

University of California Cooperative Extension - Siskiyou County

## 2022 Winter/Spring Newsletter

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### Research Updates

## Dryland Small Grain Trial

Due to the current drought conditions and the possibility of irrigation curtailments, I have begun to search for alternative crops that can deal well (or better) under dryland conditions. In 2021, I started off by planting our 2021 Dryland Small Grain Trial on October 21<sup>st</sup>, 2021 in Scott Valley. The goal of this trial is to investigate how different small grain crops (e.g. triticale, wheat, and barley) perform without any irrigation. Eighteen grain varieties/species will be assessed as follows:

a. **Grazing yields:** In the spring of 2022, the plots will be harvested and fresh weight data will be collected to mimic grazing.

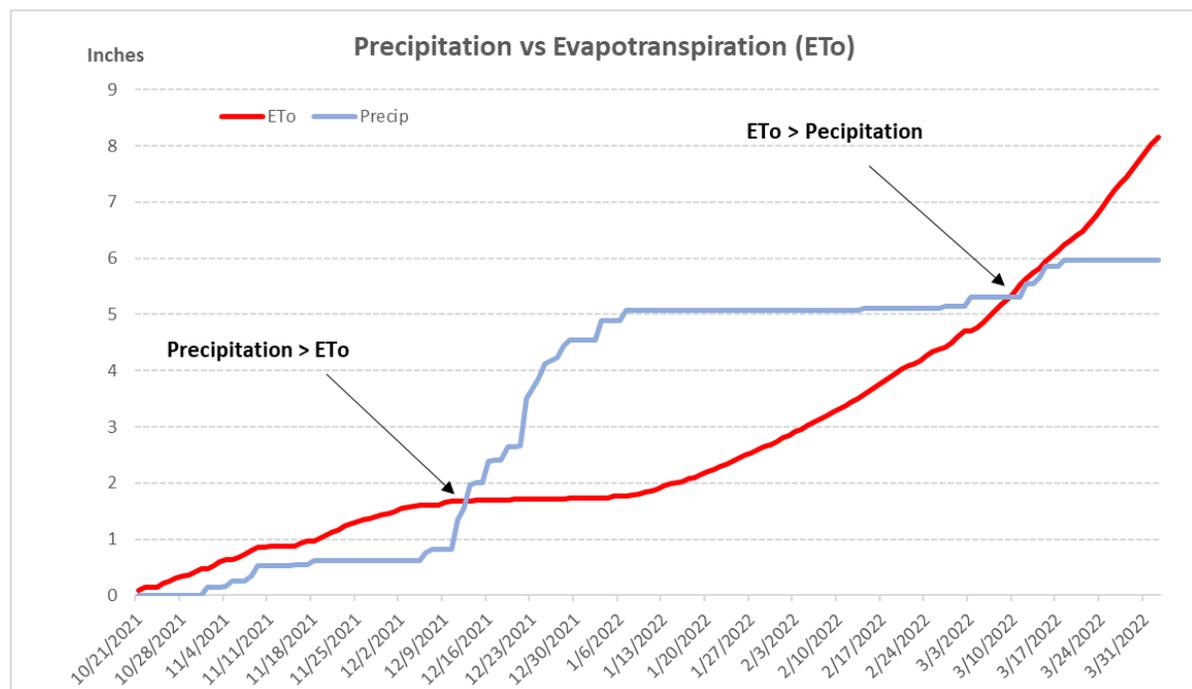
b. **Hay Yields:** In the summer of 2022, there will be one harvest to compare the species' yields on dry matter basis. A subset of samples will be collected to obtain each species' dry matter percentage.



Figures 1 (left) and 2 (right). Both pictures were taken on February 14, 2022. At this time, the crop had not received any fertilization or irrigation. From the planting date (Oct 21<sup>st</sup>, 2021) to the date when these pictures were taken, the crop had received 5.1 inches of rain.

## 1.1. Rain and crop's water status

Based on CIMIS station 225 (Scott Valley), from the planting date until April 4<sup>th</sup>, 2022, the crop had received 5.97 inches of water through precipitation. While the crop's water demand was met until March 9<sup>th</sup>, 2022 (Precipitation=5.31 inches; ETo=5.28 inches), it has become water deficient on March 10<sup>th</sup> (figure 3).



Figures 3: Scott Valley Dryland Small Grain trial precipitation (inches) versus Evapotranspiration (ETo).

