Arizona Department of Agriculture
Specialty Crop Block Grant Program (SCBGP)
FFY 2015 Quarterly Report, Current to Sept 2015 :(Q1,Q2, Q3and Q4 current).
Grant Award Agreement #SCBGP-FB14-13

Project Title

Low Maintenance Grasses for Reduced Irrigation. D.M. Kopec et.al. University of Arizona.

Activities Performed

☐ Briefly describe the work accomplished during the reporting period. What specific tasks from the **Work Plan** of the approved project proposal were accomplished? Whenever possible, describe the work accomplished in both quantitative and qualitative terms, including any significant results, accomplishments, conclusions and recommendations resulting from the work completed during the reporting period. Be sure to include any favorable or unusual developments.

☐ Clearly describe the progress made towards achieving the **Expected Measurable Outcomes** identified in the approved project proposal. Include any baseline data developed through the project and any results from the implementation of the project's performance measures. Provide any survey results or research data developed during the period.

☐ If the project has the potential to benefit non-specialty crop commodities, describe the activities that were conducted to ensure that grant funds were used to solely enhance the competitiveness of specialty crops.

☐ If a target of a project has already been achieved, project staff is encouraged to amend the outcome measure in the performance report. This permits the project staff to "stretch" the goals in order to go beyond what they are already doing.

a. First Quarter (Oct. 2014 – Dec. 2014) Activities:

Work Plan: Spring Year 1: Establish all grass species in linear irrigation gradient. Field preparation, establishment, and irrigation line source maintenance

In an effort to enhance the grass species early for enhanced root growth, the seven grass entries were initially planted in the last week of Sept of 2014. The field was previously sprayed with glyphosate to remove any existing vegetation, followed by light rototilling for seed bed preparation. All plots were marked with survey whiskers for permanent maintenance and identification. For each of the seven grass entries, seed was mixed in a small cement mixture with topdressing sand. Sand was then transferred to a drop spreader. From there the drop spreader applied the sand/seed mixture across the plots. There fixed volume of sand allowed for 5 full passes across the length of the plot. Immediately

after that, each single plot was then lightly raked with an inverted bow rake, and then rolled with an 875 lb. 36 inch diameter Brouer roller.

Irrigation was applied for germination and emergence, using all perimeter heads and select gradient heads only, to provide uniform irrigation using a standard square-spacing design. The test was irrigated with 4 to 5 short irrigation cycles per day, with manual starts based on field surface moisture observations.

Grasses began to emerge within 7 to 8 days. The three Cynodon entries emerged first, along with Galleta grass. Grasses progressed for emergence. Two days of consecutive rain then occurred on October 8th and 9th, 2014.

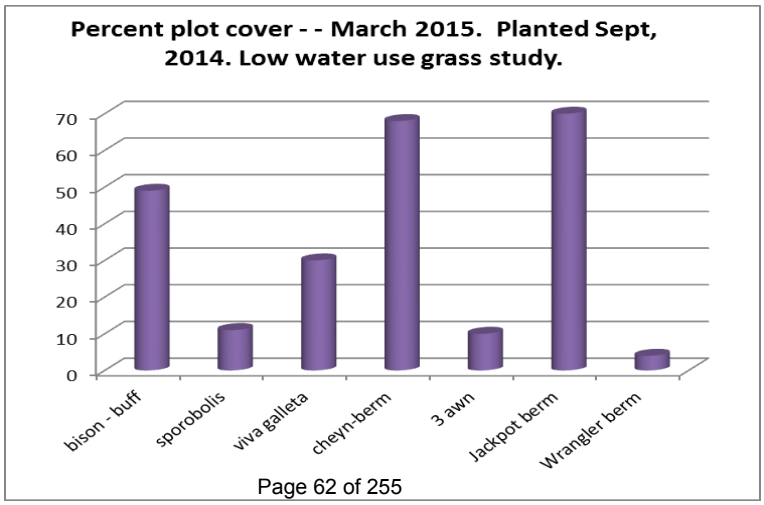
b. Second Quarter (Jan. 2015 – Mar. 2015) Activities:

Grasses emerged at different rates, and at different amounts. Surprisingly, young seedlings that survived the flooded condition in October 2014 increased in leaf width, tiller capacity, stolon capacity (where applicable) with the early return of warmer (somewhat spring like) daytime temperatures which began in late February and early March. Winter weeds were either removed physically or with a herbicide on 3 occasions this quarter, while the warm season grasses were winter dormant.

Data collected for percent ground cover showed that among the seven warm season grasses included, mean plot cover ranged from roughly 5% (Wrangler bermudagrass, to 70 percent for Jackpot bermudagrass. The other native grasses did not survive the previous flood in October.

