

Using Sudangrass as a Low Biomass Winter Cover Crop for Controlling Runoff and Erosion in Vegetable Systems

University of California
Agriculture and Natural Resources

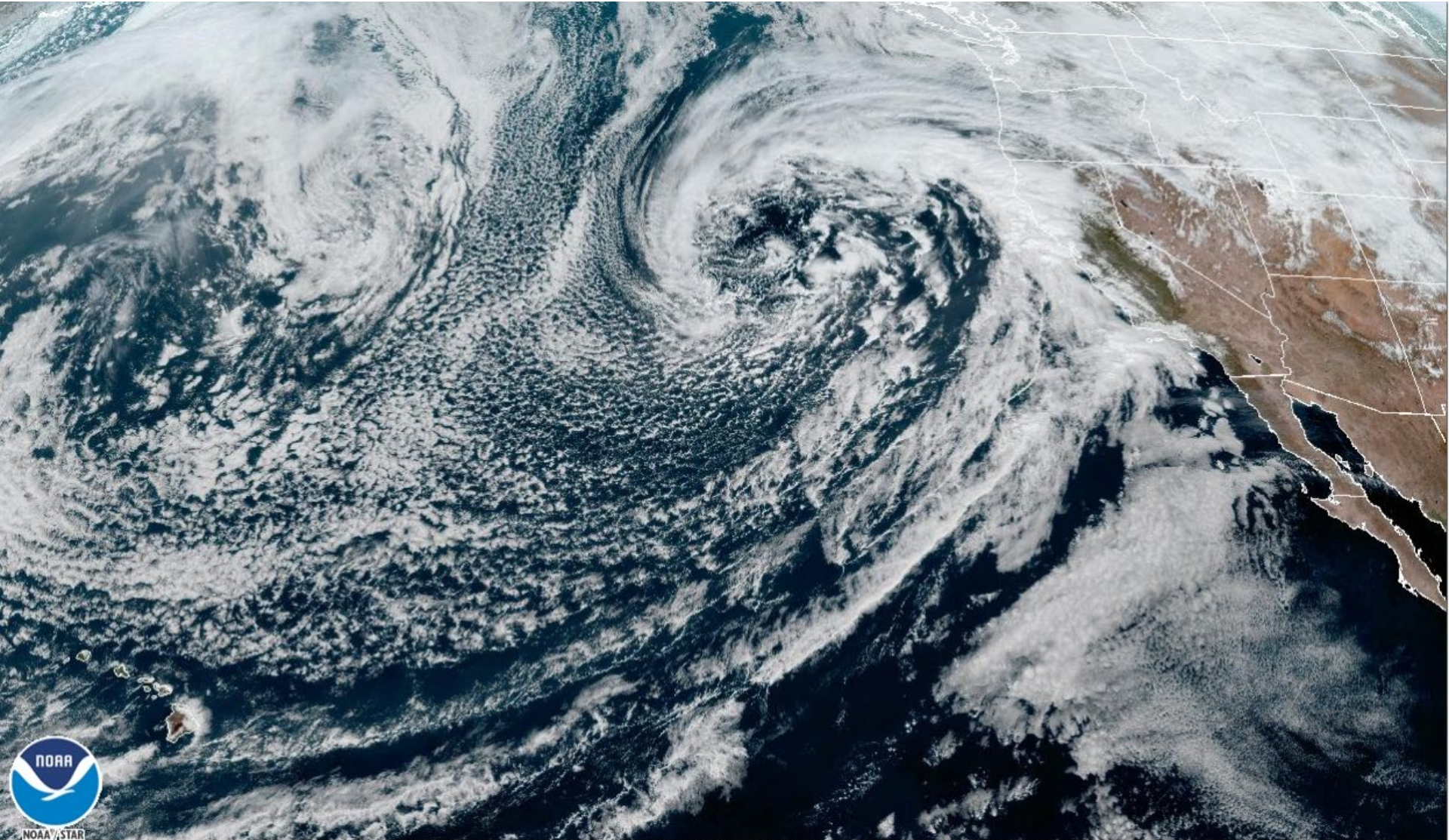
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- **Field Assistance: Noe Cabrera, Jorge Calva, David Chambers**

