Imperial County Agricultural Briefs

Features from your Advisors

November 2020 (Volume 23 Issue 10)

Table of Contents

WATER USE EFFICIENCY IN CALIFORNIA'S LOW DESERT ALFALFA

Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial and Riverside Counties

Introduction. Although alfalfa is frequently criticized for its high seasonal water requirements, it has positive biological features, environmental benefits, and greater yield potential than many other crops under water stressed conditions such as deep-rootedness, high yield and harvest index, contribution to wildlife habitat, and ability to survive a drought. The inclusion of perennial forages such as alfalfa in agricultural systems provides effective solutions for sustainable crop production and environmental protection in arid and semi-arid regions. Alfalfa has long been used as a very high-quality livestock feed, and more importantly can improve soil fertility and maintain biomass production without needing additional supplementary nitrogen fertilizer. Alfalfa, being an herbaceous crop, exhibits rapid growth characteristics and its yield is linearly related to evapotranspiration under optimum growing conditions. Dry matter yield per unit of water used (or water use efficiency) in alfalfa is compared favorably with other C3 plants. This article presents the results of my recent research in alfalfa and evaluates its water use efficiency (WUE) values in California's low desert production region.

Field experiments. Experiments were conducted at four commercial alfalfa fields (field 1 through field 4) over a 20-month period in the Palo Verde Valley, California. Dominant soil type of the sites ranged from loam at fields 1 and 2, to clay at field 3 and sandy loam at field 4. The surface irrigation practices consisted of check flood irrigation (fields 3 and 4) and furrow/bed irrigation (fields 1 and 2). All four fields were planted in October 2018.

The actual evapotranspiration (ET_a) of each field was measured using the residual of energy balance method with a combination of surface renewal and eddy covariance techniques. A full flux density tower was set up in each of the experimental fields (Figure 1).

Eleven harvest cycles (cuttings) were investigated in this study. Yield samples were collected from 12 sub-plots on the same day or the day before when the participating growers scheduled to harvest the entire experimental fields. A portable PVC quadrate with a dimension of 5-feet wide and 7-feet long was used to accurately sample uniform sub-plot sizes. The sub-plots were harvested using a hand cutter. Fresh weight of plants harvested within the quadrate was recorded, after which samples were dried for three days in a conventional oven at 60 ^oC

and recorded for alfalfa dry matter (DM). Alfalfa water use efficiency was determined using the following equation:

$WUE = (Alfalfa\ dry\ matter)/ET_a$

Results. The daily ET_a varied widely throughout the experimentation seasons at each site (Figure 2). For example, the actual ET at field 1 ranged between 0.13-inch d^{-1} after alfalfa cutting and 0.35-inch d^{-1} at midseason full crop canopy in July 2019. The maximum and minimum ET_a at this field were 0.11- and 0.02-inch d^{-1} during three-months of the study period, November 2019 through January 2020.

Figure 1. A fully automated ET monitoring tower at field 4. A total of 30 various sensors were installed above the canopy and at multiple depths of the crop root zoon at each site.

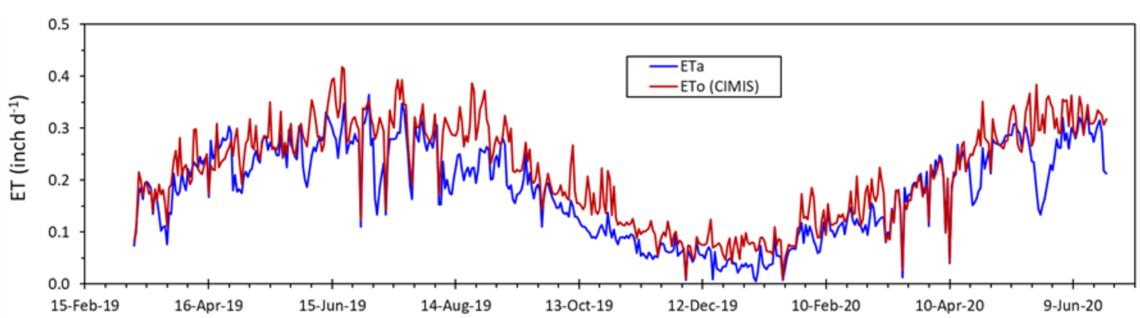

Figure 2. Daily reference evapotranspiration (Spatial CIMIS ET_o) at field 1 (March 2019 to June 2020). ET_o is an estimate of the water used by a well-watered, full-cover grass surface with an assumed crop height of 4.7-inch.

