



United States Department of Agriculture



Mitigation on Agricultural Lands

27 February 2018 | Heather Dial, Tucson Plant Materials Center

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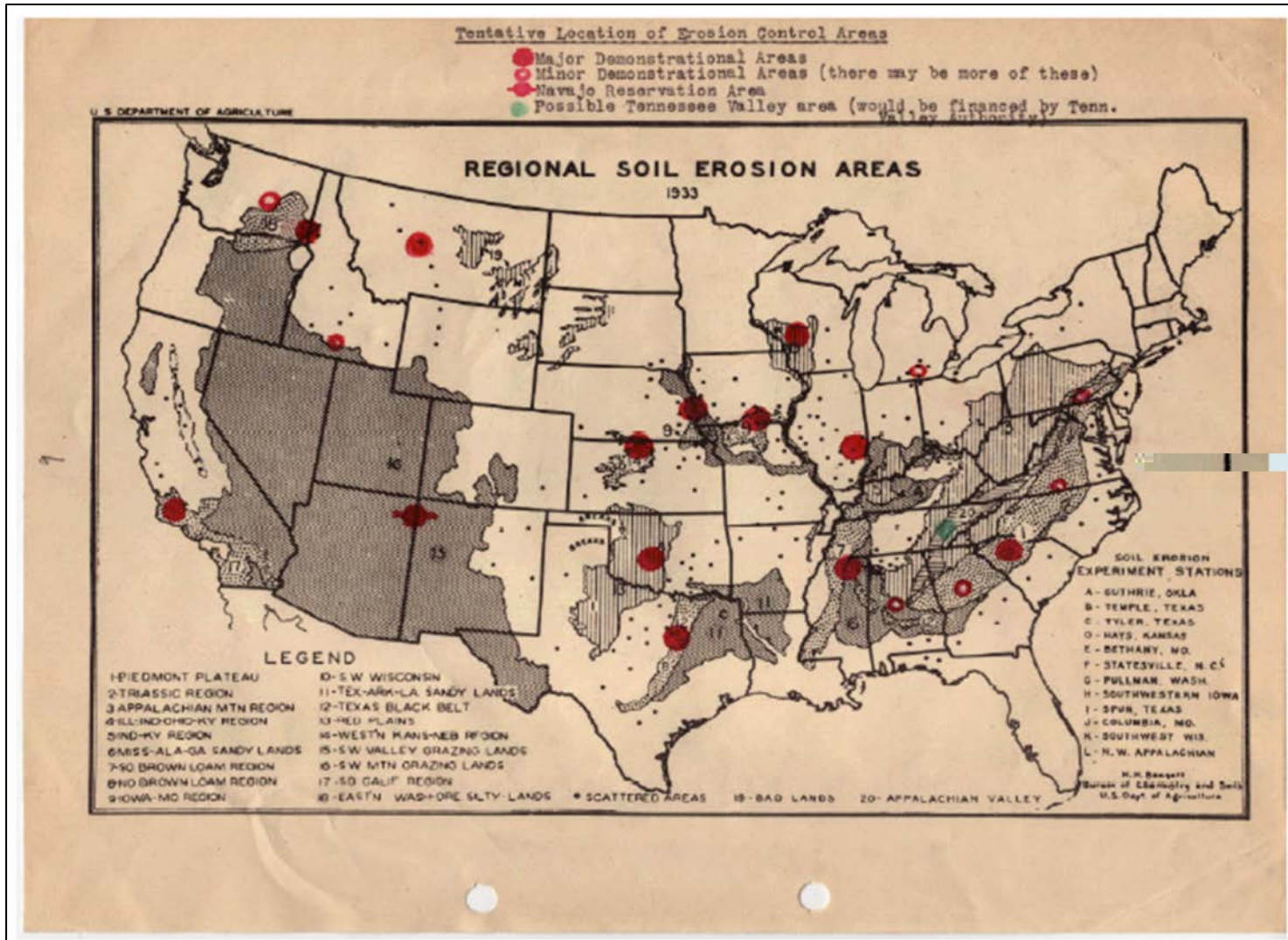
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Overview

- **The Plant Materials Program**
 - History
 - What we do
 - Releases
- **Historical and Present Studies**
 - 1977 and 1979 Trials
 - 2016 Trial
 - Pecan Orchard Trial
 - Rangeland Trial
- **Summary**



History



History

“Nursery production in this region with its attendant problems, is peculiar in that one is dealing primarily with range revegetation and restoration rather than with farm erosion control. The complexity of the situation is further enhanced by reason of the low rainfall, temperature extremes, and wide range of vegetation types which prevail in this section and which of necessity is reflected in the composition of propagation materials and general nursery practices as well as field applications.”