## 1.2. Nitrogen fertilization

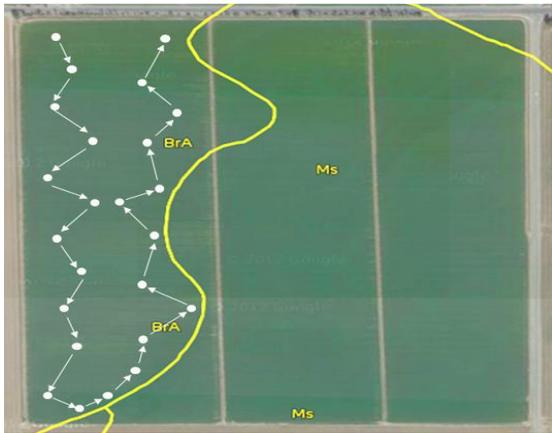
Spring is the time for small grain in-season nitrogen fertilization. With fertilizers' price skyrocketing it's a good idea to apply nitrogen efficiently. In this trial, the soil had about 24 lbs/acre (+9 lbs) on units of nitrogen based on Nitrate Quick Test performed on March 2, 2022 (figure 5). While this test is not as accurate as the lab tests, it gives a good estimation of how much in-season of nitrogen fertilizer to apply. Based on the soil nitrate quick test and the common practice in the area, 120 lbs/acre of nitrogen units were applied on March 3<sup>rd</sup> as ammonium sulfate (21%N).

## ***Soil Nitrate Quick Test and results interpretation***

It's a relatively inexpensive rapid test that provides an estimation of the concentration of nitrate-nitrogen (NO<sub>3</sub>-N) in soil. The testing process consists in the following steps:

### **A. Soil sampling**

- For small grain crops (wheat, triticale, oats, and barley), soil samples should be taken from the top 0 -12 inches of the soil. Remember, the soil samples should represent the field(s) you are trying to test. Make sure to get representative samples by dividing the field into different management areas and soil types. A minimum of 20 soil cores per similar field should be taken and mixed in a bucket to represent that area. These cores are taken with a sampling probe or auger by walking in a zigzag pattern to cover the desired area (figure 4).
- After collecting the samples and mixing thoroughly them in the bucket (break large clods and remove rocks and debris during the mixing), get a sub-sample from the bucket to perform the nitrate quick test.



*Figure 4 (left). Soil sampling zigzag pattern. Figure 5 (right) Nitrate Quick Test result strip comparison (2ppm).*

## Nitrate Quick Test Instructional Video

<https://anrcatalog.ucanr.edu/items.aspx?hierId=4000>

### Social Media

UCCE Siskiyou on



**Do you want a hard  
copy?**

Call or stop by the extension office- if we don't have the resource you need, we can help you find it.

## **B. Conducting Soil Nitrate Quick test**

### **B.1. Test Preparation**

#### **Material needed**

- Nitrate test strips (bottle of 50 test strips can be found on Amazon for about \$12);
- Bottle with cap: while it could be any bottle, these 500ml cylindrical bottles work well for this test
- Distilled water
- Pickle Crisp (Calcium Chloride)
- **Mixing solution:** Add 1 tsp of Pickle Crisp to 1 gallon of distilled water and shake until granules are completely dissolved
- **Marking 500ml bottle:** the testing bottle will need two volume marks, one at 300ml and one at 400ml. This can be done by pouring 300ml of water into the bottle from a measuring cup (the kitchen ones work just fine) and marking the level of the water on the side of the bottle. Repeat this step with 400ml of water.

### **B.2. Performing Extraction**

- Fill the marked bottle with the mixing solution (distilled water plus Pickle Crisp) up to the 300ml mark on the bottle
- Add the mixed soil sub-sample from the bucket up to the 400ml mark on the bottle. Don't add anything but soil (exclude plant material, rocks, and other debris)
- With the bottle cap in place, shake it vigorously for 3 minutes
- Let the solution settle for 2-3 minutes
- Using a test strip, deep the tip of the lower pad into the solution until it gets saturated. Make sure not to submerge the whole lower pad into the solution as it would make difficult to check its color in the next step
- Once the lower pad is saturated, wait 60 seconds and compare the pad's color to the colors on the side of the Nitrate Quick Test bottle (figure 5)

### B.3. Interpreting the results

- Translate the Nitrate Quick Test result to lab values (table 1)
- Fertilizer equivalence: For soil samples taken from 0-12 inches deep, multiply lab equivalent values by 3 (organic soil) or 4 (mineral soil). The resulting number will be an approximate nitrogen fertilizer equivalence in pounds of nitrogen per acre (lb acre<sup>-1</sup> N)

#### Example

In our 2021 Dryland Small Grain Trial, the Nitrate Quick test performed on the soil samples taken resulted in a nitrate concentration of 2ppm (figure 5). Since the trial is sitting on a mineral soil type, and the soil samples were taken from 0-12 inches, 2ppm of the Nitrate Quick test is equivalent to 6ppm lab value (table 1). Multiplying 6 ppm by 4 (mineral soil) would represent about 24 lbs acre<sup>-1</sup> N. However, considering the accuracy of the test (40%), the soil N available ranges from 14 to 36 lb acre<sup>-1</sup> N.

