit of irrigation water. One of the best ways to achieve this is to maximize the distribution uniformity of the irrigation system…or how evenly the water is applied across the field.

Some key points to consider are described below:

Sprinkler pressure can have a significant effect on the water application pattern and the wetted distance, which in turn affects uniformity. Some think the higher the pressure the better, but this is not the case. Sprinklers have an ideal operating pressure range. To understand the effect of pressure, it is helpful to understand how a sprinkler nozzle functions. Water exits the sprinkler as a jet stream and the surface of the diameter breaks up as the water leaves the nozzle and then breaks up further due to air resistance. The water near the edges of the jet produce smaller droplets and water in the center travels the furthest and produces the largest droplets.

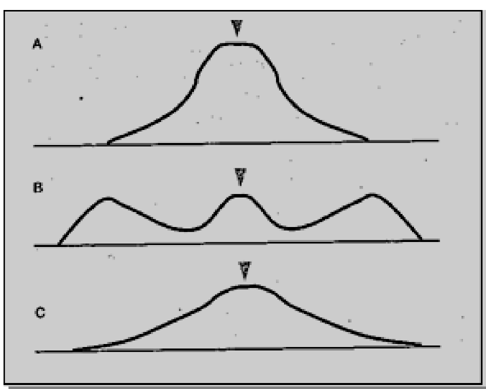

Figure 1. Cross-sections of applied water distribution for:
(A) high pressure
(B) low pressure
(C) and appropriate pressure
The triangle denotes the location of the sprinkler nozzle.

Pressure affects the droplet size distribution. High pressure produces smaller-sized droplets that fall near the sprinkler, resulting in a large amount of water near the sprinkler (Figure 1A). In contrast, low pressure results in larger water droplets that travel further from the sprinkler and tend to fall in a circle or ridge a set distance away from the sprinkler. This is often described as a doughnut-shaped pattern (Figure 1B). A triangular shaped pattern results with the proper sprinkler pressure (Figure 1C). This pattern results in a uniform water application with the overlap that occurs from adjacent sprinklers.

The recommended pressure depends on the sprinkler nozzle diameter (Table 6). For non-standard sprinklers the manufacturer should be contacted to determine the optimum pressure.

Nozzle Diameter (in)	
3/32	30 – 40
1/8	30 – 50
5/32	30 – 55
11/64	30 – 55
3/16	35 – 60
13/64	35 – 60

Table 6. Recommended sprinkler pressure for standard circular nozzles.

Knowing the water application rate of your sprinkler irrigation system is very important—especially in a drought year. Knowledge of how much water is applied helps you better match water application rates with the varying needs of the crop over the season. Most growers do not have flow meters on their irrigation system and may be unaware of their sprinkler application rate. Rate varies depending on the nozzle. Water application rates for different nozzle sizes, spacings and pressures are shown in Table 7 (see bottom of page).

Uniform nozzle sizes are critical to ensure an even application rate. This may seem like a simple straightforward suggestion but I have been surprised how many different nozzle sizes I have observed on some wheel-lines. It is understandable how it occurs because when there is a faulty nozzle it may be easiest to just grab the replacement you find on the four-wheeler. However, nozzle sizes can have a huge impact on application rate. I have measured greater than a two-fold difference in water application rate on some systems when nozzles sizes are mismatched.

Table 7 Sprinkler application rate in inches per hour for different nozzle sizes, spacings, and pressures.

	Nozzle size (in)								
	7/64	7/64	1/8	9/64	3/32	5/32	11/64	3/16	13/64
	Sprinkler-spacing (ft)								
Pressure	**(30x30)**	**(30x40)**	**(30x40)**	**(30x40)**	**(30x50)**	**(40x60)**			
(psi)	Application rate (in/hr)								
30	0.202	0.151	0.198	0.254	0.089	0.153	0.184	0.218	0.264
35	0.219	0.164	0.215	0.272	0.096	0.165	0.198	0.236	0.285
40	0.235	0.183	0.230	0.292	0.103	0.176	0.213	0.253	0.305
45	0.248	0.186	0.245	0.309	0.109	0.188	0.225	0.264	0.325
50	0.262	0.197	0.258	0.321	0.115	0.197	0.233	0.281	0.341
55	0.277	0.207	0.272	0.341	0.121	0.208	0.249	0.293	0.357
60	0.289	0.217	0.284	0.355	0.126	0.216	0.261	0.313	0.373

