Imperial AGRICULTURAL BRIEFS

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New Sudan Fertilization Challenges

By Herman Meister

Reports indicate that prices for good quality sudangrass will be strong this year. The export market is currently demanding a product low in nitrate levels to command the highest price. The key to profitability is to grow a high tonnage crop with a low nitrate level at harvest. To accomplish this, growers need to manage N so that nitrate levels decline as the crop matures.

Further complicating the challenge is having to plant sudangrass following crops with varying amounts of nitrogen carry-over and crop residue. Growing sudangrass under this "low nitrate" regime following a produce crop may require little, if any N supplementation for the first cutting of sudangrass. A more difficult scenario is following wheat. Experience has shown that any means of wheat crop debris removal makes N management easier.

After the first cutting of sudangrass, I suggest taking a soil samples to determine the residual amount of N present in order to determine how much to apply for the second crop. It is a good idea to sample the fields in at least 3 areas per field, one at the head end, one in the middle, and one at the tail end. Soil fertility levels can vary considerably across the field due to different soil types, irrigation uniformities, and past fertilizer applications.

A general rule of thumb in the past seasons is that sudangrass requires approximately 30-40 lbs of N per ton, depending upon soil type. If your soil sample shows 15 ppm of NO3-N in the top 12 inches, then you can expect around 60 lbs of residual N to be present or enough to grow approximately 2 tons of sudangrass (4 X 15ppm = 60 lbs). An acre-foot of soil weighs approximately 4 million pounds, hence the number 4 for a multiplier. With soil test results, your decision on how much N to add can be modified to supply the correct amount of N to the crop to grow the crop well enough to get tonnage with low nitrates levels at harvest.

Observations of various practices last year indicate that applying the total N that the crop needs up front, prior to irrigation or in the first irrigation water was successful in lowering brown-leaf problems while still maintaining adequate production as opposed to supplying N to the crop in small amount during the growing season.

If your crop is higher in N than necessary, raising the cutting bar to 8-10 inches will significantly lower the amount of nitrate in the sudangrass. Nitrates tend to accumulate in the vascular system of the plant and convert to proteins in the leaves. Raising the cutting height reduces the amount of stem and increases the relative amount of leaves in the bale, thereby reducing the nitrate in the stack.

Protecting Hay During Summer

Juan N. Guerrero

Prolonged exposure to high temperatures decreases hay quality. During the summer of 1993 we stored alfalfa hay for 20 weeks under four different storage methods: stacked roadside, outside under a shade, outside and protected by a gray plastic tarp, and stored in an air conditioned room at a constant 72°. This trial was repeated thrice; in Holtville, CA; in Parker, AZ; and in Mexicali. All treated hays were sampled weekly. Figure 3 depicts what happened to bale dry matter after 20 weeks of storage. The tarped hay had less storage shrink ($P < 0.01$) than the hay stored in the shade or roadside hay. In California, the principal chemical determinant of hay quality is the Acid Detergent Fiber (ADF) analysis. Figure 7 illustrates what happened to ADF values after 20 weeks of storage. Both the tarped hay and the road-sided hay increased ($P < 0.01$) in ADF (bad), while the hay stored in shade was not affected as adversely. Extreme heat also degrades protein quality, makes the protein indigestible. The measure that we use to quantify heat degradation in forages is ADIN/N (the portion of nitrogen in ADF as a percent of total nitrogen). Greater than 14% ADIN/N is considered to be heat damaged. After 20 weeks of summer storage in the irrigated Sonoran Desert, both the tarped and road-sided hays were heat damaged (Figure 5). The hay kept under a shade was not heat damaged. In the 1993 trial, however, we did not actually feed the treated hay to cattle.

During the summer of 1998, we stored alfalfa hay at UC DREC for 21 weeks. The alfalfa hay was exposed to three treatments: stored roadside, outside under shade, and outside protected by a plastic tarp. All treated hays were sampled every two weeks. At the end of the hay storage period, the experimental hay was fed to 3 fistulated (rumen, ileum, and duodenum) 150 kg Holstein steers in a 3 X 3 Latin square experimental design. Fifteen g of chromic oxide per day were administered to each steer in ground feed to determine hay digestibility. Digesta and fecal samples were subjected to the following analyses: Dry Matter, crude protein, Cr, NDF, and ADF. Table 1 depicts the results of the digestibility trial. Both the tarped and shaded hays had greater dry matter digestibilities ($P < 0.05$) than the road-sided hay. Both the tarped and shaded hays had greater crude protein digestibilities ($P < 0.05$) than the road-sided hay. Protecting alfalfa hay from the extreme heat of the Sonoran Desert summer improves hay quality. Either the use of a plastic tarp or a shaded structure improved hay quality compared to road-sided hay.