The cumulative ET_a of fields 1 to 4 during a 590-day period (over 11 harvest cycles) was 90.4, 89.9, 84.6, and 90.6-inch, respectively (Figure 3). For the 2019 season (January 1st through December 31st), the cumulative ET_a was 62.8-inch at field 1, 62.2-inch at field 2, 55.9-inch at field 3, and 61.3-inche at field 4. The results indicate that moderate water stress occurred occasionally at sites 3 and 4, due to the dry-down around alfalfa harvests or the unprecedented delays in irrigation schedules. The cumulative CIMIS ET_o was 72.7-inch for the season 2019 and was 107.6-inch for the 590-day period.

Mean total alfalfa dry matter values of the experimental fields over the 11 cuttings (eight cuttings in the 2019 season and the first three cuttings of the season 2020) are given in Table 1. The t-test performed showed that there was no significant difference between the mean dry matter yields of the fields. Mean DM yields varied from 15.0-ton ac^{-1} (field 3) to 16.3-ton ac^{-1} (field 2). The results demonstrate that the first four cuttings of season 2019 (Cut 1 through Cut 4) and cuttings 9-11 were more productive than the cuttings in the late summer through the fall (Cuttings 5 to 8).

Approximately, 73-74% of total alfalfa seasonal yield productivity at the experimental sites occurred by mid-July for the 2019 season (Cut 1 through Cut 4).

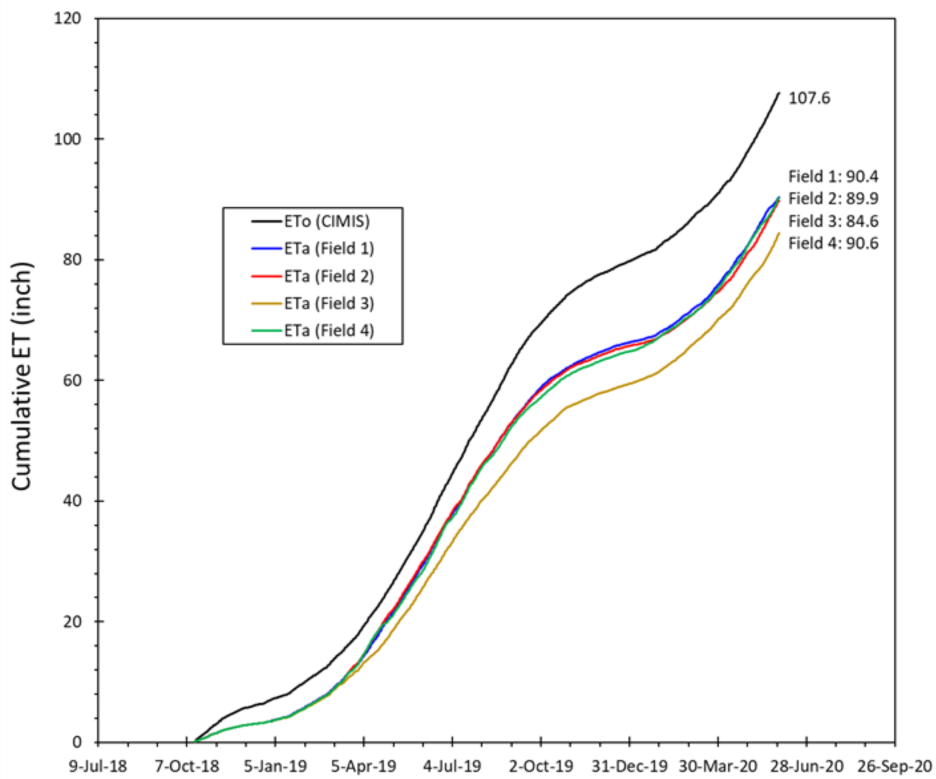

Figure 3. Cumulative reference evapotranspiration (Spatial CIMIS ET_o) and cumulative actual evapotranspiration (ET_a) at each of the experimental fields.