A surprise here is that one of the bermudagrass entries (Wrangler) had very little ground cover (5%), while the other two bermudagrasses (Jackpot and Cheyenne had 65-70% ground cover. This will be investigated by conducting a lab germination to check on seed viability before this entry is reseeded. Also a positive surprise was that the Bison buffalograss had more grass cover than expected (from both seedling flood survival and late winter stolon growth). Viva galleta grass averaged 30 percent cover, and will be interseeded again, as will Sand dropseed (sporobolis), which has 10-15% cover.

The figure below shows the current main plot grass coverage as of the end of March 2015.

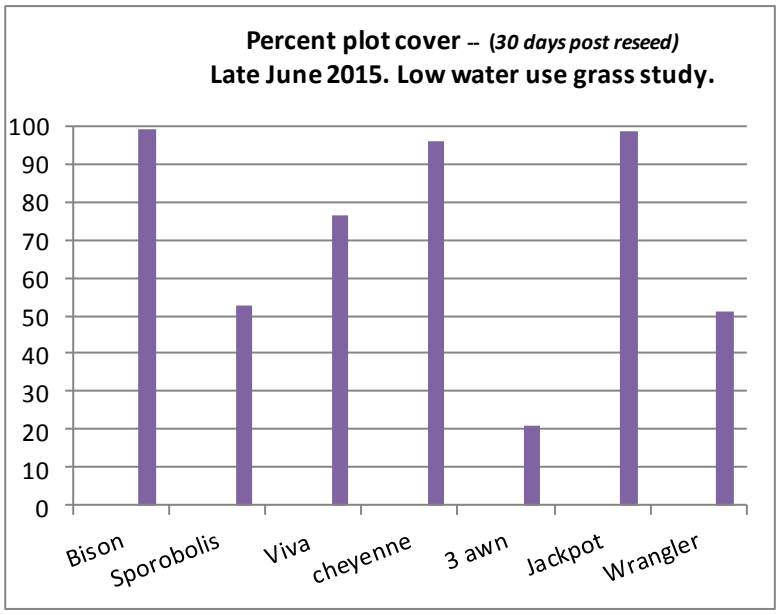


Grasses will be inter-seeded accordingly to increase density as soon as the night temperatures allow for a stable increase in soil temperatures (required for germination). This spring, soil will be prepped (prior to re-seeding) based on amount of existing vegetation and surface soil condition. These include the options of vertical mowing the soil surface, hydro-seeding, or slit seeding.

c. Third Quarter (Apr. 2015– June 2015) Activities:

- By mid-spring of 2015, grass entries had increased in ground cover, as three of the following entries had 90% or more cover within 4 weeks after green up. These three entries which would NOT need to be reseed included "Jackpot ", "Cheyenne II" and Bison buffalograss. "Wrangler" had 25-30% cover and was thus reseeded. The reaming three entries of Sand drop seed, Viva galletagrass and purple 3 awn all had less than satisfactory cover and also required reseeding as well.

  The figure below represents the percent ground cover of 7 low maintenance grasses at the third week of July, 2015, 30 days after hydroseeding 'Viva Galletagrass', 'Wrangler bermudagrass', 'Sand dropseed', and 'Purple 3 awn'.



All plots were mowed to 3 inches (7.6cm) during the second and third quarter to promote uniform coverage. Feral plants of bermudagrass were removed on several occasions by direct spay applications of glyphosate.

On June 4th, the four entries which had 50% or less ground cover were hydro-seeded at no charge by Desert Seeders Inc, with direct assistance from the P.I. The irrigation system was set for emergence of these grasses. Each day, plots were also hand watered as needed by observation to assure a wet surface moisture condition for the new seeds. The trial was under constant daily attention from June 4th afterwards, for daily irrigation needs. On June 15, it was noticed that the emerged seedlings of purple3 awn quickly to 2 inches, and then stopped. This was followed by die back from the leaf tips. Immediately plants were sampled for any seedling diseases, which proved not to be present. Immediately after that event, soil samples were taken for analysis. Samples were taken at the top1 inch (were the seedling crowns and initial roots are located) and for the entire 6 inch root zone. Soils test showed extremely high salts at the top inch level (2500 ppm TDS) along with a high sodium soil content (ESP of 23%). The salinity level proved too high for seedling germination and emergence for the newly hydro-sprigged entries.

The entire root zone profile (0-6 inches) of the plots which failed, is suitable for seedling emergence (500 ppm TDS) and a low sodium soil content (ESP = 6%). Since soil penetration at depth was easily accomplished across all plots, under irrigation was **not** the cause of salt build up at the soil surface. Instead, cumulative surface evaporation is most likely the cause of salt (and sodium) accumulation at the soil surface.

At this time, two action items are planned to establish 7 grasses in the trial.
First and foremost, the soil will be tilled to a depth of 8 inches to dilute the soil and sodium salinity levels that reside in the top inch. Flowers of sulfur will be added to that entire profile to reduce the overall soil ESP down to '0', to eliminate any sodium hazard.