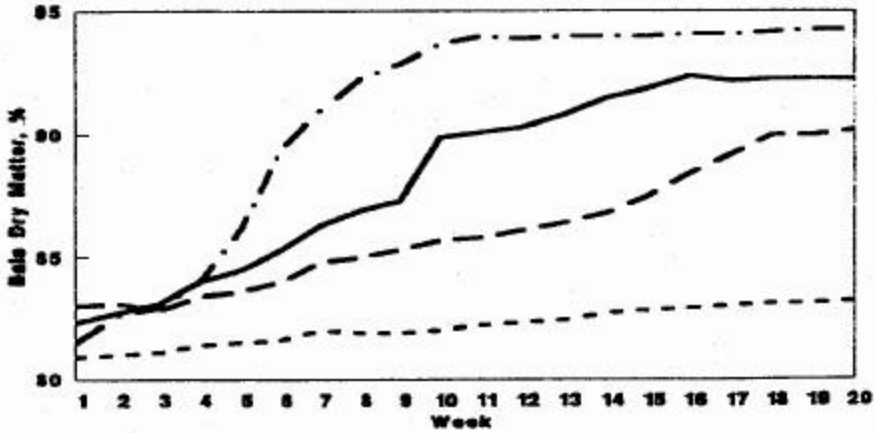


Fig. 3. Mean bale dry matter from alfalfa stacks stored from late May to early October 1993 in the Sonoran Desert under four storage treatments; hays stored in air conditioned room, - - - -; hays stored outdoors under a roof, ———; hays stored outside protected by a plastic tarp, — — —; and hays stored outside in full sunlight, - · - · -.

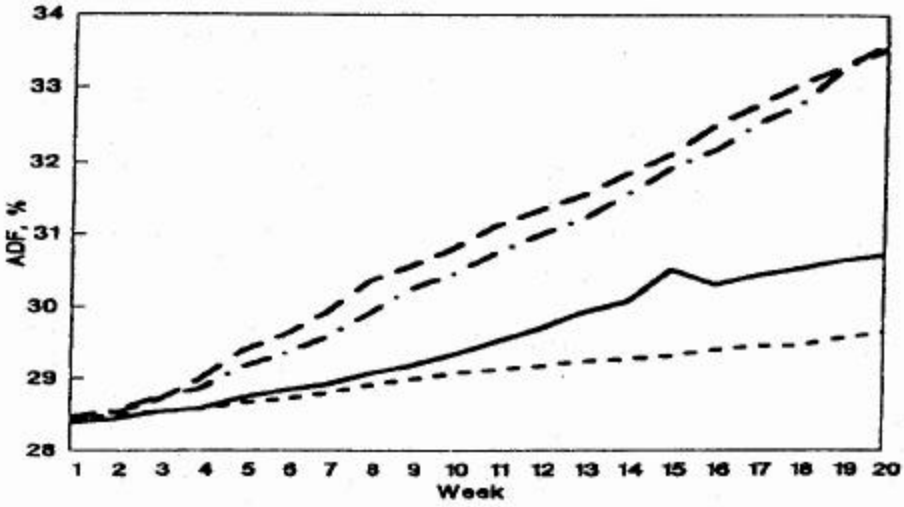
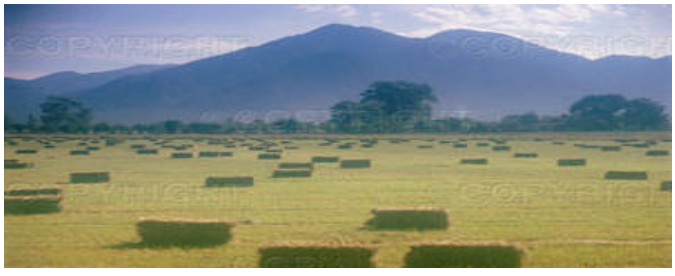


