New Mexico State University

Extension Plant Sciences

Alfalfa Market News

New Mexico Hay Association, www.nmhay.com

Hay Prices for New Mexico | **Volume 9, Issue 2** | **May 27, 2010**

County	Contact	Premium Hay ($/ton)	Top Quality Hay ($/ton)	Other Hay ($/ton)	Condition/ Market Activity/Cut Complete
Chaves	Sandra Barraza, County Agent	$165-170 large delivered; $200-220 small in barn	N/A	N/A	1st 90%; Market strong; Climate quite variable
Colfax	Boe Lopez, County Agent	$130	$120	$120	2 weeks out from 1st cut. Cool conditions, freezing nights. Market slow.
De Baca	Leigh Ann Marez, County Agent	$150 large	$140 large	$100-110 striped; $120 wheat hay	1st 100%; Supply low, demand high; very little horse hay available off 1st
Dona Ana	Rafa Realivasquez, County Agent	$180 large; $6.00 small	$160 large; $5.00 small	$140 large; $3.75 small	All 1st cuts baled; watering 2nd; warm/windy conditions
Eddy	Woods Houghton, County Agent	$210 large and small	$160 large; $180 small	N/A	1st 100%, 2nd 40%.
Hidalgo	Christy Rubio, County Agent	$135 large	$130; $7.00 per 3-string bale	$95 oat hay; $5/bale ryegrass	1st 100% complete and contracted; some weevil damage; wind/sand damage
Lea	Wayne Cox, County Agent	$190-200 large; $7.50-9.00 small	$175-185 large; $6.50-7.50 small	N/A	1st 100%
Luna	Jack Blandford, County Agent	$125-150	N/A	N/A	1st 100%, approaching 2nd. Horse hay in demand. Warm/dry/windy.
Roosevelt	Patrick Kircher, County Agent	$165-180 large; $185-200 small squares	<$165 large	$140 wheat round bales; $180 wheat small bales	1st 90%; good quality/yield; wheat hay affecting 1st cut alfalfa market; still aphids & weevils after sprays

Irrigation Efficiency and Uniformity – Flood

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As the 2010 hay crops are off to a good start, it is appropriate to discuss irrigation and how important it is to make sure you are getting as much as possible out of every drop of water you are applying. Poor irrigation efficiency is not only an improper use of our most valuable resource, but it can be a nutrient leacher, yield reducer, and ultimately a money waster. Flood irrigation has, by nature, relatively low efficiency compared to other systems such as LEPA (Low Energy Precision Application) on sprinkler systems and subsurface drip. There are, however, some ways that we can ensure that our flood systems are as efficient as possible under the conditions with which we have to work. Irrigation efficiency is a function of two major components: application efficiency and distribution uniformity (DU). For this article, I want to focus on the distribution uniformity aspect along with set times (cutoff) since these are the factors that we have the most control over in our flood irrigation systems.

In general, the faster you can get the water across the field, the more evenly distributed it will be. So, you want your system to be set up where you get the most rapid flow over the whole area. This may mean incorporating shorter runs in large fields, especially where water flow from the source is limited (e.g., low gpm or cfs). If water distribution is not uniform, then losses are almost certain. Figure 1 shows the effect of two different DU on how much water is wasted through deep percolation and how much yield reduction can result. At 62% DU, much more water is lost (blue area) from the segment of the profile where the crop takes up the bulk of its water. However at 75% DU (light green line), less water is leached by the time the water gets over the entire field and crop losses (red area) are less. Crop losses result from over-irrigating certain portions of the field and under-irrigating others.