Secondly, four low maintenance grasses will be seeded (matching the two species which did not have problems at the initial fall seeding or the later spring hydro-seeding. These include low maintenance Cynodon cultivars and the low maintenance Buffalograsses.

Viva Galletagrass (which had the most cover of the grasses that needed to be reseed) may also be included, which is under deliberation.

d. Fourth Quarter (July 2015 – Sept. 2015) Activities:

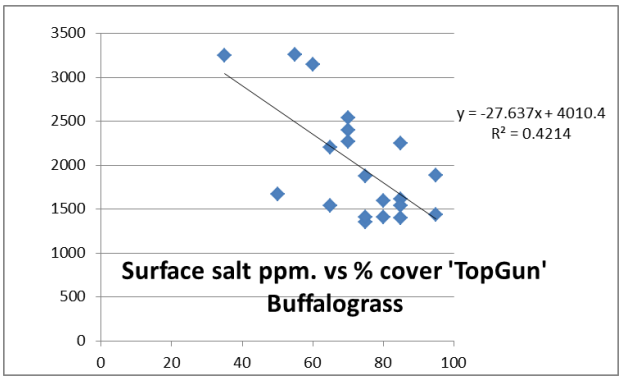
The fourth quarter included renovation/replacement of the treatment entries which did not re-establish well due to the salinity and sodicty as noted in Q3 above. These entries were replaced/renovated in all 4 of the field replicates. Viva Galleta and sand dropseed were removed with a herbicide in early July since these entries also did not tolerate the mechanics of mowing traffic. Purple three- awn was also removed due to uneven stand density across the plots. On all plots of these 3 entries, gypsum was applied on the renovated surface at the rate of 50 lbs. per 250 feet. Plots were then irrigated by hand twice daily to dissolve the gypsum. The entry replacements were then re-seeded were as follows; Sand dropseed was replaced by "TopGun" Buffalograss, Viva Galleta was replaced with "SunDancer" buffalograss, and purple three- awn was replaced with "Nu-Mex Sahara," a large rhizome producing turf-type bermudagrass. Thus the test

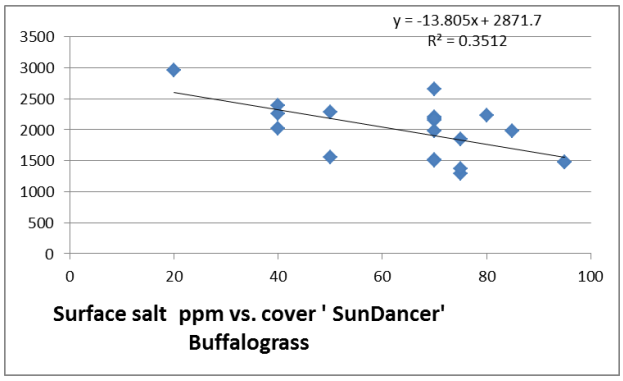
entries therefore stand as four (4) commercially available bermudagrass cultivars, and three (3) commercially available buffalograsses.

All seeding was done on August 3rd, 2015. Soil crusting occurred on the new buffalograss plots (which had slower emergence than Nu-Mex bermudagrass). On August 15th, these plots were soil drilled to depth of 16 inches with a 3/4inch masonry bit on a six in spacing to assist surface drainage which was related to surface crusting.

On August 19th, the thin areas within the recently planted buffalograss entries were reseeded by hand, and then top-dressed with ¼ inch of washed sand. Plots were irrigated by standard irrigation (heads) and by hand throughout the day when required. Only one field replicate of the Nu-Mex Sahara required partial re-seeding.

As some initial establishment differences were observable both within plots and between entries among the new buffalograss entries, surface salinity measurements were taken every 10 feet within the plots of SunDancer and TopGun. Salinity levels were determined using a 1:1 dilution of soil/distilled water, which were then correlated to percent grass cover. While the correlations are only moderate, TopGun bufflograss is slightly more salt tolerant than SunDancer in initial establishment as far as seedling salinity tolerance is concerned. SunDancer would provide 50% initial cover at 2100 ppm TDS, while TopGun would provide 50% initial ground cover at 2700 ppm TDS.





E. Fifth Quarter (Oct 2015 – Dec 2015) Activities:

After the replacement of 'Viva' Galletagrass, Purple 3 awn , and Sand drop (Sporobolus) seed during the summer, soil samples taken warranted the applications of gypsum at that time to reduce soil salinity and sodium levels (see 4th quarter report).