Mineral soil type (1.4 g cm <sup>-3</sup> )		Organic soil type (1.0 g cm <sup>-3</sup> )	
Pad value (ppm)	Lab value (ppm)	Pad value (ppm)	Lab value (ppm)
0	0	0	0
0.5	2	0.5	5
2	6	2	9
5	10	5	14
10	15	10	20
20	23	20	27
50	40	50	41

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*Table 1. Chart to translate Nitrogen Quick Test values to lab values*

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The final results and yield data of this trial will be shared through our extension outlets. Stay tuned!

# Scott Valley Alfalfa Variety Trial

Our UCCE alfalfa variety trial planted on 2019

The second year of data (2021) is available and showed on the following table:

2021 Yields (3 cuttings), UCCE Scott Valley Alfalfa Variety Trial								
Varieties	FD	Dry t/a						
Ameristand 518 NT	5.2	9.6	A					
Hybriforce 3400	4	9.4	A	B				
SW 4412Y	4	9.3	A	B	C			
LG EXTERRA (5FD)	5	9.1	A	B	C	D		
SW5210	5	9.0	A	B	C	D		
AFX Hybriforce 4400	4	9.0	A	B	C	D	E	
SW4107	4	8.9	A	B	C	D	E	
AFX 579	5	8.9	A	B	C	D	E	
AFX Magnum 8	4	8.8	A	B	C	D	E	
SW3407	3	8.8	A	B	C	D	E	
DG 4210 Dynagrow	4	8.7	A	B	C	D	E	
6585 Q	5	8.7	A	B	C	D	E	
LG Camas	4	8.7	A	B	C	D	E	
AFX 460	4	8.6	A	B	C	D	E	
Ameristand 427TQ	4	8.6	A	B	C	D	E	
DG 5315	5	8.5	A	B	C	D	E	F
6422Q	4	8.4		B	C	D	E	F
Nexgrow 6516	5	8.4		B	C	D	E	F
Ameristand 415 NT RR	4.3	8.4		B	C	D	E	F
WL 377 HQ	5	8.4		B	C	D	E	F
LG 5R300 (5FD)	5	8.3			C	D	E	F
LG 4R300	4.1	8.1				D	E	F
AFX 360 Highgest	3	8.0					E	F
Ameristand 545 NT RR	5.4	7.5						F
MEAN		8.67						
CV		9.74						
LSD		S						

\*Yields of 3-cuttings

\*Trial conducted in Scott Valley, CA

\*Fall Dormancy Reported by seed companies

\*Levels not connected by same letter are significantly different.

For comparison purpose, the trial's first year of data (2020) is also included. Please note that cumulative yields reported on the following table are only for two cuttings in 2020.

**2020 Yields (2 cuttings), UCCE Scott Valley Alfalfa Variety Trial**

<b>Varieties</b>	<b>FD</b>	<b>Dry t/a</b>	
6585 Q	5	6.0	A
Nexgrow 6516	5	5.9	A
Hybriforce 3400	4	5.9	A
AFX Hybriforce 4400	4	5.7	A
LG EXTERRA	5	5.6	A
AFX 579	5	5.5	A
Ameristand 518 NT	5.2	5.5	A
AFX 360 Highgest	3	5.5	A
SW4107	4	5.5	A
LG 4R300	4.1	5.5	A
SW5210	5	5.5	A
DG 4210 Dynagro	4	5.4	A
SW3407	3	5.4	A
AFX Magnum 8	4	5.4	A
Ameristand 415 NT RR	4.3	5.3	A
LG Camas	4	5.3	A
SW 4412Y	4	5.3	A
DG 5315	5	5.3	A
AFX 460	4	5.2	A
LG 5R300	5	5.1	A
Ameristand 545 NT RR	5.4	5.1	A
WL 377 HQ	5	5.0	A
6422Q	4	5.0	A
Ameristand 427TQ	4	4.8	A
MEAN		5.40	
CV		8.10	
LSD		NS	