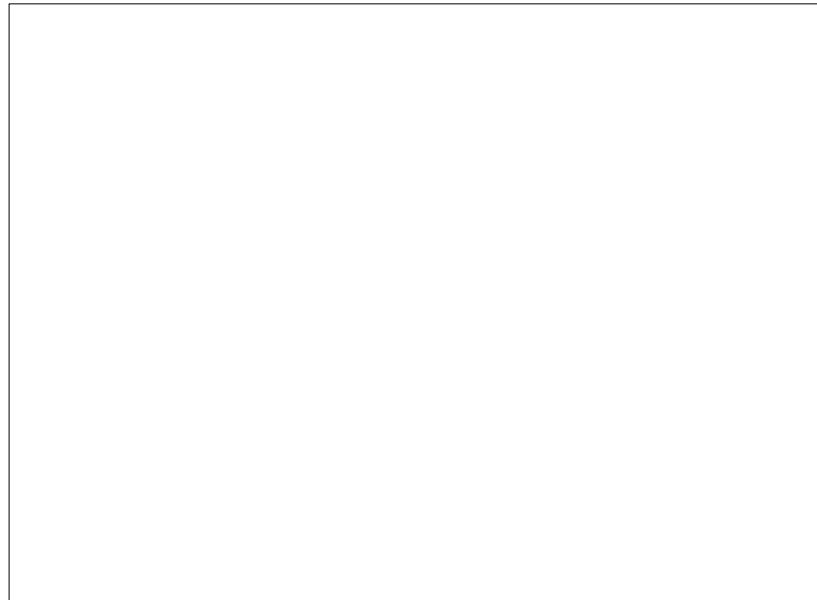
Dr. F.J. Crider, 1934 Tucson Plant Materials Center Technical Report



History



“Plants must be chosen, in the first place, especially for their known or potential erosion control values.” Dr. F.J. Crider, 1936 Field Memorandum #SCN-4



*“What plant can possibly be more important in the Southwest than blue grama?”
Leslie N. Gooding, 1939 Annual Report for the Field*



Tucson Plant Materials Center Mission

- Assemble, test and release native plant material for conservation use in the Sonoran, Chihuahuan, and Mojave Deserts
- Encourage the commercial increase of conservation species
- Develop and transfer plant science technology to address conservation problems



United States Department of Agriculture
Natural Resources Conservation Service
Plant Materials Program

Salttilo Origin Germplasm cane bluestem

Bothriochloa barbinodis (Lag.) Herter

A Conservation Plant Release by USDA NRCS Tucson Plant Materials Center, Tucson, Arizona



Advanced Strain Trial at the PMC. Salttilo Origin Germplasm cane bluestem was selected as the top performer in this trial based upon its superior vigor, forage production, and tolerance to drought and cold.

Conservation Uses
Salttilo Origin Germplasm cane bluestem may be used as an erosion control plant on rangelands and critical areas such as abandoned cropland and road cuts. It also has beneficial qualities in terms of diet and cover for wildlife species including pronghorn antelope, mule deer, desert cottontail, white-throated woodrat, javalina, and scaled quail.

Area of Adaptation and Use
The identified range of adaptation of Salttilo Origin Germplasm cane bluestem is Major Land Resource Areas 30, 38, 39, 40 and 41 at elevations between 1,000 and 6,000 feet. Prior to release, Salttilo was evaluated at two planting sites in Pima County, AZ and at three planting sites in Cochise County, AZ. In all plantings, Salttilo was determined to be highly successful in terms of increased