Fig. 7. Mean ADF values from alfalfa stacks stored from late May to early October 1993 in the Sonoran Desert under four storage treatments; hays stored in air conditioned room, - - - -; hays stored outdoors under a roof, ———; hays stored outside protected by a plastic tarp, — — —; and hays stored outside in full sunlight,



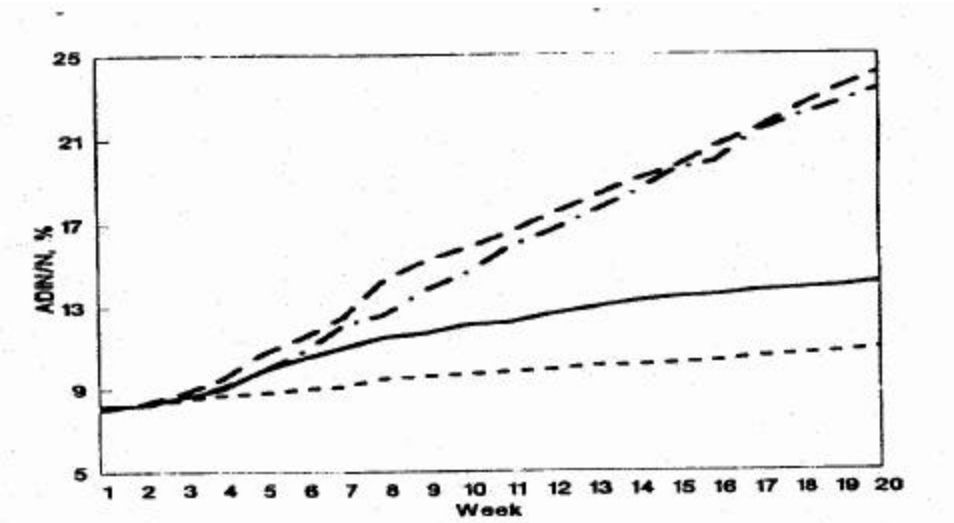


Fig. 5. Mean ADIN/N values from alfalfa stacks stored from late May to early October 1993 in the Sonoran Desert under four storage treatments; hays stored in air conditioned room, - - - -; hays stored outdoors under a roof, ———; hays stored outside protected by a plastic tarp, — — —; and hays stored outside in full sunlight, — · — · —.

Table 1. Mean digestibility of nutrients of 150 kg Holstein steers consuming alfalfa hay stored from June to November, 1998, in the irrigated Sonoran Desert.

	Treatment*			
	1	2	3	SE
Total digestion, % of consumption				
DM	59.5[c]	66.2[a]	64.7[b]	0.7
NDF	39.2[b]	53.2[a]	47.2[ab]	4.2
ADF	33.0[c]	47.5[a]	37.9[b]	2.0
CP	76.7[b]	81.2[a]	80.6[a]	0.3

* 1 = stored outside uncovered, 2 = stored outside under a roof and protected from sunlight; and 3 = stored outside covered with plastic tarp.

[a] means within row with different superscripts differ, ($P < 0.05$) LSD.

CUTWORMS MANAGEMENT IN ALFALFA

Eric T. Natwick

Cutworms are serious pests of desert alfalfa especially in alfalfa planted on beds. Granulate cutworm, *Agrotis subterranea* (Fabricius), and the variegated cutworm, *Peridroma sausia* (Hübner), are the two species that most commonly attack desert alfalfa. Cutworm adults are night-flying moths in the Family: Noctuidae. The white or greenish eggs of cutworm moths are laid in irregular masses on alfalfa leaves or stems often near the base of the plant. The eggs darken as they approach hatching. Larvae can grow up to 2 inches long. The heavy-bodied larvae appear as smooth-skinned caterpillars of various colors and patterns. Larvae frequently roll into a C-shape when disturbed. Cutworm larvae hide under loose soil, in soil cracks or under duff during the day, and move to the plants at night to feed.

Granulate cutworm is a devastating pest of bed planted alfalfa, but can also be a pest of alfalfa planted between borders. Low desert alfalfa fields are attacked by granulate cutworm from May through October, but theses pests are resident in fields throughout the year. Established alfalfa fields can be severely injured when cutworms cut off new shoots at or below ground level following hay harvest. The pest often goes undetected after cutting and hay removal. The problem becomes apparent when the field is watered back and there is little or no re-growth due to cutworms feeding. Cutworms feeding on shoots, thereby holding back re-growth, deplete starch reserves in the crowns, weakening the plants, making them susceptible to disease. Granulate cutworm is nocturnal; they move from their daytime hiding places and climb onto the alfalfa canopy to feed in the evening.