From June to December 2015 (5th quarter) the test received irrigation plus rainfall of 8.81 inches. To investigate the levels after the rains during the 5th quarter, soil samples were taken on eight plots which had the grass replaced (due too poor grass performance from high salinity and soil sodium (ESP) levels). These eight plots received gypsum in mid- June 2015. For comparison, eight other plots which did not

have high salinity or sodicity (and thus did not require re-establishment or gyspum) were also selected for soil sampling in December 2015. Therefore,16 plots were sampled in December 2015.

Note (reported earlier) that salinity and sodicity were extreme at the soil surface, which diminished emergence and seedling survival of some of the original native grass stand early on in June 2015. The high levels of salt and soil sodium also resulted in slower emergence of the two buffalograss cultivars used for replacement in late August 2015 (reported earlier). In the previously noted cases, salinity and ESP in the surface soil (0-1 inch) was up to five times higher than that of the root zone profile at the same sampling location.

In December 2015, Within each of the sixteen plots, soils were sampled at the soil surface (0-1"), and for the root zone of 0-6 inches, each at distances of 20 and 40 feet from the Line source.

In "irrigation treatment mode", the 40 foot distance would receive less water than the 20 foot distance. With less water applied at 40 feet, one would expect higher salinity and perhaps higher ESP because less leaching would occur with less than an optimal ET replacement, as opposed to the 20 foot distance, which receives a higher applied irrigation rate.

Lab results show that in all cases (for both gypsum amended vs. non gypsum amended plots) the surface salinity levels have decreased significantly compared to previous values. The salinity levels are now extremely low (0.54 to 1.4 dS/m = 350 ppm to 900 ppm) and fully suitable for unrestricted growth for both buffalograss and bermudagrass. (See Table 1 below).

Table 1. Soil Salinity (EC) and Exchangeable Sodium Percentage (ESP) of gypsum and non gypsum treated LIGA strip plots, December
Results show gyspsum treated plots now have similar soil salinity and ESP to plots which did not exhibit previous turf loss,
and thus, did not require gyspsum.

		20 feet From Line Source				40 feet from Line source			
PLOT	Gypsum applied	Soil Depth				Soil Depth			
		(0-1 inch)	(0-6 inch)	(0-1 inch)	(0-6 inch)	(0-1 inch)	(0-6 inch)	(0-1 inch)	(0-6 inch)
		EC -salt		ESP- sodium		EC-salt		ESP-sodium	
3	YES	0.91	0.74	3.9	4	1.4	1.4	6.8	8.3
4	no	0.6	0.59	5.1	5.3	0.82	1.3	5.3	9.3
5	YES	0.67	0.68	2.6	4	0.84	1.2	2.7	5.9
6	no	0.59	0.52	4.7	4.7	0.72	1	4.5	7.2
8	YES	0.96	1.1	4.2	6.6	0.93	1.2	2.7	3.6
10	no	0.66	0.6	4.7	5.5	0.67	1.3	4.3	6.7
11	YES	0.68	0.6	2.4	3.3	0.75	0.88	1.8	5.1
12	no	0.59	0.48	3.9	4.1	0.69	0.73	3.8	6.7
15	no	0.61	0.52	4.2	4.5	0.61	0.6	4.3	5
16	YES	1	0.85	4	4.9	1.5	0.87	6.6	5.1
18	YES	1.2	1	3.4	4.7	1	0.91	3.8	5
20	no	0.54	0.47	4.7	4.8	0.57	0.64	5.3	6.7
22	YES	0.93	1	4.4	8.4	0.96	0.89	5.2	6.1
24	YES	1.6	1	8.9	5.9	0.91	0.72	4.3	4.7
25	no	0.58	0.57	4.9	5.6	0.59	0.86	4.8	8.5
27	no	0.64	0.58	5.2	5.6	1.1	0.73	4.6	5.9