TECHNICAL NOTES

U S Department of Agriculture

Natural Resources Conservation Service

TN – Plant Materials – 6-1- Arizona

November 2005

Use of Non-Dormant Cottonwood Poles for Riparian Revegetation

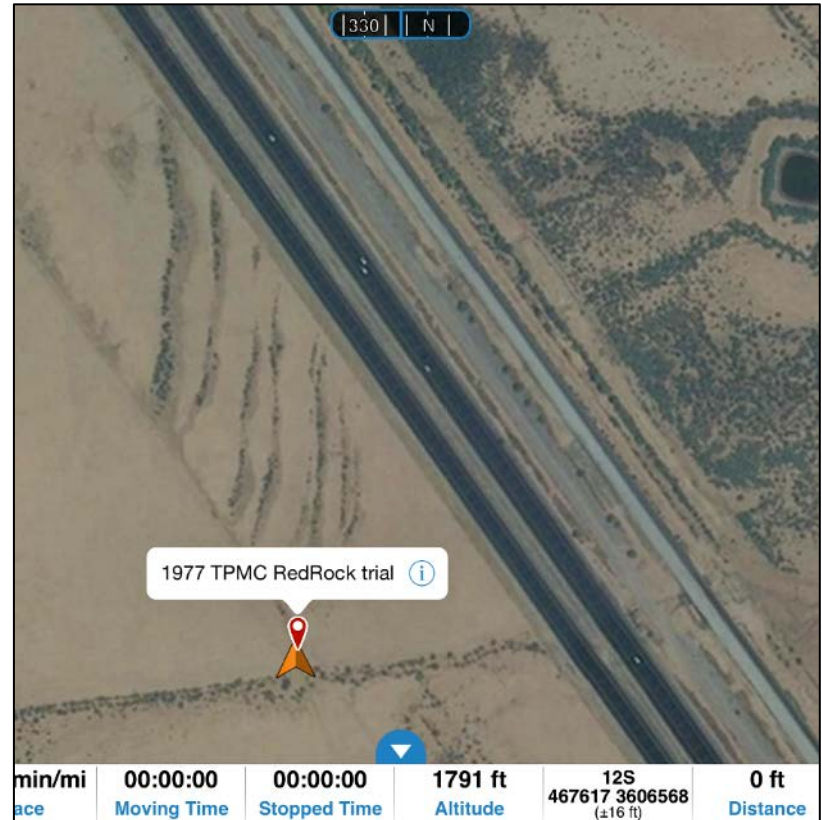
Abstract

The use of dormant poles for planting cottonwoods and willows is an established practice. However, in southern Arizona there is a narrow window of opportunity to plant dormant poles before they break dormancy. The objective of this study is to evaluate the survival and growth rates of non-dormant poles planted at three different dates. Planting dates were October 1991, November 1991, and July 1992. Planting stock included native Fremont cottonwood (Populus fremontii Wats.) and a hybrid black cottonwood (Populus nigra L.). Two diameter classes were evaluated, poles (>0.5 inches) and whips (<0.25 inches). Survival over all treatments was greater for the hybrid stock (86%) compared to



Studies

- Collaborative work
- Objective was to control blowing dust causing multiple accidents along Interstates 8 and 10
- Two separate trials
 - 1977
 - 20 acre abandoned field
 - Two seeding mixtures & 11 cultural techniques
 - 1979
 - 34 acre abandoned field
 - One seeding mix & 2 cultural techniques



1977 Trial

- Entire area was fenced
- Cultural treatments used included pitting, land imprinting, mulching, listing, ripping
- Some successful establishment of seeded species
- Best results were from contour-furrowed and drill seeded plots
- Results were used to develop 1979 study plan