Management Cutworms are most injurious in fields with high plant residue. Pre-plant tillage and abatement of weedy refuge areas around fields help prevent cutworm infestations. Flood irrigation will drown many cutworm larvae. Flood irrigation during daylight hours will attract black birds, Egrets, Ibis, gulls and other birds that prey on the cutworm as the advancing water forces the larvae from hiding. Monitoring and treatment guidelines have not been established for cutworms in desert alfalfa. However, cutworms can be detected by looking under duff and carefully digging to a depth of one inch deep in loose soil near alfalfa crowns. When cutworm numbers exceed one or two per foot of row or severe damage is apparent, treatment with an insecticide is usually warranted. Pyrethroids were the only efficacious insecticides for control granulate cutworm in the low deserts until the recent registration of Steward ®.

Variegated Cutworm

Granulate Cutworm larva

Rhizomania

Tom Turini and Herman Meister

Rhizomania is a devastating virus disease of sugar beets. It is caused by Beet Necrotic Yellow Vein Virus (BNYVV) and is vectored by a soil borne fungus *Polymyxa betae.* The disease is controlled through the use of Rhizomania-resistant varieties and cleaning harvesting equipment when moving from field to field. Current varieties are estimated to be 80 to 99% resistant depending on the variety. Resistant varieties have been successful in reducing the incidence of Rhizomania for a long time.

There is evidence that plant resistance-breaking strains are present in Imperial County. Last year, several fields of beet varieties with BYNVV-resistant varieties were suffering characteristic Rhizomania symptoms. Yellow stunted foliage was obvious in patterns that extended across the field in a few consecutive rows with a few isolated patches exhibiting similar symptoms. The fields we examined were in beets two consecutive years. Unfortunately, these symptoms have been detected in more fields this year.

Dr. Hsing-Yeh Liu, USDA Salinas, CA, molecularly characterized the BNYVV associated with Rhizomania on resistant varieties in Imperial County. He verified that the BNYVV from Imperial County causes Rhizomania symptoms in resistant varieties. He also documented that the plant-resistance-breaking viral strain in Imperial County is similar to 'Pathotype A', the pathotype known to be present in this area. The more virulent 'Pathotype P' was not been detected. In his analysis, Dr. Liu indicated that there might be some resistant-breaking isolate that has evolved from the original A type.

This research finding has growers re-evaluating their growing practices as to whether is it feasible to grow beets two years in a row. In conjunction with the increase in the number of sugar beet cyst nematode findings, we strongly suggest avoiding planting beets back to back in any situation.

In addition to Dr. Liu, several plant breeders including Dr. Bob Lewellen, USDA-ARS, Dr. Mike Georgescu-Holly Hybrids, and Dr. J. R. Stander-Betaseed are cooperating in a test north of Brawley to evaluate a wide range of germ plasm in a field that was infected with BNYVV last year.

Figure 1. Lateral root proliferation resulting in the "bearded" or "hairy" root symptom associated with rhizomania. (Courtesy E. D. Kerr)

Results of Vydate® L Efficacy Against Root Knot Nematode on Muskmelon, 2003

T. A. Turini and A. Ploeg

This study was conducted in a commercial field in northern Imperial Valley on Vint loamy very fine sand. 'Honey Ace' honeydew melon seeds were sown and irrigated on 17 August. The plants were sprinkler irrigated to emergence; then, irrigated using underground drip. The treatments included the following: 1) Vydate® L (oxamyl) applied on 13 and 29 Sep and on 21 Oct; 2) Vydate® L applied on 13 Sep and 3) untreated control. All Vydate® L applications were made at 2.0 qts/A through the drip irrigation system. The experimental design was a four-replication randomized complete block. Each treated area consisted of one 950 ft long 80 inch bed. The area from which data was collected was in a marked 30 ft long portion of each of these treated beds. From each plot, ten 6 to 10 inches deep, 1 inch diameter soil cores were taken on 1 Sep and 28 Oct. Nematodes were extracted and the number of J2 *Meloidogyne spp.* in 100 g of soil was determined.