Atmospheric rivers can cause intense rainfall events that result in runoff



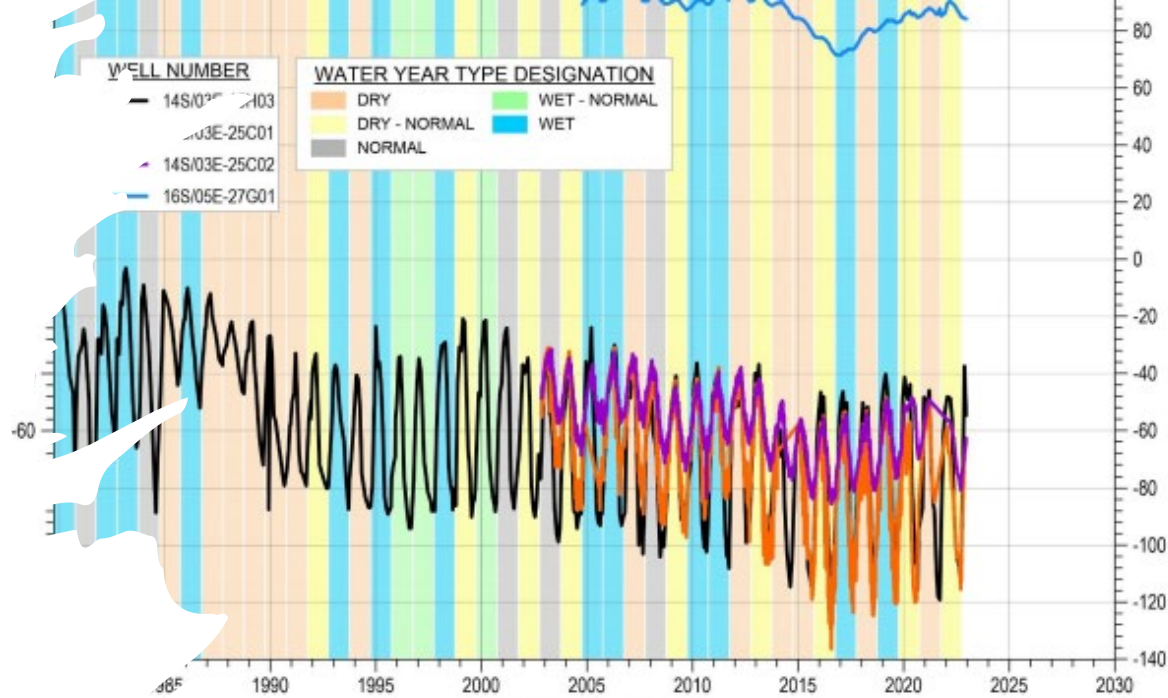
Which causes flooding



and soil erosion and water quality impacts



Challenges in Sustainably Managing Groundwater on the Central Coast



Fall and winter cereal cover crops are usually grown to improve soil health and uptake residual soil N

Benefits of long-season cover crops

- Prevent nitrate leaching during the winter
- Add organic matter to soil
- Improve soil tilth
- Improve soil health

Cultural practices

- Usually planted on flat ground
- Produce 3 to 6 tons/acre of dry matter
- Require substantial tillage to incorporate
- Require several weeks to breakdown before planting



5% of the row crop ground in the Salinas Valley is cover cropped in the winter

Cover crops for erosion control and infiltrating rainfall

- Plant in beds and/or furrows
- Early fall establishment before storm season begins
- Limit biomass (0.5 to 2 tons dry matter/acre)
- Minimal additional tillage needed before planting