1977 Trial



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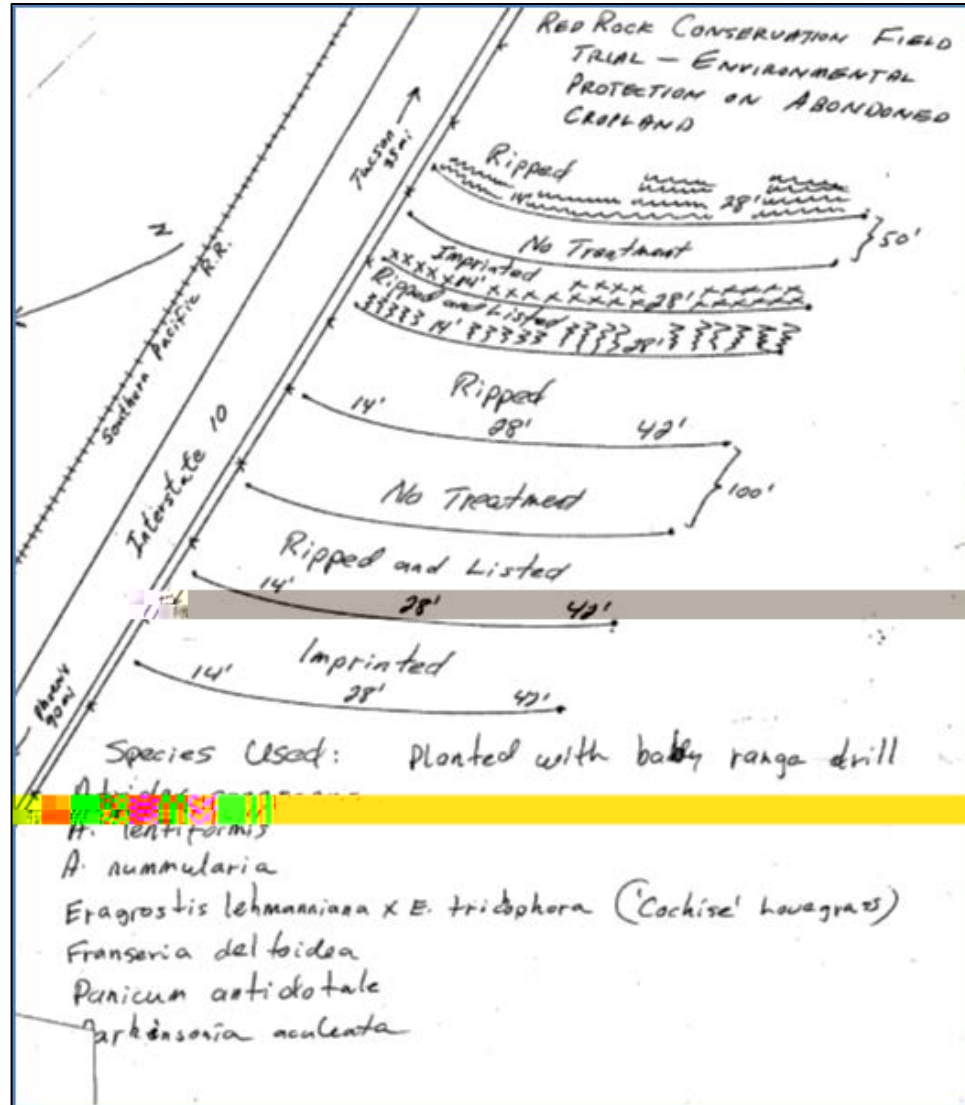
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1979 Trial

- One of the problems from the 1977 trial was water infiltration
- Constructed contour borders at 50' and 100' wide
- Between each border varying widths were contour furrowed, ripped or left as a check and then drill seeded
- A portion between each border was left as a watershed area to provide extra moisture for the seeded area
- Average slope of the field between borders was 1.5%



1979 Trial



1979 Trial

- The techniques worked and are still working today
- Present day vegetation on the berms consists of velvet mesquite, wolfberry, fourwing saltbush and annual forbs and grasses
- Of these, only fourwing saltbush was seeded