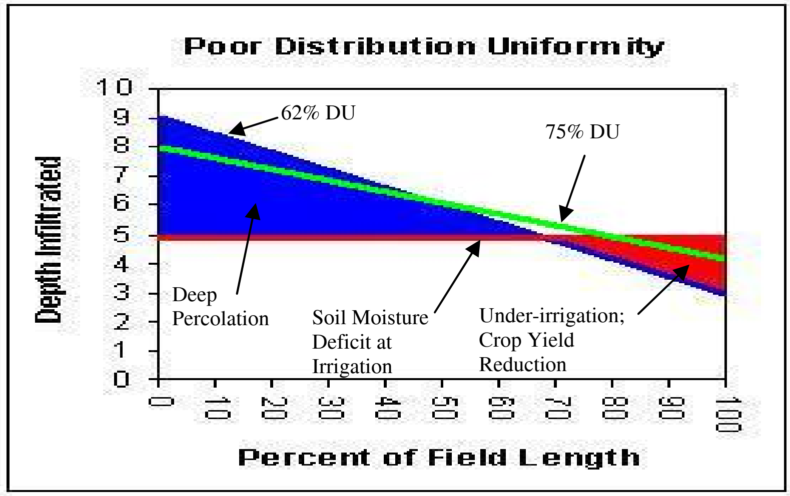

Figure 1. Distribution uniformity effects on depth of water infiltration and crop yield reduction. Source: Furrow irrigation systems. Water Management Handbook. Westland Water Dist. Fresno, CA.

Soil type plays a major role in not only how fast water will move across the field, but also how fast and to what degree water moves into the soil and through the profile. Depending on what type of soil texture(s) you have in any particular field, there are different general cutoff times that need to be considered. For instance, finer-textured, clay soils (clay loam = 0.2 inch/hr) cannot take in water as fast as more sandy soils (sandy loam = 0.4 inch/hr). Thus, water tends to move across the surface of clay soils faster than sandy soils. In effect, this means a sooner cutoff time for fine-textured soils. In general, a heavy, clay soil will require a cutoff time near 60-70% of the water advance down the field. Contrast that with a very coarse, sandy soil where the cutoff time may be closer to when the water has advanced nearly 95-100% of the field. Growers should know their soil type and the impact type has on water movement.

Table 1 gives an example that shows the different properties that are affected by varying cutoff times. In this example, the soil type lends itself to an advance time of 650 minutes from one end of the field to the other. It is easy to see that for this soil, to achieve adequate infiltration and uniformity >80%, cutoff time needed to be about 600 minutes or more. If water was shut off ~1.5 hours earlier than the advance time (550 minutes), then infiltration across the field was inadequate and it is likely that plants would stress in areas of the field. On the other hand, if the water was allowed to go to 800 minutes (just 2.5 hours longer than it took the water to advance the field), although infiltration and uniformity were plenty adequate, nearly 3 inches of water ran off or accumulated at the end of the field. There was no reason in this instance to let the water run longer than 600 minutes. Tailwater waste should be minimized as much as possible or collecting the tailwater somewhere to be used later or for another area of the farm. Many fields in NM are enclosed on all sides, so very little runs out of the field; however, this doesn't necessarily mean that water is not being lost out of those systems. Large amounts of water collecting at the end of the field (top or bottom) can lead to leaching of both water and nutrients out of the profile, drowned alfalfa, and increased weed presence.

Cutoff Time (minutes)	Applied Water (inches)	Surface Runoff (inches)	Distribution Uniformity (%)	Infiltration*
800	12.8	2.8	89	Adequate
700	12.1	1.6	87	Adequate
600	11.2	0.5	82	Adequate
550	10.7	0.06	78	Inadequate
500	9.8	0	62	Inadequate

Table 1. Flood irrigation properties as affected by cutoff time. *Assumes a 650 minute 'advance time'. Adapted from Hanson and Putnam, Flood irrigation of alfalfa: How does it behave? UC Coop. Ext.Pub.