Low-Residue Cover Crops for Controlling Runoff

Triticale planted in Furrows

Merced Rye planted in Furrows and Beds

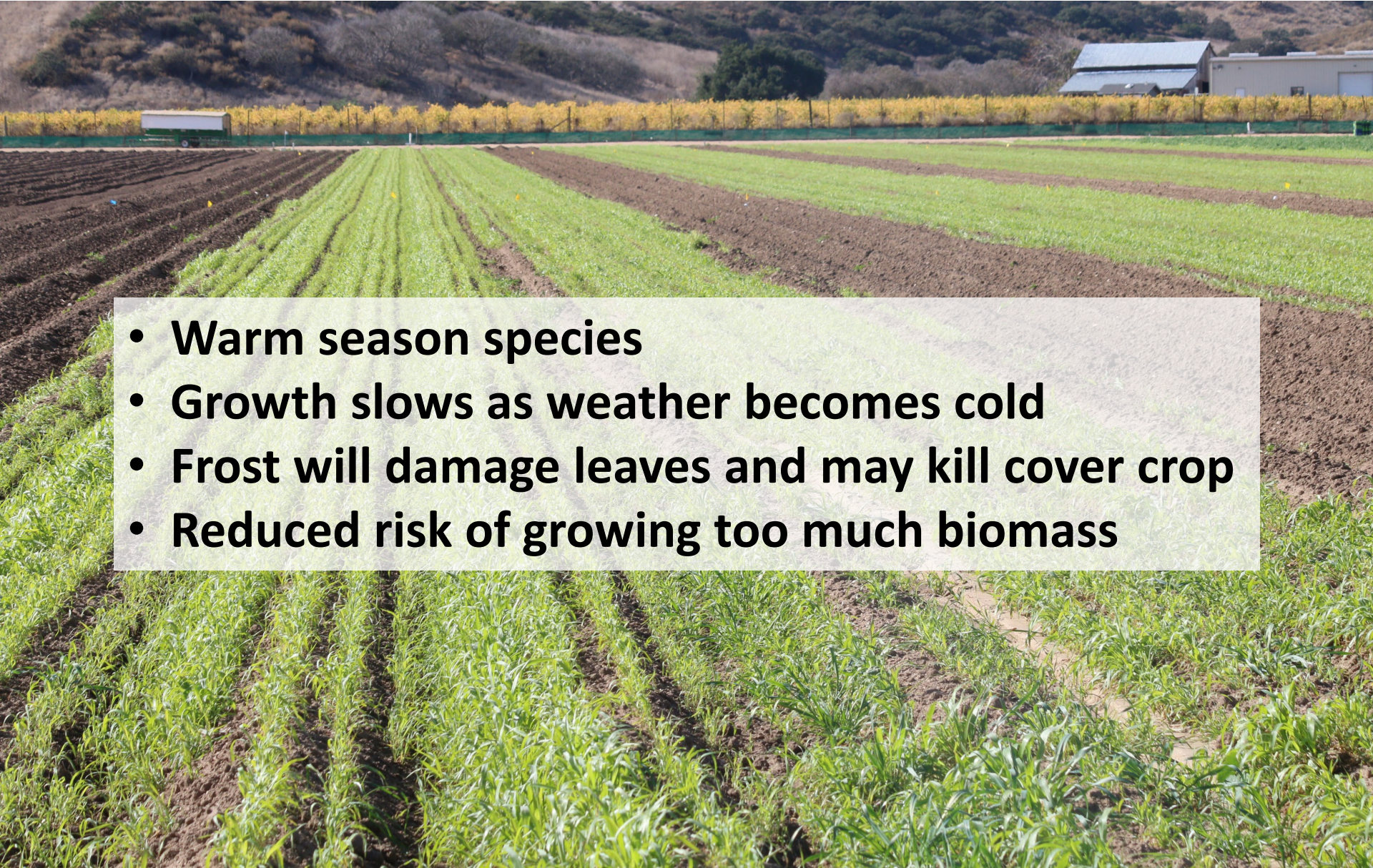
Herbicide Application 60 Days after Planting



YouTube Video



Using Sudangrass and Sorghum sudangrass as low biomass winter cover crops