1979 Trial

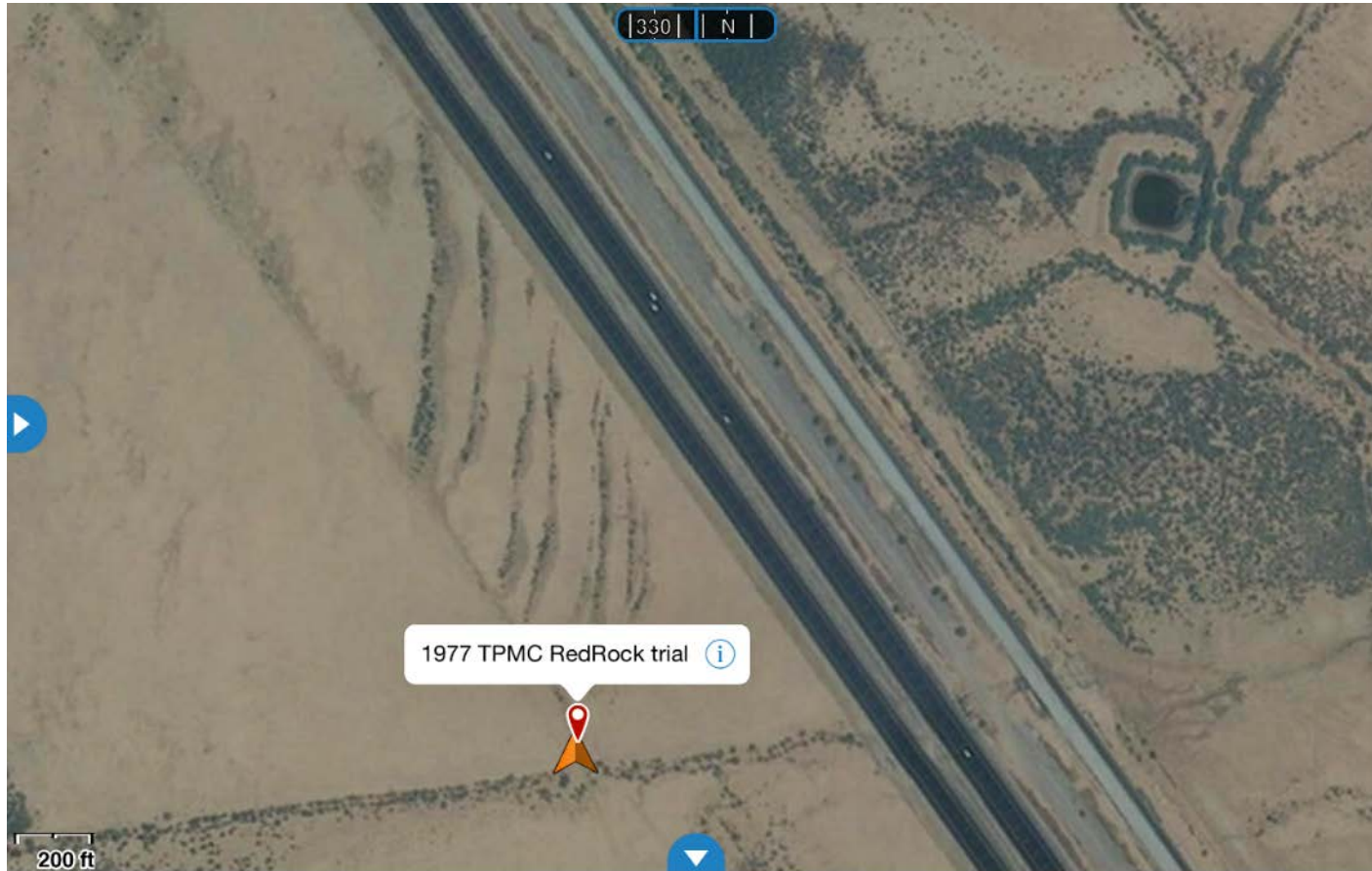
- After 6 years of evaluation of the trial, a “prescription” for planting abandoned cropland was developed
- Further trials were conducted in various areas along I-10 but none with the success of the Red Rock Trials
- Collaboration was key



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1979 Trial



Press and hold to set stats	0:00 min/mi Pace	00:00:00 Moving Time	00:00:00 Stopped Time	1791 ft Altitude	12S 467617 3606568 (±16 ft)	0 ft Distance	12S 467617 3606568 (±16 ft)
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2016 Trial



- **Collaborative project**
- **200 acre site**
- **Farming began on the site in the 1960s; the fields were abandoned by the late 1970s**
- **Similar soils and condition to Red Rock**



2016 Trials



- Berms were built on 40 acres of the site at 3 different widths
- The upstream side of each berm was ripped and seeded
- May and August seeding dates
- Section of land was key line plowed



2016 Trials



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2016 Trials



NAWA Restoration Project
"Kingfish"

Aerial imagery (pre- and post-project) collected using advanced camera-mounted system (drone). Aerial imagery is a Q/NIR image provided by the Quilt Creek Conservancy on www.quiltcreek.com.

NAD 1983 NAD83 StatePlane Arizona Central
0 0.2 Miles

PIMA COUNTY
BARRY COUNTY CLERK

USDA
Quilt Creek Conservancy

Below is a near-infrared (NIR) image of the project area. The image has an unusual color because the three colors used are red, green, and NIR instead of red, green, and blue.

Spillway

Lateral berm and rock dam

Berms and key line treatment

Measuring Vegetation

Normalized Difference Vegetation Index (NDVI) is a metric showing areas of high chlorophyll concentration. The index is created by comparing two light measurements: the visible infrared and the near-infrared. The visible and near-infrared are the two primary components of high chlorophyll concentration. The green areas have high chlorophyll.