Figure 2 gives some common scenarios of what can happen in surface irrigated fields that have varying degrees of both application efficiency (E_a) and distribution efficiency (E_d). Application efficiency can be thought of as the percentage of water delivered that is actually used by the crop. As mentioned previously, distribution efficiency (or uniformity) is an indicator of the degree of uniformity at which the water is delivered. The dashed line in the figure indicates the amount of water needed to meet the crop's requirement. The dark area is relative crop productivity and the light area represents the depth of water applied during irrigation. Examples A, B, and C show an increasing amount of water applied from the top of the field and assume that there is no blocked end or runoff. In example A, even though all the water delivered was utilized (100% E_a), not all plants received their requirement because the distribution was low. Matching irrigation with crop demand was nearly perfect at the top end of the field, but dropped off sharply the further you moved down field. When more water was added, uniformity increased (B and C), but water was lost out of the profile (reduced E_a), especially on the upper end. In examples B and C, crop productivity was more uniform, but at the expense of significant deep percolation. Examples D, E, and F represent a field that is blocked on the lower end to prevent runoff. Again, in example D, 100% E_a is achieved because all of the water applied is utilized; however, because uniformity is so low the crop stresses in spots. In these fields, it is not uncommon to see plant stress about 2/3 of the way down the run. When more water is applied to offset this stress (E and F), uniformity can increase (and hence plant production), but large amounts can potentially be lost from the profile especially on either end of the field. Reduced crop performance where water quantity was high enough to leave the profile (e.g., example F on either end) is likely due to leaching of nutrients or waterlogged conditions.

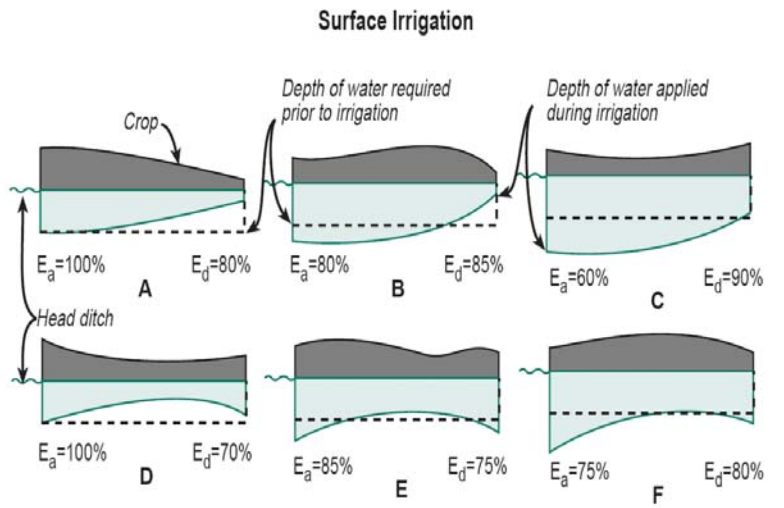

Figure 2. Application and distribution efficiencies and their effects on water loss and crop production. Source: Rogers et al. 1997. Efficiencies and water losses of irrigation systems. KSU Extension Pub. MF-2243.

The irrigator's goal is to be able to match as close as possible both types of efficiencies and meet the crop's water demand. In reality, this is easier said than done because of things like water restrictions, allocations and soil type diversity within fields. Producers may recognize areas of crop stress or low productivity in the middle or bottom of the field when using flood or furrow irrigation. Irrigation application efficiency and distribution uniformity can be improved by shortening runs. One means to accomplish this in established fields is to use gated pipe to deliver water to the lower sections of the field first and then irrigate the top end. Alternatively, irrigation efficiency is greatly improved by using LEPA sprinkler and subsurface drip systems. While these systems have a greater cost in capital investment than flood or furrow irrigation, they also save water, can increase crop productivity, and are much less labor intensive allowing more time for other tasks on the farm. Whether it is shortening runs, knowing soil types, adjusting set times, or changing water delivery systems, producers should be continually looking for ways to improve their irrigation efficiency and subsequently their profits. For further information about alfalfa management contact your County Cooperative Extension office or visit the NMSU Cooperative Extension Service publications website (http://aces.nmsu.edu/pubs/). For more information on measuring irrigation and system efficiency please visit: www.attra.ncat.org/attra-pub/irrigation_water.html or www.attra.ncat.org/attra-pub/PDF/irrigation_water.pdf.

******* UPCOMING EVENTS *******

• Dairy Producers of New Mexico Convention & Trade Show, Ruidoso, NM, June 11-12, 2010. www.nmdairy.org or 575-622-1646.

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