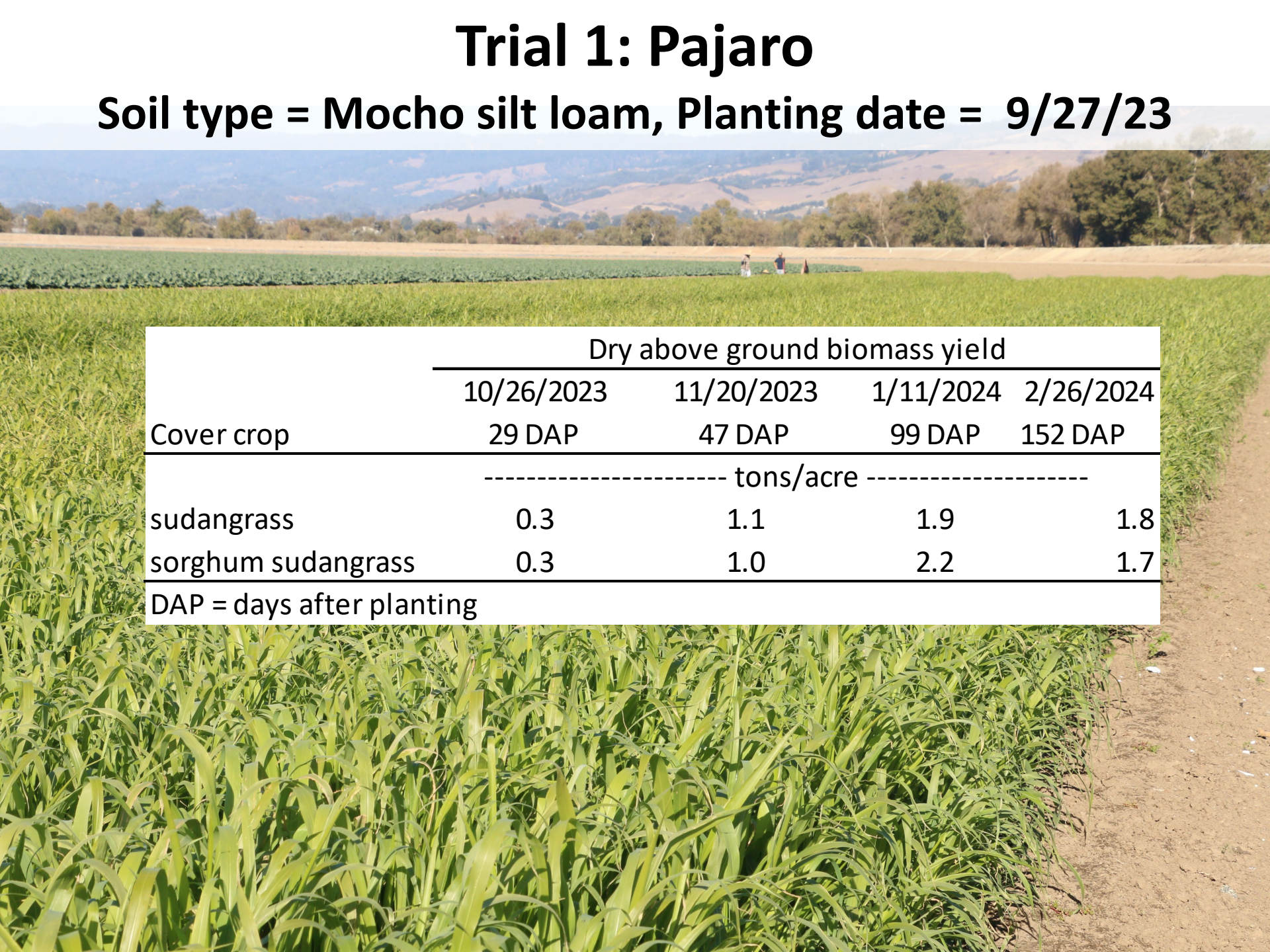
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- Warm season species
 - Growth slows as weather becomes cold
 - Frost will damage leaves and may kill cover crop
 - Reduced risk of growing too much biomass

