



Lockeford Plant Materials Center

2023 Progress Report of Activities

December 2023

Website: [California - Lockeford Plant Materials Center | Natural Resources Conservation Service \(usda.gov\)](https://www.usda.gov/nrcs/california-lockeford-plant-materials-center)

The mission of the USDA NRCS Plant Materials Program is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs. The Lockeford Plant Materials Center (CAPMC) provides information about adapted plants and conservation practices to NRCS staff and their clients, producers, landowners, and tribes of California. We are a 106-acre facility located in the Central Valley of California and the only PMC within the state. The CAPMC is responsible for the Mediterranean areas of California: the Northwest is covered by ORPMC, Corvallis, OR; the Great Basin and High Desert by GBPMC, Fallon, NV; and the southern desert areas by AZPMC, Tucson, AZ.

2023 was the 50th Anniversary of the CAPMC at its current location in Lockeford after a move from Pleasanton. Many of the plantings around the main office and buildings were planted at the same time, providing extensive shade. A significant storm came through in January, and there was substantial damage to the mature trees, fortunately, there was no damage to the buildings, even from the fall of a treetop onto the roof of the shop.



Figure 1. Margaret inspecting a downed tree covering tractor implements.

Our staff were Margaret Smither-Kopperl, PMC Manager, Annie Edwards, Study Leader, and Shawn Vue, Farm Foreman. Additional help was provided by Charles Goodluck, a 1994 Tribal Scholar from the Navajo Nation who stayed at the PMC until August, Ashley Koenigs, a Biological Science Technician, who started in July to give us part-time assistance, and Sara Powers, who was an Earth Team volunteer for one month over summer.

Cover Crops

During 2023, for the 11th year, we planted a demonstration with 50 plots, including various cereals, legumes, forbs, commonly planted mixes, and native species. Neighboring this plot was a planting of small-seeded fava beans and oats for a study with Dr Hossein Zackeri and CSU Chico. A Conservation Cover planting with eight different mixes planted in 2021, was maintained and data collected.



Figure 2. Shawn Vue, Farm Foreman, using a roller crimper to terminate a brassica cover crop mix.

Roller Crimper Trial: Cover crop termination times and methods are of major interest to California growers. This year, we planted a demonstration study with two common cool season California cover crop mixes and two single species to evaluate roller crimper termination and timing. While roller crimpers are uncommon in California for terminating cover crops, we hope demonstrations of how to successfully use this tool will provide more information about this minimally disruptive method of termination. After one year of data collection, our most successful crimping/termination was in

the brassica mix after it flowered and in the fava beans, just before seed set. Triticale and oats from the legume mix were unsuccessfully crimped even when crimped in their later stages. A final study report for this work is in progress and will be published in 2024.



Figure 3. Cover crop mixes and species two days after being crimped on May 2nd. Clockwise from top left; legume mix (Annual Plow Down), brassica mix, fava beans, and triticale. Note the oats in the legume mix stood up among the legumes that successfully remained crimped.

Warm Season Cover Crop Study:

The third and final year of a regional warm season cover crop study was planted in collaboration with the PMCs in AZ and NV. Broadly, this study aims to provide information on drought-tolerant warm season cover crops for the southwestern US. In California, we are specifically interested in evaluating the potential of these species to grow and provide cover after summer row crops, such as tomatoes, with minimal water use, as well as evaluating the different performances between the planted cultivars and species. The study included eight millet species, three cowpea cultivars, and ‘Tropic Sun’ sunn hemp. The study was planted on July 19th and irrigated with 3 inches of water after planting. Other benefits of warm season cover crop species include their ability to self-terminate with cold fall



Figure 4. Warm Season Cover Crop Study 48 days after planting, with millets in foreground, legumes with cowpeas and Sunn hemp to the right.

temperatures, increase infiltration from precipitation, especially severe fall rains, and prevent soil erosion. A final study report for this work is in progress and will be published in 2024.

Pollinator Propagation and Establishment

Xerces Collaboration: In collaboration with the Xerces Society, the CAPMC developed propagation experiments for two species. Purple milkweed, *Asclepias cordifolia*, to determine if potting media or container size impacts the plant’s development, and blue dicks, (*Dichelostemma capitatum*, also called *Dipterostemon capitatus*) to determine protocols to produce bulbs in a semi-permanent planting (Figure 5).