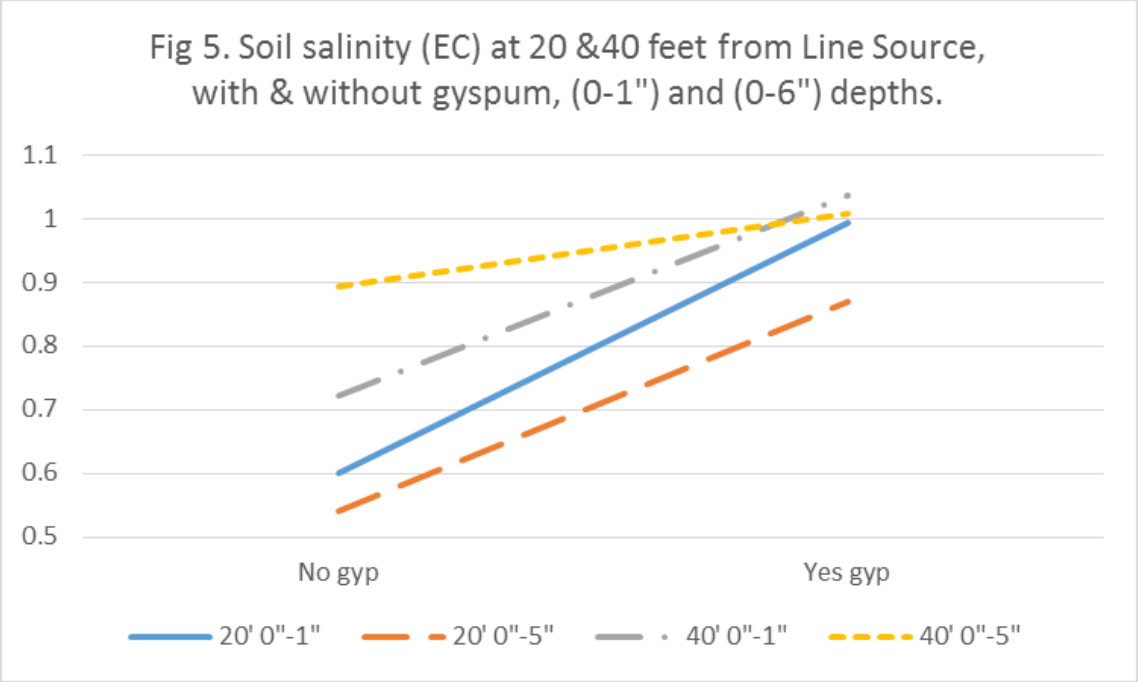
[1] Soil salinity measured as dS/m, 1:1 soil/water, Motzz Laboratories. 1 dS/m = 640 ppm TDS.

[2] Exchangeable sodium percentage (ESP). Percent of total soil cations which are sodium.

[3] Gypsum applied 3000 lbs. acre mid June 2015, to plots which had turf failure from high salinity and sodicity in spring 2015. .
Additional an equal number of plots soil tested (n=8) which did not exhibit turfgrass failure = no gypsum applied.

Rainfall in inches: June (0.32), July (0.69), Aug (2.17), Sept (2.48), Oct (2.30), Nov (0.28), Dec (0.57). Total 7 months = 8.81 inches.

Likewise, salinity for the surface and root zone soil profile is also very low, (0.47 to 1.1 ds/m) (See Table 5 below).

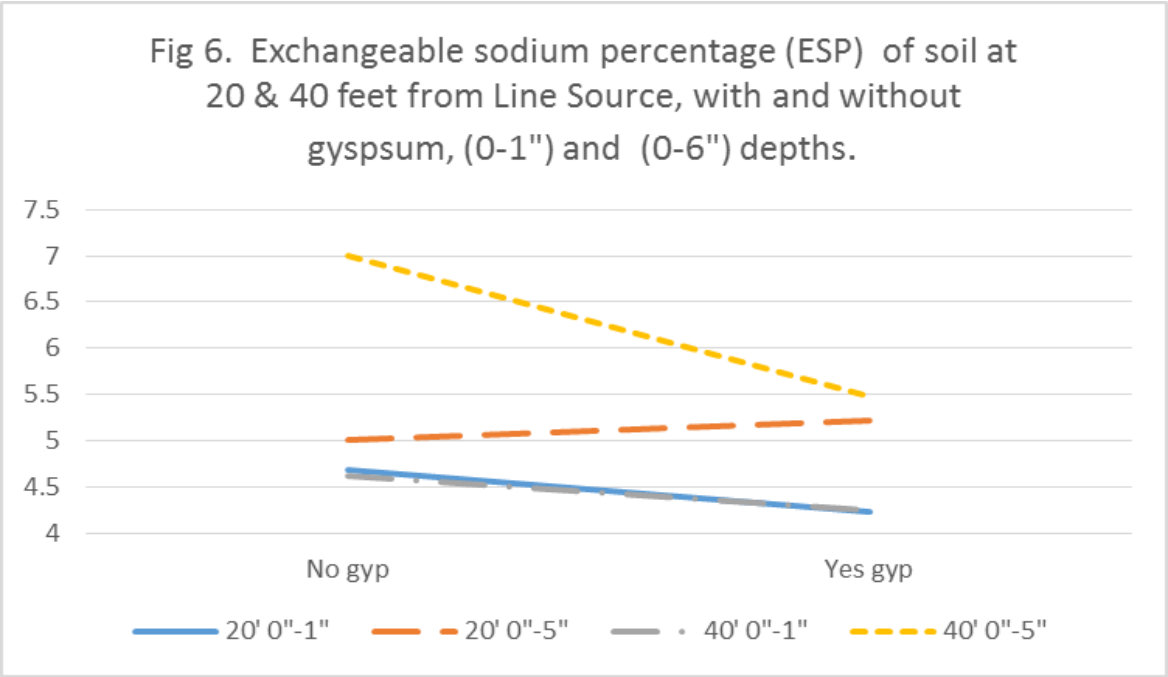


Of the samples collected in the December soil harvest, 51 of the 64 (79%) of the samples had salinity levels of less than 1.0 ds/m. Reclaimed waste water used for landscape and large turf areas from Tucson Water (used at the test site as well) averages 1.32 to 1.5 ds/m (same as 830- 960 ppm) or more. The soil salinity is now actually less than that of the reclaimed waste water, which demonstrates the benefits of natural rainfall in leaching soil salts.