2023-24 Cover crop trials with sudangrass and sorghum-sudangrass in the Salinas and Pajaro Valleys



Trial 1: Pajaro

Soil type = Mocho silt loam, Planting date = 9/27/23



Cover crop	Dry above ground biomass yield			
	10/26/2023	11/20/2023	1/11/2024	2/26/2024
	29 DAP	47 DAP	99 DAP	152 DAP
	----- tons/acre -----			
sudangrass	0.3	1.1	1.9	1.8
sorghum sudangrass	0.3	1.0	2.2	1.7

DAP = days after planting

Trial 2 Arroyo Seco

Soil type: Arroyo seco gravelly loam, Planting date = 10/4/23

Dry above ground biomass yield

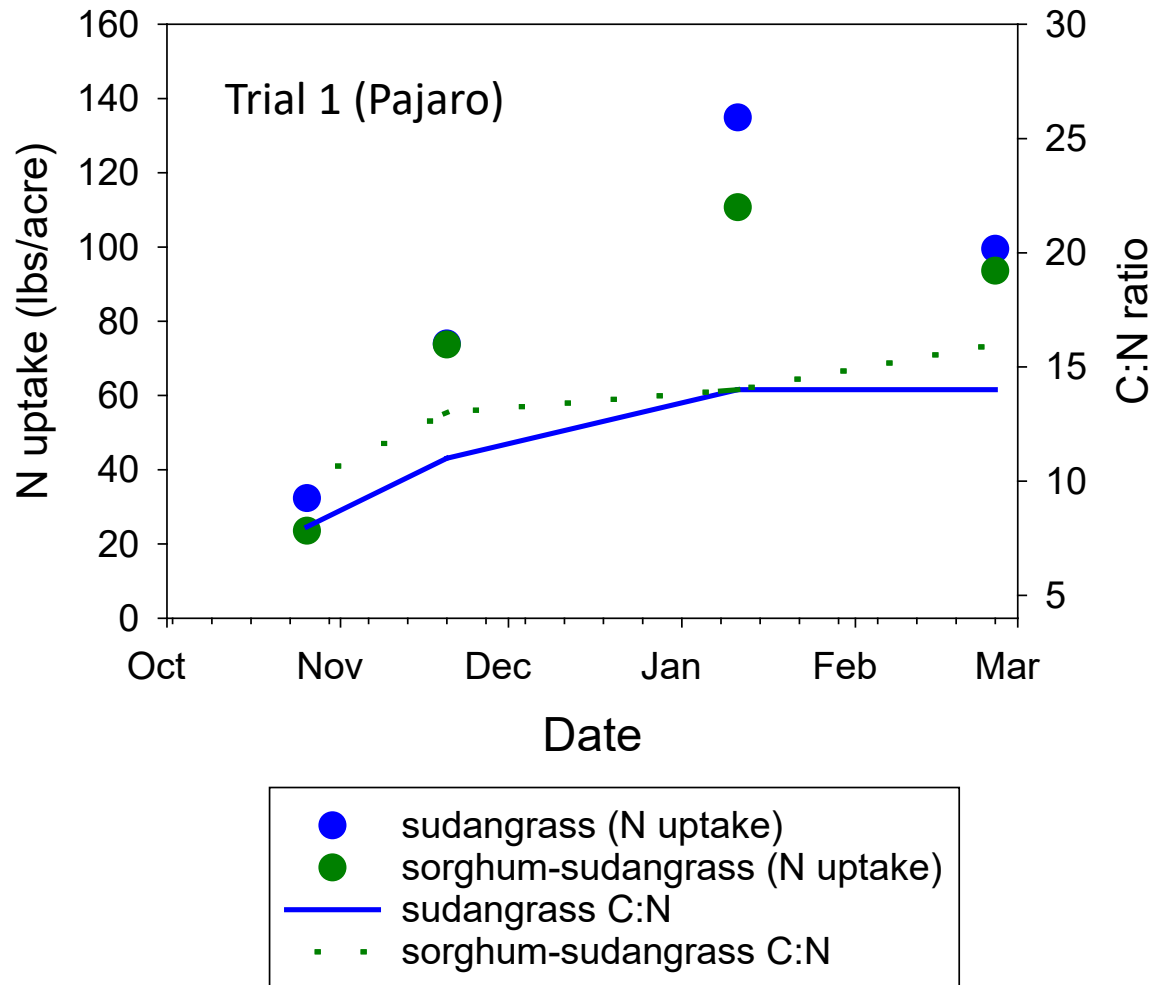
	11/30/2023	1/9/2024	3/13/2024
Cover crop	57 DAP	97 DAP	161 DAP
	----- tons/acre -----		
sudangrass	0.3	0.5	1.0
sorghum sudangrass	0.2	0.3	0.8