Table 1. Mean (±standard deviation) dry matter yields in each of the experimental fields over the 11- harvest cycle.

Dry matter yield ($ton\ ac^{-1}$)	Field 1	Field 2	Field 3	Field 4
	16.2 (±1.3)	16.3 (±1.1)	15.0 (±1.4)	15.3 (±1.3)

The practice of filling the soil profile so that it holds as much water as possible would be an effective early season alfalfa irrigation strategy. Such practice may allow alfalfa to take full advantage of available water and promote its rapid, early-mid season growth when the yield potential is highest (the first 4-5 annual harvest cycles), and when soil and water temperatures are not likely to be high enough to stress the crop and limit crop productivity. Consequently, combining full irrigation during winter-spring with moderate deficit irrigation during summer could be an efficient approach in conserving water than continuously irrigating (or over irrigation) the entire season.

The results revealed considerable variability in water use efficiency of alfalfa, both spatially and temporally (Figure 4). For instance, the WUE declined from 3.0 ton $(ac.ft)^{-1}$ in Cut 3 to nearly 1.0 ton $(ac.ft)^{-1}$ in Cut 8 at field 1. The values were 2.5 ton $(ac.ft)^{-1}$ and 1.2 ton $(ac.ft)^{-1}$ for the corresponding harvests at field 3, respectively.

There is a negative trend of alfalfa water use efficiency with the progressive cuttings along the crop season. The higher WUE in spring and early summer can be related to higher yields and lower crop water use during these periods than its water use during late summer through fall. Consequently, the WUE is greater in earlier cuttings than that of mid-summer and fall. The average alfalfa WUE over the season 2019 (eight harvest cycles) varied between 1.9 (field 1) and 2.1 (field 3) ton $(ac.ft)^{-1}$ at the experimental fields. An average of 2.1 ton $(ac.ft)^{-1}$ was found as the WUE of these alfalfa fields over the 11-harvest cycle.

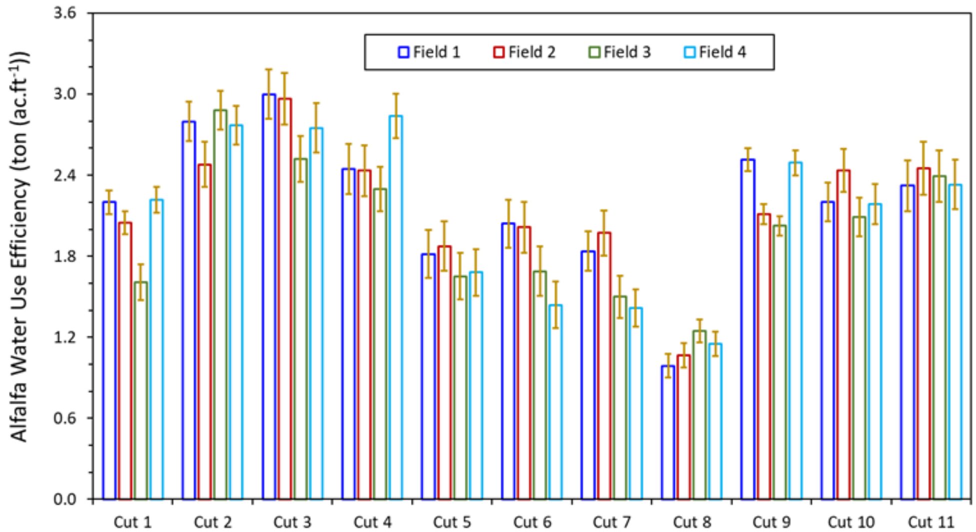

Figure 4. Alfalfa water use efficiency values of different harvest cycles in each of the experimental sites.