Thus, the current soil conditions show a successful reclamation of surface soil salinity and sodicity. The applied gypsum has reduced the surface soil ESP to acceptable levels. Leaching has greatly reduced to salinity from the surface as well. Salinity for the 0-6 inch root zone is now very low as well.

As reported previously, plots which failed after the early July 2015 hydro-seeding were found to have surface salinity levels of 4.2 (moderate salinity), and extremely high ESP values of 25%. Comparing soil samples taken at the end of August, to those collected in December 2015 showed a reduction in ESP levels. For example, plot 22 (sand dropped seed, replaced with 'Topgun' Buffalograss) had an ESP of 26.7% in August, and an ESP of only 4.4% at the end of December 2015. Likewise, plot 16 (Viva Galleta, replanted to 'Sun Dancer' buffalograss) went from an ESP of 18.3% to 6.6%. Plot 3 (Viva Galleta, replanted to 'Sun Dancer') went from 15.4% to 6.8% ESP. The applied gypsum thus had sufficiently dissolved and successfully exchanged the soil sodium adequately

For the final December soil responses, soil ESP averaged 5.3% without gypsum, and 4.8% when gypsum was applied (when averaged across both soil sampling depths and location distance from the line source) (See FIG. 6 below).



Applied gypsum did not affect ESP levels at the 20 foot location for the overall root zone (0-6 inches), as the ESP was 5.0% and 5.2% for the non- treated and gypsum treated plots, respectively. At the 40 foot distance, the surface (0-1 inches) and root zone (0-6) soils had the same ESP values (4.4- 4.5%) whether gypsum was applied or not. More importantly, the gypsum had reduced the ESP on the plots that failed originally in the summer.

In review, all plots at all locations (distance from the source), at either soil depth, now have extremely low salt levels, of 1.0 ds/m, or less. Gypsum plus leaching (which was greatly assisted by rainfall of 8.81inches during the last seven months) has reclaimed the soil surface to manageable levels in terms of salinity and soil sodium (in plots that formerly had grass failure). Now the species at hand (bermudagrass and buffalograss) can be tested for response to differential amounts of applied water, avoiding the immediate confounding effects of soil salinity and sodium affected soils.

Problems and Delays

☐ Describe any unexpected delays, impediments, and challenges that have been confronted in order to complete the goals for the project such as changes or delays to the approved **Work Plan** activities and **Expected Measurable Outcomes**. Explain why these changes took place.

☐ Describe the corrective actions that were taken in order to address these delays, impediments, and challenges and to prevent their recurrence.

☐ If challenges occurred, review measurable outcomes to determine if targets are still realistic and attainable. An objective that is too stringent should be scaled back and identified in the performance

report. Keep in mind that targets may slip due to all kinds of factors, such as employee turn-over and bad weather.

a. First Quarter (Oct. 2014 – Dec. 2014) Activities:

During the establishment phase, the two rain days of October 8th and 9th dropped 1.50 inches of rain. Even with the irrigation system off, this rain "sat" on the plots for 3 days after October 9th. After the surface drained several days later, visual assessment of the plots showed that emerged seedlings had become necrotic due to the standing water condition. The lack of oxygen for these young plants (many with just the cotyledon showing) killed the plant. This occurred more soon the native species of Buffalograss, Three-awn, Viva Galletagrass, and Sand Drop seed. The three Cynodon entries were the least effected, which subsequently proved to have a high level of emergence by the end of October.

Starting in the spring of 2015, the 4 native grasses will be replanted in full. Based on weather and the condition of the surviving bermudagrass, the native grasses may be irrigated by hand if necessary (hose/quick coupler) to avoid potential overwatering of the Cynodon plots.