DAP = days after planting

Cold weather and frost limited growth of Sudangrass



Sudangrass and Sorghum-sudangrass can accumulate > 100 lbs N/acre in above ground biomass during the winter months

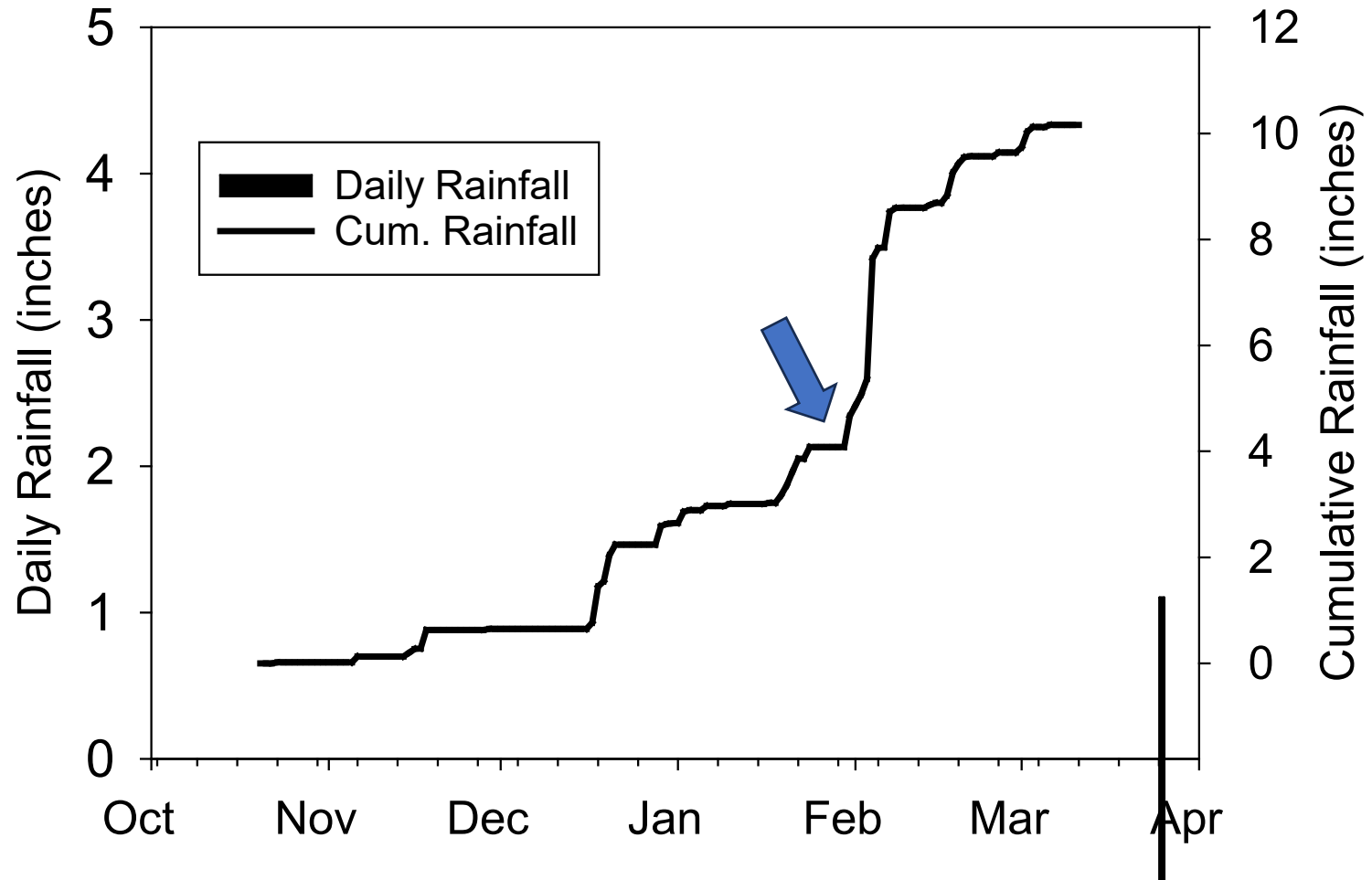




Storm runoff monitoring

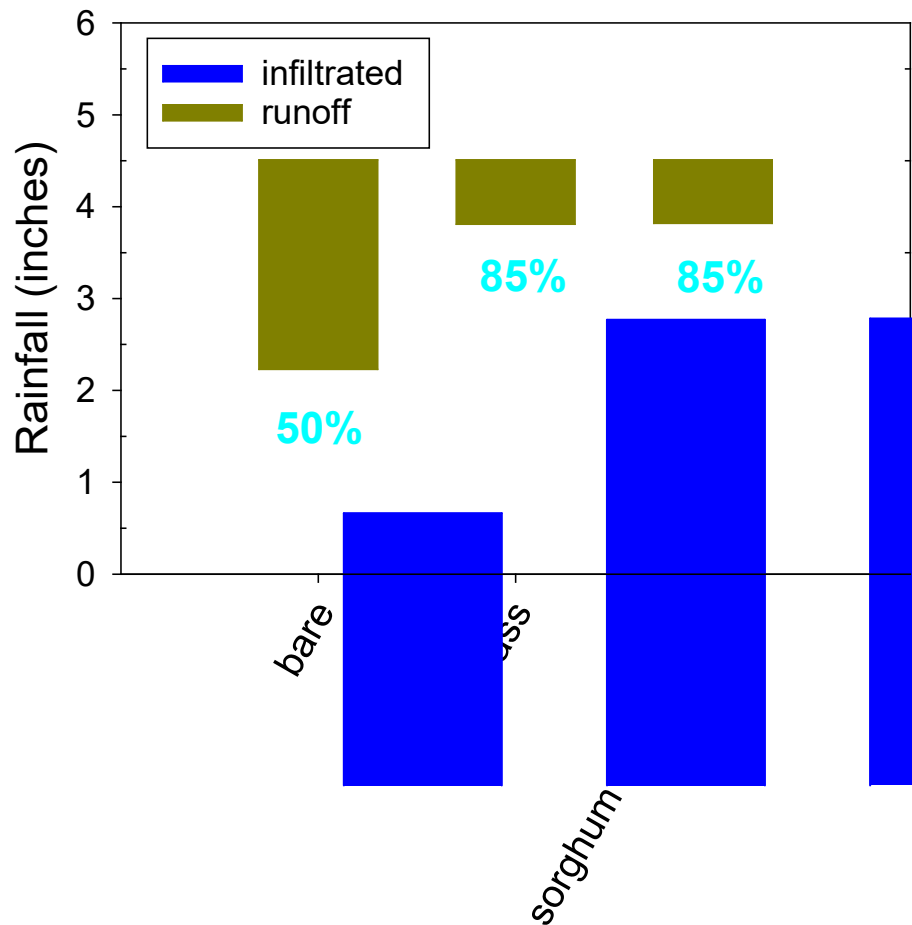
- Flumes at the lower end of the plots were used to monitor the volume of runoff
- pumps were automatically activated to sample runoff at 5-minute intervals during flow events

The most intense rainfall rates corresponded with an atmospheric river event in late January and Early February in 2024