October 2015 NDVI image September 2016 NDVI image Aerial with 400-foot stripophyll increase from 2015 to 2016 are shown in red



2016 Trials



Measuring Vegetation

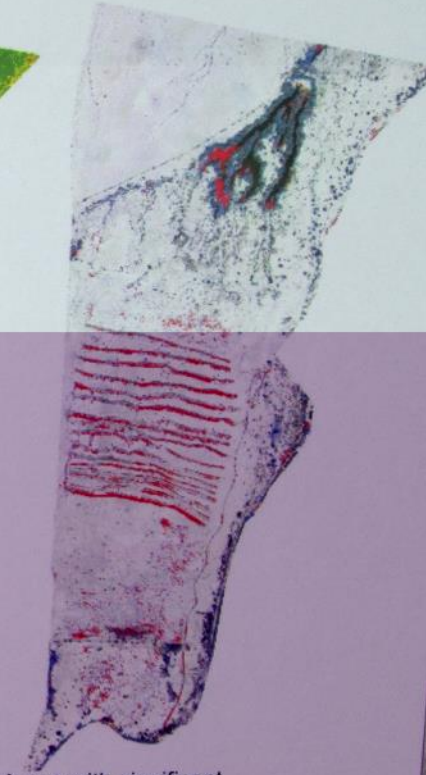
Normalized Difference Vegetation Index (NDVI) is a metric showing areas of high chlorophyll concentration. The index is created by comparing two light frequencies: red and near-infrared. The yellow and red on the first two graphics indicate high chlorophyll concentrations. The green areas have little chlorophyll.



October 2015
NDVI image



September 2016
NDVI image



Areas with significant
chlorophyll increase from
2015 to 2016 are shown
in red



2016 Trials



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Pecan Orchard Trial



- **Contacted by U of A professor regarding new pecan orchards and potential for trials**
- **Coordinated site visit and developed study plan to test various releases in between orchard rows**
- **Orchard acreage is on the rise in Arizona and this particular orchard is near I-10**



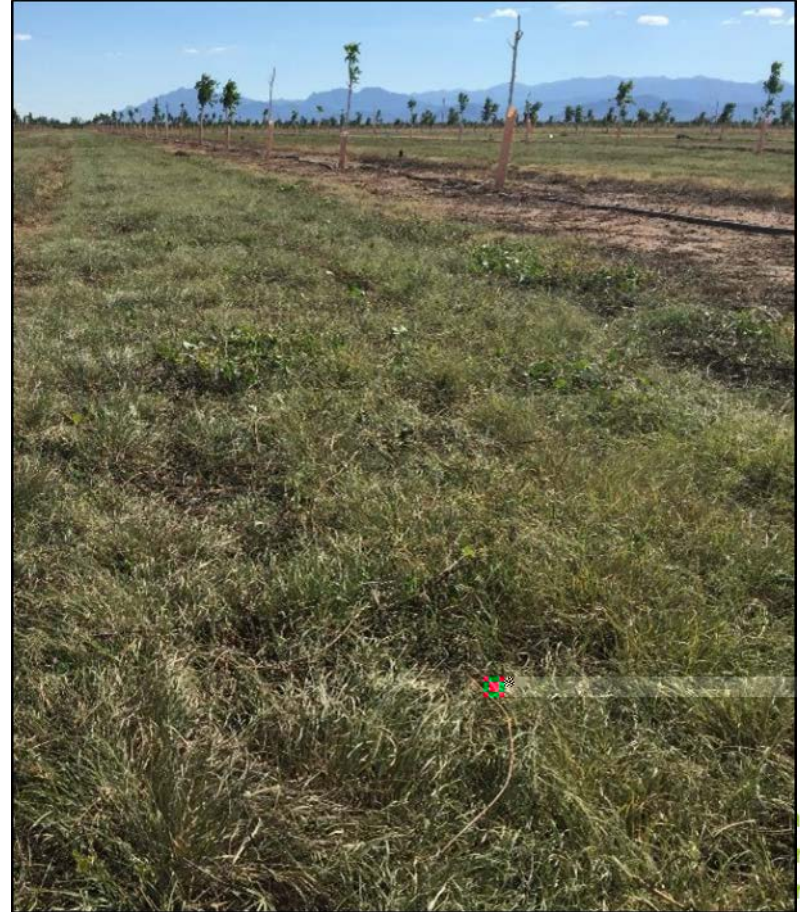
Pecan Orchard Trial



- **Finding a native commercially available species that can exist in the understory of pecan orchards could provide soil coverage for thousands of acres in Southern Arizona**
- **Replicated trial was installed in 2015**
- **Preliminary results indicate that two species have established, and are providing cover despite weed competition**