Figure 5. *Asclepias cordifolia* growing in tubes (left) and *Dichelostemma capitatum* bulbs after planting (right).

Pollinator Strips: To investigate the potential of establishing pollinator plants from plugs in the spring, as compared to the more usual fall planting, a demonstration project was implemented in May (Figure 6). Rows of plants were planted at 2-foot and 3-foot spacing and irrigated via drip tape for establishment. During the first two weeks after planting, additional irrigation was applied every other day. Due to the season and use of drip irrigation, weed competition was minimal. By late summer, the plants were well established and in full bloom. The results will be compiled and used to develop a technical note on plant establishment.



Figure 6. Flat of pollinator plugs prior to planting along strips of drip tape on May 25 and their progress on July 7 and Sept. 5.



Trainings

CAPMC staff contributed to several trainings, conducted both virtually and in person, during 2023 to provide Conservation Planning credits for NRCS staff.

- Introduction to the [eVeg Guide](#), the plant selection tool for NRCS staff in California.
- Orientation for New Employees – explained the role of the Plant Materials Center in the greater context of the NRCS and how we can be a resource (Figure 7).
- Plant propagation with culturally significant plants at the Lockeford PMC, for Intertribal Nursery Training hosted by the Intertribal Agriculture Council.
- Planning a Seeding – this hands-on event at the CAPMC focused on rangeland plantings with an emphasis on equipment for site preparation, different types of planting equipment, and included calibration and planting.



Figure 7. Orientation for New Employees group at the CAPMC.

Outreach

The CAPMC continues to support outreach with Areas and Service Center Staff as well as partners. Some outreach activities the CAPMC was involved with in 2023 include:

- Spring Cover Crop and Soil Health Field Day held on April 5, about 50 participants attended (Figure 8).
- The CAPMC hosted a FARMS field day for the Center of Land-Based Learning in March. Here, a group of high schoolers came to the PMC to learn about agricultural careers in NRCS and assist the PMC in planting pollinator plants.
- Soil and Water Conservation Society CA/NV Chapter Annual Meeting had a Tour entitled “From the Dam to the Delta: Stewardship and Challenges, which included a stop at the CAPMC.
- Staff attended the Miwok Big Time Festival and Lange Twins field day to represent NRCS and the PMC at a booth (Figure 7).
- For the fourth year, the CAPMC was pleased to host the Xerces Society, for their Monarch Kit distribution event in November (Figure 7).



Figure 8. Conservation planners and the public examining a mixed brassica cover crop plot at the Spring Field Day.



Figure 7. Annie Edwards, Study Leader, and Charles Goodluck, Tribal Intern, working an NRCS booth at the Miwok Big Time Celebration (left) and the Xerces Society passing out their Monarch Habitat Kits at the CAPMC (right).

Technical Products and Technology Transfer

Published Symposium Report

- [Soil Biodiversity in California Agriculture: Framework and Indicators for Soil Health Assessment](#)

Technical Notes

- [Cover Crop Seed and Native Seed Vendors for California](#) (revision)

Propagation Protocols

- [Heart-leaf milkweed \(*Asclepias cordifolia*\)](#)

Information Brochure

- [Management and Termination of Insectary Cover Crop Mixes](#)

Plant Materials News Articles

- [Training and outreach on croplands, rangelands, riparian lands and more!](#)
- [Southwestern Plant Materials Centers Address Climate Concerns](#)

Plant Selection Tool for NRCS Practices

- [NRCS eVeg Guide](#)



Figure 8. Bloom of pollinator species including CA poppy and Arroyo lupine following 2022 Cultural burn on 2014 seeded area.



United States Department of Agriculture



Figure 9. Lockeford Plant Materials Center staff, left to right: Shawn Vue, Farm Foreman, Margaret Smither-Kopperl, Manager, Charles Goodluck, Tribal Intern, Ashley Koenigs, Biological Technician, and Annie Edwards, Study Leader.

Contact us:

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