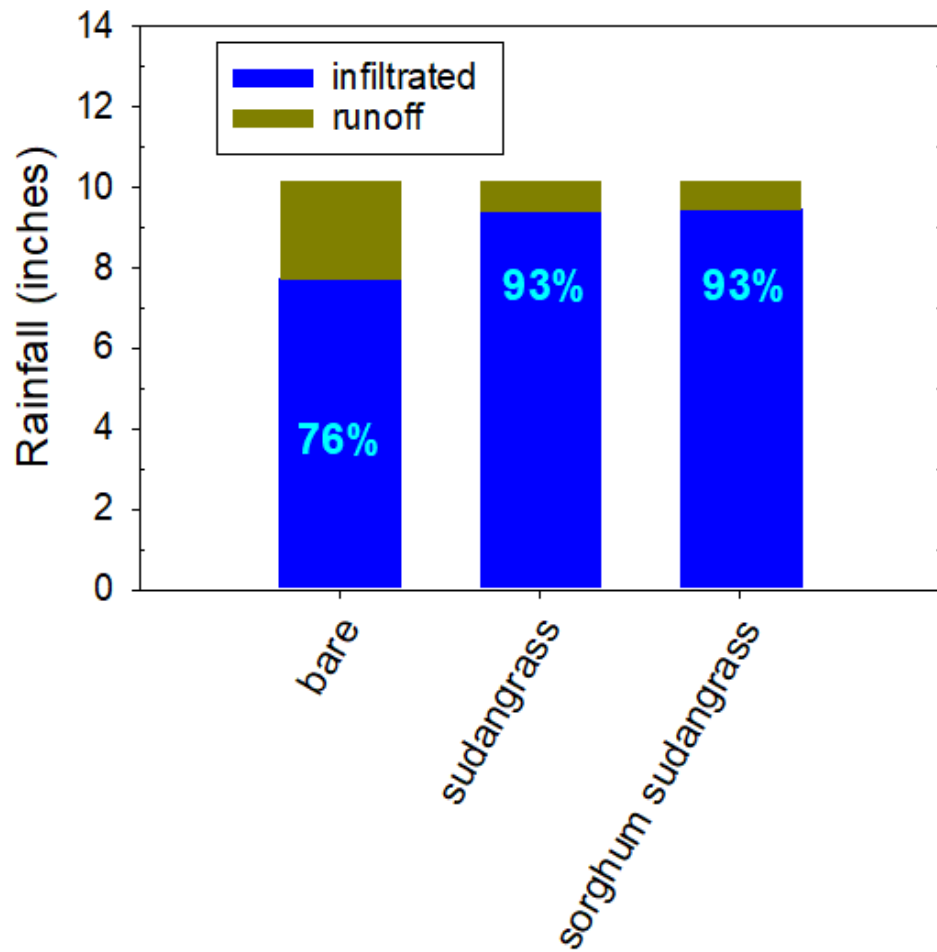


Cover crop treatments reduced runoff volume by 70%