Additional Note. I have ongoing large-scale irrigation management projects in alfalfa. The project involved research work at several commercial fields and research plots at UC Desert Research and Extension Center (DREC), with various irrigation practices, soil and water related issues, and sensor-based irrigation managements. The findings of these projects and the relevant information developed will be published periodically. In the meantime, if you have any questions or concerns about soil and water related issues of alfalfa production in the desert region, please feel free to contact me at (442) 265-7707 or email me at amontazar@ucanr.edu. You might be interested in looking at the recent journal article published in Journal of Agronomy from the findings of one of my alfalfa projects as:

Montazar, A.; Bachie, O.; Corwin, D.; Putnam, D. Feasibility of Moderate Deficit Irrigation as a Water Conservation Tool in California's Low Desert Alfalfa. *Agronomy* **2020**, *10*, 1640. https://www.mdpi.com/2073-4395/10/11/1640.

Save the Dates...

31st Annual Fall Desert Crops Workshop

Webinar Series

Via zoom in two individual Webinars
Dec. 3rd, 2020 (9am-11am) &
Dec.10th, 2020 (9am-11am)

For additional information on the workshop, please contact organizers Oli Bachie, obachie@ucanr.edu, or Ali Montazar, amontazar@ucanr.edu, or call us at (442) 265-7700

Pre-Register via email in advance to Andrea Ramirez, aiestrada@ucanr.edu with full name of attendee(s).

Application for CE units has been made with CA Department of Pesticide Regulation, AZ Department of Ag & Certified Crop Advisors

Presented by:
University of California Cooperative Extension Imperial County
1050 E. Holton Rd, Holtville, CA 92250 (442) 265-7700 office
http://ceimperial.ucanr.edu

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31st ANNUAL FALL DESERT CROPS WORKSHOP

UCCE Imperial County - December 3 and 10, 2020

Via zoom in two individual Webinars (Webinar #1 on December 3rd and Webinar #2 on December 10th, 2020)

Pre-registration: Please send an email in advance to aiestrada@ucanr.edu with full name of attendee(s).

	Webinar #1 - December 3, 2020 (9:00 - 11:00 a.m.)
9:00	**Welcome** – Oli Bachie, UCCE Imperial County Director
9:05	**Covid-19 and contribution by the Agricultural Commissioner's Office to ag industry** - Carlos Ortiz, Imperial County Agricultural Commissioner
9:20	**Drip irrigation in the low desert cropping systems: Climbing the learning curve** - Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial County
9:35	**New training resources for organic farming and pest management** - Sonja Brodt, UCD Sustainable Agriculture Research and Education Program
9:50	**Fusarium wilt of lettuce in the low desert** - Alex Putnam, Assistant Cooperative Extension Specialist, UC Riverside
10:05	**Where are we in the search for alternatives to chlorpyrifos?** – Oli Bachie, Agronomy Advisor, UCCE Imperial County
10:20	**Analytical resources to assist SW desert growers manage their resources: soils, waters and pests** - Aron Quist, Stanworth Crop Consultants
10:35	**Industry updates** – Gowan Co. (Chris Denning), Westbridge Agricultural Products (Heather Palmer), Ocean Organics (Arthur Dawson), Syngenta (Kyle Keucher) and Dr. Robert Suranyi (Valent)

	Webinar #2 - December 10, 2020 (9:00 – 11:00 a.m.)
9:00	**Welcome** – Oli Bachie, UCCE Imperial County Director
9:05	**The low desert water-agriculture-environment nexus: Is current research meeting the needs of the region?** Kurt Schwabe - Professor of Environmental Economics and Policy, UC Riverside
9:20	**Using CropManage online tool for irrigation decision support of alfalfa** - Michael Cahn, Irrigation and Water Resource Advisor, UCCE Monterey County
9:35	**Alfalfa Aphids and Recent Results** - Michael Rethwisch, Crop Production and Entomology Advisor, UCCE Riverside (Palo Verde Valley Office), Blythe, CA
9:50	**Recent innovations in crop protection against plant-parasitic nematodes** - Ole Becker, Nematology Specialist, UC Riverside
10:05	**Possible herbicide resistant weeds in the low desert that have not been documented** – Barry Tickes, Area agent and county director at Arizona Cooperative Extension, La Paz County - Parker Yuma Agricultural Center
10:20	**Comparison of relative forage productivity potentials of forage crops** - Brooke Latack, Livestock Advisor, UCCE Imperial County; Oli Bachie Agronomy Advisor, UCCE Imperial County
10:35	**Industry updates** – Delta Plastics (Steve Walmsley), NovaSource (Bernard Olsen), FMC (Philip Northover), and BU North America (Victor Lopez)

For additional information on the workshop, please contact organizers Oli Bachie, obachie@ucanr.edu, or Ali Montazar, amontazar@ucanr.edu, or call us at (442) 265-7700

PENDING CEU CREDITS: CALIFORNIA DPR (2.5hrs.), ARIZONA DEPT. Of AG (2.5 hrs.) & CCA (4 hrs.)