Pecan Orchard Trial



Rangeland Trial

- **Site has low productivity, subject to wind erosion**
- **What species will establish and persist?**
- **Developed planting plan and procured the seed**
- **Installed the trial in three days with assistance from NRCS and AZ Game and Fish staff**

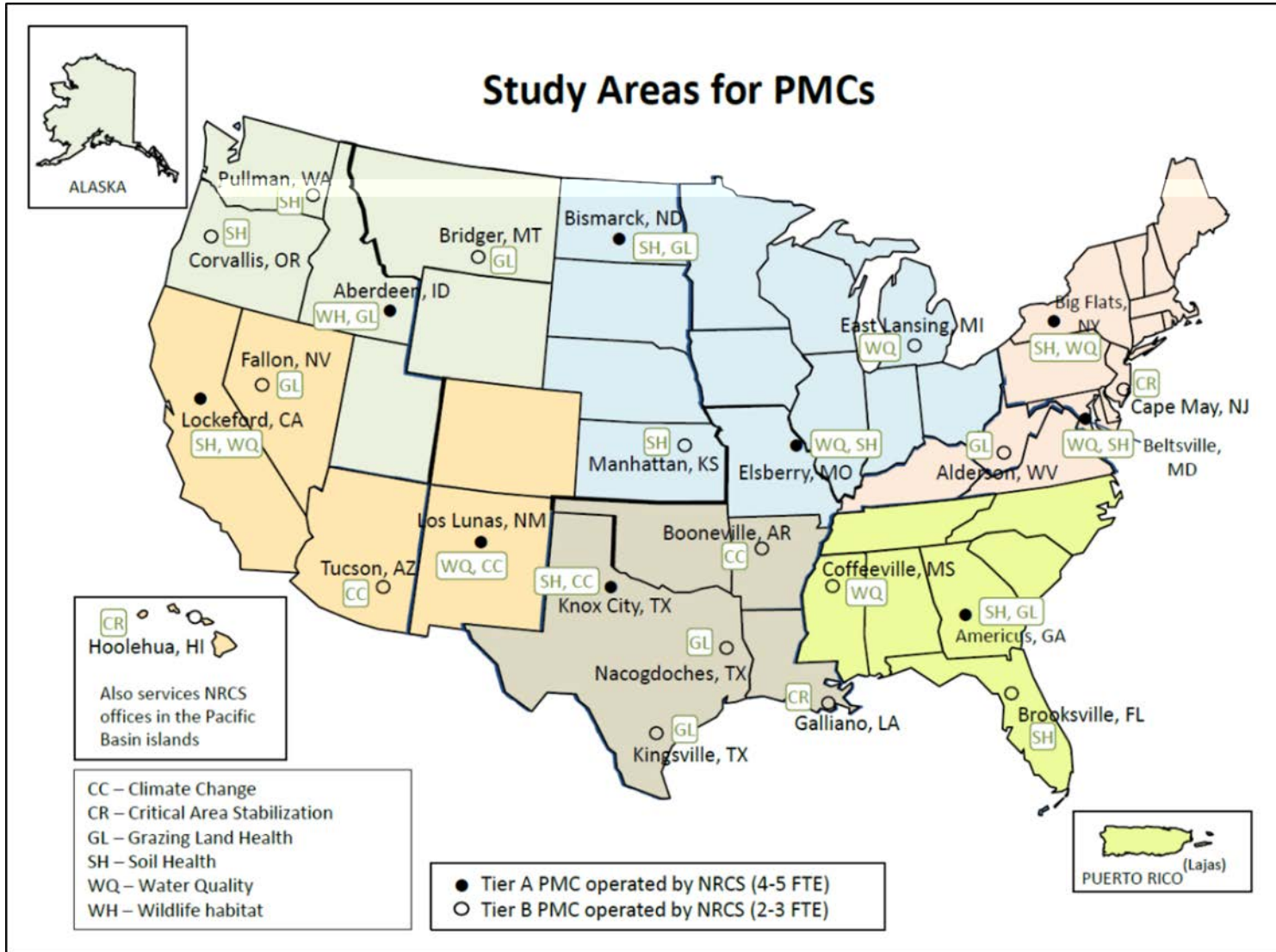


Rangeland Trial



- Replicated trial
- 2 acres
- 17 species
 - 26 entries
- Multiple cultivars of some species
- 6 mixed plots





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