Based on the immediate above note, it is hoped that establishment will be satisfactory to begin in the LIGA irrigation treatments by either early June (preferred) or late June (second choice), based on the new establishment growth of the 4 native grasses.

b. Second Quarter (Jan. 2015 – Mar. 2015) Activities:

Based on the noted existing groundcover percentages, entries will be re-seeded or interseeded once adequate soil temperatures are achieved. Existing seed inventory is adequate with the exception of purple -3- awn, which will be re-acquired. A laboratory seed germination will be conducted for Wrangler bermudagrass, which unexpectedly currently has a low groundcover status. Perhaps this line of bermudagrass was effected more so by the flood the previous October, than that of the other two bermudagrass entries.

c. Third Quarter (Apr. 2015– June 2015) Activities:

See Section above: 'Activities performed, Third quarter':
That section includes the description of the spring 2015 re-seeding of the four grass entries which suffered stand loss from the flood of October 2014, followed by the subsequent loss of seedlings after the June 4th 2015 reseeding. Loss in 2015 occurred from high salinity and high soil sodium content present in the top 1 inch soil layer. That section includes a description of the two step renovation process that will take place immediately this July to include soil amendments/deep soil cultivation, and the establishment of 4 new grass entries.

d. Fourth Quarter (July 2015 – Sept. 2015) Activities:

See section above: "Activities performed, Fourth Quarter':
That section describes the removal of grasses which either did not tolerate mechanical mowing, had unsatisfactory plot uniformity in terms of plot cover from salinity/sodicity, or both. Plots

have been treated with gypsum, leached, and replanted with one commercially available seeded bermudagrass, and two commercially available seeded buffalograsses.

e. Fifth Quarter (Oct 2015 – Dec 2015) Activities.

The previous section above addressed the activities taken to secure a test site which now (1) has 100% grass cover (2) is void of any confounding issues of soil salinity at both the surface and root zone profile, and (3) is void of any dispersed/unstable soil conditions caused by a high soil sodium content (high soil ESP). Both the physiological osmotic stress (salinity) and poor physical soil conditions (from sodicity) are no longer a problem. Therefore, turf responses to different irrigation levels will now be a plant based response. The methods and results performed to achieve this are included in the previous section.

Future Project Plans

☐ Briefly describe the work to be accomplished in the next reporting period. What specific tasks from the **Work Plan** of the approved project proposal will be accomplished? Make sure to include those activities that will be required to track and collect the data necessary to report on the **Expected Measurable Outcomes** from the approved project proposal.

☐ If the timeline of the approved project **Work Plan** has changed or is anticipated to change during the next reporting period, please provide an updated timeline for the remainder of the project.

☐ Describe any additional changes that are anticipated in the project in the future.

- When it is necessary to modify the **Project Purpose**, substantially change the **Expected Measurable Outcomes** and/or the proposed **Work Plan** deliverables of an award, you must submit a formal scope amendment request to the ADA. This must be submitted as a separate document.
- When it is necessary to make cumulative budget changes of 20% or more of the project's total budget, you must submit a formal budget change request to the ADA. This must be submitted as a separate document.

a. First Quarter (Oct. 2014 – Dec. 2014) Activities:

Time line has not changed per contract, only the effort to establish the plots at the end of the previous summer has resulted in partial success to date. Corrective actions within the normal planned activity period are noted in previous section.

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b. Second Quarter (Jan. 2015 – Mar. 2015) Activities:

As noted above, all entries will be reseeded or interseeded to establish at least 95% cover or more.

Once re-established and capable of being mowed, the linear irrigation plots (perpendicular within and too the grass main plots) will be determined by measuring successive water delivery patterns from when the main linear irrigation line is in sole operation. This allows for identifying critical plot width and location (as a % of line source water replacement).

The success of replanting and emergence will determine exactly when the Irrigation treatments are first implemented. Ideally, this would take place by June 1, which would allow for a full months of grass observation and measurements, before the (unpredictable) monsoon.

c. Third Quarter (Apr. 2015– June 2015) Activities:

Activities:

The grass failure of four of the grass entries mandates that starting in early July 2015, that the soil condition of high salinity and sodicity at the soil surface be remediated by deep rototilling, which will dilute the immediate surface salinity and sodium levels to acceptable levels (similar to the entire root zone profile of 0-6 inches). This involves the activities of (1) removing any remaining exiting vegetation with glyphosate, (2) roto-tilling to a depth of 6 inches, (3) including elemental sulfur for the entire 6 inch root zone to reduce the ESP level to nil '0' and (4) establishing the additional 4 low maintenance grasses.

Work Plan - Updated time line:

Soil remediation and another establishment will delay the employment of the Irrigation treatment phase, due to the grass establishment. When new plots have reached 95% or more groundcover, with an established root zone of 4-6 inches, the Linear Irrigation treatments will begin. The current loss of data time is now one month. It is hoped that by mid-August, that full data collection will begin. Data will be taken into the fall before cooler night temperatures cause a pronounced cessation of growth.

d. Fourth Quarter (July 2015 – Sept. 2015) Activities:
For Oct. Nov, December 2015, soil samples will be taken for ESP and salinity. Based on results, gypsum will be applied if ESP values require it, and leaching will take place if soil salinity requires it. This winter is predicted to be an El Nino season, which will greatly assist in leaching (if required). Bermudagrass stolon contaminants continue to be removed mechanically from any bufflalograss plot entries.

e. Fifth Quarter (Oct 2015 – Dec 2015). Activities:

During the 6th quarter (January, February, March), the test site will be managed for (1) eradication of any bermudagrass contaminants (2) maintenance of plot integrity (3) a proper mowing frequency to promote maximum shoot density and (4) weed control, as necessary.