**** Test will be given intermittently on each day for people registering for CEU ****

Join the workshop at: https://ucanr.zoom.us/j/99164951106?pwd=MGJEaGxLbjJaUWhtUUszcVpjcHFldz09,

Meeting ID: 991 6495 1106, Passcode: 92250, One tap mobile: +16699006833, 99164951106# ***US (San Jose)***
+12532158782 ,99164951106# US (Tacoma)
(Oli Bachie, Ali Montazar & Andrea Ramirez will be zoom host

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1050 E. Holton Rd.
Holtville, CA, 92250
(442) 265-7700

Hello,

This month examines a study looking at the effect Virginiamycin and protein nutrition on the performance of calf-fed Holstein steers in the feedlot.

If you have any comments, questions, recommendations, or know someone who would like to be included on the mailing list, please feel free to contact me.

Best wishes,

Brooke Latack
Livestock Advisor
UC Cooperative Extension – Imperial, Riverside, and San Bernardino counties
1050 E Holton Rd
Holtville, CA 92250
442-265-7712
bclatack@ucanr.edu
http://ceimperial.ucanr.edu/Livestock/

While cooperative extension is working remotely for the time being, we are still available to help answer any questions you have. Feel free to contact me on my cell phone (269-313-2579) or through email.

EFFECT OF PROTEIN NUTRITION AND VIRGINIAMYCIN SUPPLEMENTATION ON CALF-FED HOLSTEIN STEER PERFORMANCE

Brooke Latack
Livestock Advisor

Introduction

Feedlots feed calf-fed Holstein steers typically feed a diet that uses urea as supplemental nitrogen source to meet protein requirements. The metabolizable protein requirements are typically met for the entire 300+ day feeding period, but may be deficient for the initial 112 days on feed. This study aimed to evaluate the effect of virginiamycin supplementation and managing the diet to meet the initial 112 day metabolizable protein requiremnts.

Methods

120 Holstein steers (127 ±9 kg) were sorted into 20 pens (6 steers/pen). Steers were fed for 308 days and harvested. Diet is shown in table 1. Four treatments were fed for the first 112 days on feed:

1. 100% metabolizable protein requirement fed with 0 mg/kg Virginiamycin
2. 100% metabolizable protein requirement fed with 22.5 mg/kg Virginiamycin
3. 87% metabolizable protein requirement fed with 0 mg/kg Virginiamycin
4. 87% metabolizable protein requirement fed with 22.5 mg/kg Virginiamycin

Diets 1 and 2 had a protein blend supplemented while diets 3 and 4 used urea as the only form of supplemental nitrogen. Cattle on diets 1 and 2 were moved to diets 3 and 4 respectively after day 112 (all cattle fed same diet). Performance and carcass characteristics were recorded.

Results and Implications

As expected, the cattle fed 100% of the metabolizable protein requirement had improved ADG by 12.4%, gain to feed ratio by 12.7%, and dietary NE by 9% compared to cattle fed 87% of the metabolizable protein requirement. These effects carried through the last 188 days on feed while cattle were fed the same diets. There were no treatment effects on DMI.

Virginiamycin improved the gain to feed ratio by 4% and dietary NE compared to cattle not supplemented with virginiamycin.

Based on the metabolism study conducted simultaneously using the same treatments, diets with urea as the only form of supplemental nitrogen supplied 73.5% and 79.2% of methionine and lysine respectively.

There were no effects on carcass characteristics based on protein supplementation. Virginiamycin tended to increase dressing percentage (0.9%).