Avoid irrigating in the wind if possible. This is much easier said than done. Most irrigations systems do not have the capacity to keep up with crop needs when the system is shut down on windy days so growers are forced to continue irrigating. However, if you have the capacity to shut down your system on a windy day and resume irrigating when it is calm, that would help with uniformity. Wind is the enemy of uniform sprinkler irrigation. Good uniformity occurs until winds speeds exceed about 5 miles per hour. After that the distribution uniformity of the system decreases an average of 3 percentage points for every 1 mile per hour increase in wind speed. A general recommendation has been to orient the sprinklers perpendicular to the wind direction. However, irrigation uniformity tests have shown that distribution uniformity is largely unaffected by sprinkler orientation (perpendicular or parallel) to wind direction. The distribution uniformity value is similar with both orientations but the water distribution pattern differed greatly. There is actually little that can be done of a practical nature to greatly improve uniformity during windy conditions—they should be avoided when possible. One possible suggestion follows.

Offsetting sprinkler laterals can increase uniformity. Distribution uniformity can be improved by about 10 to 20 percentage points by offsetting sprinkler laterals. This simply means that the sprinkler laterals for the current irrigation are set midway between the lateral locations at the previous irrigation set. For the next irrigation set, the laterals resume their original position. The net effect is a smoothing out of the irrigation pattern (especially when some sets occurred during windy conditions). This practice continues throughout the irrigation season alternating the position of the laterals.

Other Common Items to Consider to Improve System Performance:

-Repair Leaks

-Fix malfunctioning sprinkler heads

-Replace warn nozzles. Nozzles can wear significantly over time especially if the water contains sand or other particles. Use a drill bit to check actual nozzle orifice and replace worn nozzles. One study showed a distribution uniformity of 81.6 for new nozzles, 79.1 for 2-year old nozzles and 74.8 for nozzles older than 3 years. *How old are your nozzles?*

-Clogged screens and nozzles

-Crop interference with spray pattern If this occurs a longer riser height is needed.

-Risers not vertical or leaning. A riser angle of 20 degrees can reduce distribution uniformity by 7 to 10 percentage points under low wind conditions and even greater in windy conditions.

-Different day and night set times.

Hopefully, these suggestions can help you get more out of your irrigation water this year by improving the uniformity of water application. The way this drought year is looking, we are going to need all the help we can get.

Check Soil pH Before Planting Alfalfa

Alfalfa is not real tolerant of low soil pH. It's not so much that the alfalfa plant itself needs a higher pH, but that the *Rhizobium* bacteria that live in nodules on the alfalfa roots need a suitable pH to function well and fix atmospheric nitrogen (N). If pH is too low, the Rhizobium bacteria suffer and the alfalfa plant does not obtain enough nitrogen, turns yellow (typical N deficiency symptoms) and growth is severely stunted. Most pH issues typically occur with seedling alfalfa plants rather than established stands. What typically occurs is the alfalfa seedlings emerge well but then growth slows and the plants may turn yellow.

In the Intermountain Region we most often encounter pH problems on sandy or gravely soil, in fields near wooded areas, or in fields following potatoes. The acidic layer may only be a few inches thick. Oftentimes, upper soil layers are lower in pH and pH increases with increasing soil depth.

Because pH is so important for initial growth and development of alfalfa seedlings, University of Nebraska forage specialist Bruce Anderson recommends a "special" soil test before planting**.** Rather than only taking a typical soil sample that is 6 to 8 inches deep, he recommends taking a shallow sample that is only 2 inches deep. This will better characterize the conditions the young seedlings will be exposed to. The laboratory should only run pH on this sample. Use the traditional deeper 6-8 inch sample for the usual analysis (pH, phosphorus, potassium, etc.).

Bruce Anderson recommends lime if the pH of the 2-inch sample is below 6.2 (same pH level where we generally recommend a lime application in California). However, if the pH of the normal 6-8 inch sample is above 6.2 and more than one-half point higher than the shallow sample, you need only about half the usually recommended amount of lime.