Fruit were harvested from 30 ft of bed in each plot on 27 and 28 Oct. On 29 Oct, ten roots were dug from each plot and were rated for root galling severity on a scale of 0 to 10 with 0 being galls. Data was subjected to analysis of variance and Least Significant Difference (P=0.05) was calculated.

Under the conditions of this study, there were no differences in yield, root damage or yield detected among treatments. Some galls were detected on roots at the time of the first application. In this study, the first application was delayed due to heavy rains, and was not made until 26 days after the first irrigation. At the time of the first application, root knot nematode damage was detected on plants. In replicated studies conducted in pots, Ploeg et al. found that melons suffering root knot nematode damage at early stages of plant development have the greatest impact on growth. Therefore, it is likely, that the plants suffered nematode damage prior to the first treatment. Further investigation regarding the effect of Vydate® L applied at early stages of plant development in root knot nematode infested melon fields is needed.

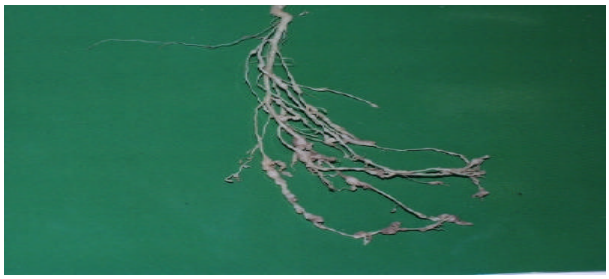


Table 1. Effect of Vydate® L applied 26 days after first irrigation on Nematode densities, root damage and yield in 2003 Imperial County, CA experiment.

Treatment [t]	Nematode counts[u]		Root Rating[v]	Cartons per acre[w]				
	Pre-treatment	Post-treatment		4	5	6	8	9
Vydate (3 applications)[x]…	1.0	2.0	1.5	177	316	372	136	54
Vydate (1application)[y].....	1.5	116.0	1.7	177	294	463	109	36
Untreated……..	1.0	27.8	1.5	82	381	463	128	42
LSD (P=0.05)	NS[z]	NS	NS	NS	NS	NS	NS	NS

[t] All Vydate® L applications were made at 2.0 qts/A through the drip irrigation system.

[u] From each 30 ft plot, ten 6 to 10 in deep 1 inch diameter soil cores were taken on 1 Sep (pre-treatment) and 28 Oct (post-treatment). From both sets of samples, nematodes were extracted and the number of J2 *Meloidogyne spp.* in 100 g of soil was determined.

[v] On 29 Oct, ten roots were dug from each plot and were rated for root galling severity on a scale of 0 to 10 with 0 being unaffected and 10 being completely covered with galls.

[w] Fruit were harvested from 30 ft of bed in each plot on 27 and 28 Oct. Fruit were placed in size categories 4, 5, 6, 8 and 9 based on the number that would be packed in a standard carton. Cartons per acre for each size category were calculated.

[x] Vydate® L (oxamyl) wasapplied on 13 and 29 Sep and on 21 Oct.

[y] Vydate® L applied on 13 Sep.

[z] NS = no significant difference (P=0.05).

CIMIS REPORT

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of July 1 to September 30 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (760-352-9474; http://ceimperial.ucdavis.edu) or the IID, Irrigation Management Unit (760-339-9082).

Please feel free to call us if you need additional weather information. Or check the latest weather data on the worldwide web. Imperial County Weather Stations:
http://www.ipm.ucdavis.edu/calludt.cgi/WXSTATIONLIST?COUNTY=IM
California weather databases: http://www.ipm.ucdavis.edu/WEATHER/weather1.html
CIMIS web page: http://wwwcimis.water.ca.gov/cimis

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	July		August		September	
	1-15	16-31	1-15	15-31	1-15	16-30
Calipatria	0.39	0.38	0.35	0.32	0.30	0.27
El Centro (Seeley)	0.38	0.37	0.32	0.29	0.29	0.26
Holtville (Meloland)	0.39	0.38	0.34	0.31	0.30	0.27

To simplify our information it is sometimes necessary to use trade names of products or equipment. No endorsement of named products is intended nor is criticism implied of similar products, which are not named

Eric T. Natwick, County Director