Table 1.
Ingredient composition of experiment diet

Item	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Alfalfa	6.00	6.00	6.00	6.00
Sudangrass	6.00	6.00	6.00	6.00
Steam-flaked corn	69.66	69.66	76.23	76.23
Protein blend	7.00	7.00	0	0
Yellow grease	2.00	2.00	2.00	2.00
Cane molasses	6.00	6.00	6.00	6.00
Limestone	1.27	1.27	1.27	1.27
Urea	0.90	0.90	1.30	1.30
Trace mineral salt	0.40	0.40	0.40	0.40
Magnesium oxide	0.15	0.15	0.15	0.15
Dicalcium phosphate	0.62	0.62	0.65	0.65
Virginiamycin mg/kg	0	25	0	25

References

Salinas-Chavira, J, Barreras, A, Plascencia, A, Montano, MF, Navarrete, JD, Torrentera, N, and Zinn, RA. Influence of protein nutrition and virgiamycin supplementation on feedlot growth performance and digestive function on calf-fed Holstein steers. 2016. J. Anim. Sci., 94:4276-4286.

Help Available from USDA to Apply for the Coronavirus Food Assistance Program 2

USDA Agricultural Marketing Service sent this bulletin at 10/29/2020 09:22 AM EDT

Trouble viewing this email? View it as a webpage.

USDA United States Department of Agriculture

Agricultural Marketing Service

Creating Opportunities for Farmers and Businesses

Help Available from USDA to Apply for the Coronavirus Food Assistance Program 2

At USDA, we are committed to helping you complete program applications, and USDA's Farm Service Agency staff can help guide you through the process of applying for the Coronavirus Food Assistance Program 2 (CFAP 2), including preparing and submitting required paperwork. There is no need to hire a paid preparer.

Additionally, translation services are available in all USDA Service Centers, so one-on-one assistance with a Service Center employee can be translated in real time. To find the nearest USDA Service Center, visit farmers.gov/service-locator.

A call center is also available for producers who would like additional support with the CFAP 2 application process. Please call 877-508-8364 to speak directly with a USDA employee ready to offer assistance. The call center can provide service to non-English speaking customers. Customers will select 1 for English and 2 to speak with a Spanish speaking employee. For other languages, customers select 1 and indicate their language to the call center staff to be connected to an over-the-phone translation service.

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CA 4-H COMPUTER SCIENCE PROGRAM KICKOFF

Save the Date: Nov 14, 9:30-3pm

CALIFORNIA 4-H COMPUTER SCIENCE PATHWAY TEAM

UNIVERSITY OF CALIFORNIA
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IMPERIAL VALLEY CIMIS REPORT AND UC WATER MANAGEMENT RESOURCES

Ali Montazar, Irrigation & Water Mgmt Advisor, UCCE Imperial & Riverside County

The reference evapotranspiration (ET_o) is derived from a well-watered grass field and may be obtained from the nearest CIMIS (California Irrigation Management Information System) station. CIMIS is a program unit in the Water Use and Efficiency Branch, California Department of Water Resources that manages a network of over 145 automated weather stations in California. The network was designed to assist irrigators in managing their water resources more efficiently. CIMIS ET data are a good guideline for planning irrigations as bottom line, while crop ET may be estimated by multiplying ET_o by a crop coefficient (K_c) which is specific for each crop.

There are three CIMIS stations in Imperial County include Calipatria (CIMIS #41), Seeley (CIMIS #68), and Meloland (CIMIS #87). Data from the CIMIS network are available at: http://www.cim is.water.ca.gov. Estimates of the average daily ET_o for the period of October 1 to December 31 for the Imperial Valley stations are presented in Table 1. These values were calculated using the long-term data of each station.

Table 1. Estimates of average daily potential evapotranspiration (ET_o) in inches per day

Station	November		December		January	
	1-15	16-30	1-15	16-31	1-15	16-31
Calipatria	0.13	0.11	0.09	0.09	0.09	0.10
El Centro (Seeley)	0.14	0.12	0.10	0.09	0.10	0.11
Holtville (Meloland)	0.13	0.11	0.09	0.08	0.09	0.10

For more information about ET and crop coefficients, feel free to contact the UC Imperial County Cooperative Extension office (442-265-7700). You can also find the latest research-based advice and California water & drought management information/resources through link below:
http://ciwr.ucanr.edu/.