If the typical 6-8 inch sample also has a pH below 6.2, I would recommend deeper sampling at 6-8 inch increments down to 18-24 inches. It is important to determine if the acidic pH is just a surface phenomenon or if it persists at lower depths as well. This will help determine how much lime will be needed and how long the pH adjustment might last. Typical lime application rates are shown in the table below. Lime applications are different from fertilizer applications. With fertilizer applications, yield generally increases when more fertilizer is added until you reach a point where returns diminish and the yield improvement no longer pays for the additional fertilizer. With lime applications, yield only increases until the desirable threshold pH value is reached (6.2 pH or 6.5 at the most) and then no further yield increases can be expected with additional applications of lime. When it comes to lime more is not better. More is better only until an adequate level is reached and then there is no advantage to applying more.

Getting the Most Out of Fertilizer and Pesticides during Drought

Rob Wilson, Farm Advisor and IREC Director

Spring planting is upon us and the hillsides and cropland are once again green. Unfortunately, mother-nature provided limited snowpack this winter and there is a lot of uncertainty on how long we can keep our crops, pasture, and rangeland green. Drought conditions create unique conditions that should be considered during fertilizer and pesticide applications this year. Along these same lines, unique fertilizer and pesticide decisions are made when managing fallowed land and deficit irrigated fields. Below are some considerations and tips that can hopefully help aid decisions and maximize efficiency of valuable inputs.

-The recent warm weather and few rain showers have created perfect conditions for weeds. Start scouting grain, pasture, and grass hay fields early this year and be prepared to budget herbicides into your costs. Early scouting suggests many fields are at the optimal growth stage for herbicide treatment. Broadleaf herbicides such as 2,4-D and dicamba (Banvel) work best when applied to small weeds that are actively growing. Controlling weeds now while soil moisture is adequate minimizes weed competition for limited soil moisture, maximizes herbicide efficacy, minimizes crop herbicide injury, and prevents weed seed production.

-Spring soil nitrogen sampling and proper nitrogen fertilization of irrigated grasses and grain forage is one of the best ways to maximize forage production with limited acreage. In wet years, ample forage and low forage prices can sway growers to skimp on nitrogen fertilizer, but all-time high forage prices make nitrogen fertilization very cost-effective this year. University trials consistently show a 20 to 40% increase in first cutting forage production when annual and perennial grass fields deficient in soil nitrogen are fertilized properly. Fertilizer should only be applied to fields where soil moisture is available until first cutting. Along the same lines, summer nitrogen fertilization for 2nd cutting or summer grazing should only be considered if full-season irrigation is available. A word of caution: Growers need to be careful not to apply too much nitrogen if there is a chance the crop will not be adequately irrigated up to the time of cutting. A moisture-stressed crop with high nitrogen fertilization is may have high nitrates, which can be toxic to cattle.

-Top dress urea and ammonium sulfate fertilizers on small grains and grass hay shortly before irrigation. A ½ inch of water is needed to incorporate these fertilizers into the soil and prevent volatilization losses. Nitrogen volatilization losses can exceed 20% if urea is left on soil surface for more than 4 to 6 days without incorporation, especially during warm, moist weather conditions.

-Start scouting for insect pests in alfalfa, small grains, and row crops early this spring. Warm spring temperatures have accelerated insect emergence and drought-stressed crops are typically more susceptible to insect problems. Aphids and alfalfa weevil are common pests in alfalfa that often go unnoticed until shortly before harvest. Weevil damage can reduce 1st cutting alfalfa yields by ½ ton per acre. Recent research has shown early identification with regular field scouting and properly timed insecticide treatment can minimize weevil damage and prevent yield loss. Spider mites are another insect problem that can occur during drought conditions. Spider mites infestations often start near field edges and along dusty field borders near roads.

-Add an adjuvant and follow herbicide label directions when treating weeds during drought conditions. Weeds grown in dry conditions have smaller leaves and develop a thicker cuticle which results in fewer droplets intercepting leaves and less herbicide absorption into the leaves. Adjuvants help spread herbicides over the leaf surface and better overcome leaf barriers like a thick cuticle.

-Dust is another consideration when applying herbicides during drought conditions. Dust on leaves inactivates many herbicides, especially glyphosate (Roundup). In dusty situations, herbicide rates should not be reduced and wash dust off the leaves before herbicide application if possible.

FIELD CROP NOTES

DATED MATERIAL

Cooperative Extension
University of California
1655 South Main Street
Yreka, CA 96097

NON-PROFIT
STANDARD MAIL
PERMIT #3
YREKA, CA

CURRENT RESIDENT OR