During the 6th quarter, the linear irrigation plots will be delineated and defined as the percent of ET replacement value from the line source to the outer plot edge. This will be accomplished by

placing catch cans in successive equidistant locations across the entire plot. The irrigation (collection) values are then plotted as a function of distance from line source. These absolute values are then divided by the application rate at the line source itself, to provide the percentage of replacement water realized as function of distance from the line source. This is essentially the calibration of the LIGA system itself. Calibration is required to delineate and establish the irrigation treatments across the plots in gradient fashion, and also to define the levels of applied irrigation themselves. From there, plant responses will be recorded once only the main line source is in operation.

Funding Expended To Date

☐ Provide the actual dollar amount or percentage of grant funds expended on the project from the beginning of the project to the end of the reporting period covered by this report, regardless of whether expenses have been reimbursed by the ADA.

☐ If less than 1/2 of the project funds were expended in the first half of the total project period, please verify if you anticipate expending the remaining funds on approved project activities and budgeted expenditures by the end date of the grant. Please also describe your plans to ensure that the funds are expended in a timely manner.

☐ The progress to date should coincide with the level of funds expended. If problems or delays have occurred, these should be described in the **Problems and Delays** section along with any corrective actions taken.

☐ If your original grant proposal included matching funds, provide information regarding the level of matching funds expended to date.

☐ In the event that a project generated income because of planned activities, report the amount of this additional funding and describe how it has been or will be reinvested into the project to solely enhance the competitiveness of specialty crops.

a. First Quarter (Oct. 2014 – Dec. 2014) Activities:
Expenditures: Expenditures were not posted in the first quarter (Oct, Nov, Dec 201) by the UA system, but appear as part of the accumulated total for the second quarter (Jan,Feb, Mar, 2015).

Indirect Cost share (matching funds) for first quarter (Oct, Nov, Dec 2015) = $0

b. Second Quarter (Jan. 2015 – Mar. 2015) Activities:

Expenditures Second quarter (Jan, Feb, Mar, 2015) = ($11,139)($4,711)($4,590), respectively.
Expenditures for technical salary, Jeff Gilbert. Note January ($11,139) includes charges from first quarter accounting period.

Indirect cost share (matching funds) : Second quarter :Q2 (1/1/15 – 3/31/15) =$13,026.50. Note this value includes the cost share not posted from first (previous) quarter.

c. Third Quarter (Apr. 2015– June 2015) Activities:

Expenditures this quarter:
April (3,443), May (1,213), June (not reported yet).
Cumulative expenditures to date.
($11,139)($4,711)($4,590), ($3443) = $23, 883
Expenditures for Jeff Gilbert, Technician.

Indirect Cost (cost share) this quarter:
Mar, Apr, $6,542.75. June not yet reported.
Cumulative indirect cost share to date.
$13,026.50. + $6,542.75 = $19569.25

d. Fourth Quarter (July 2015 – Sept. 2015) Activities:
Expenditures for this (4^{th}) quarter:
Salary, J. Gilbert Technician for fourth quarter = $3031
(July, Aug, Sept 2015 = $743, $1144, $1144 = $3031).
Cumulative expenditures to date: J. Gilbert.
($11,139)($4,711)($4,590), ($3443) (Q4 $3031)

Expenses for student labor fourth quarter. July, Aug, Sept, 2015.
($749, $1019, $629 =$ 2397) Cumulative student labor = $2397.

Non-salary expenses for fourth quarter, plot maintenance/irrigation repair. $607.04

Indirect Cost (cost share July, Aug, Sept 2015) this quarter was $3556.
$13,026.50. + $6,542.75 + $3556

e. Fifth Quarter (Oct 2015 – Dec. 2015) Activities:
Expenditures for this (5^{th}) quarter.
Salary, J. Gilbert. Technician for fourth quarter =
(Oct, Nov, Dec = (2,546 ,1,974,1,974) =$ 6494

Cumulative salary to date.
J Gilbert.= ($11,139)($4,711)($4,590), ($3443) (Q4 $3031) ($6494) = ($33,408)

Expenses for student labor (Oct, Nov, Dec 2015 = $1421)
Cumulative student labor to date, student.
($2397) + ($1421) = $3818

Non-salary expenses for fifth quarter = none (0).

Indirect Cost- Cost share (Oct, $358.30, Nov $358.30, Dec 358.30) = $1074.90