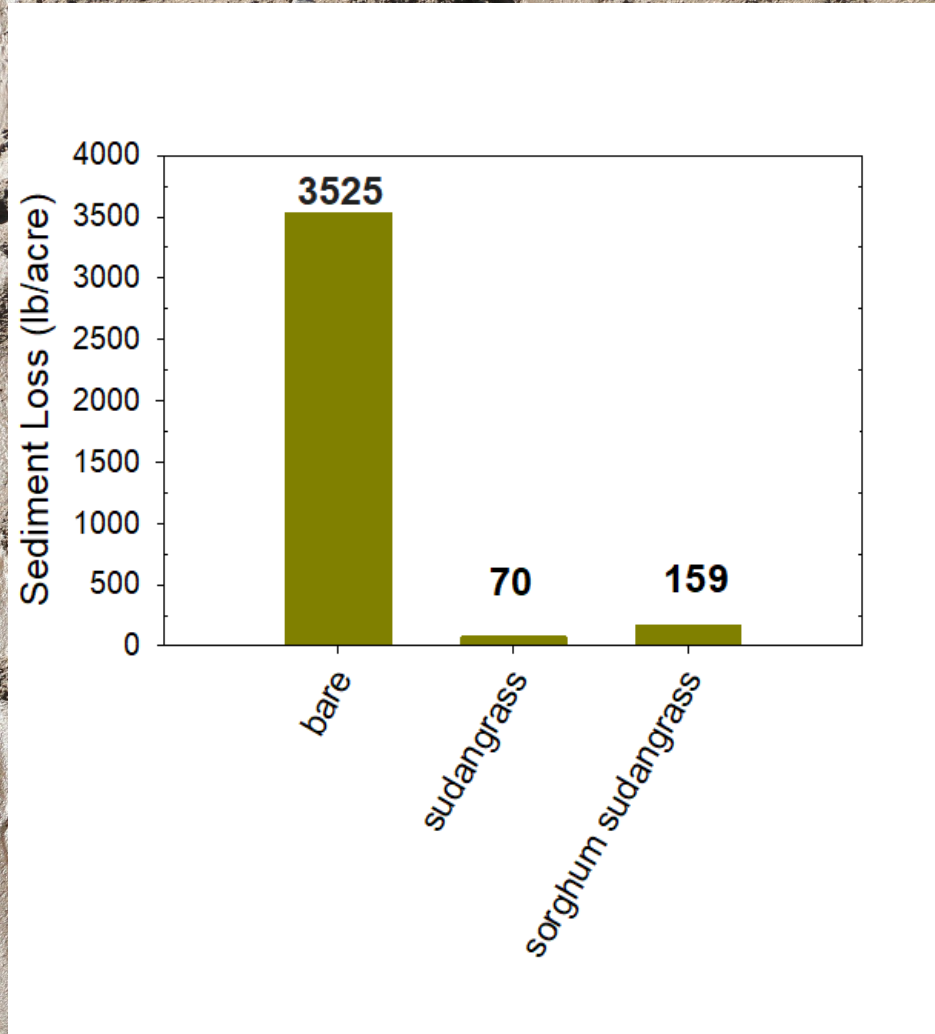
Jan 31 – Feb 8



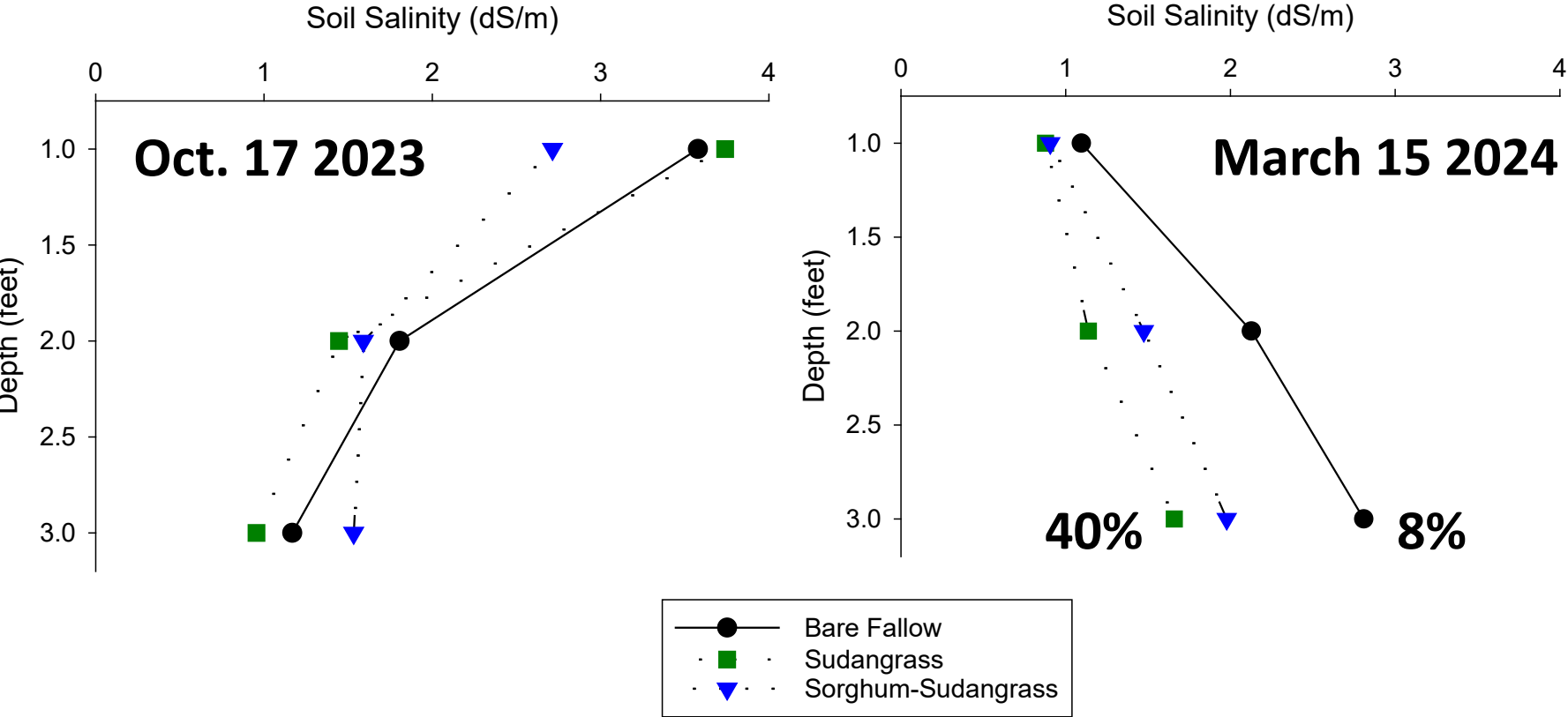
Oct 20 – Mar 11



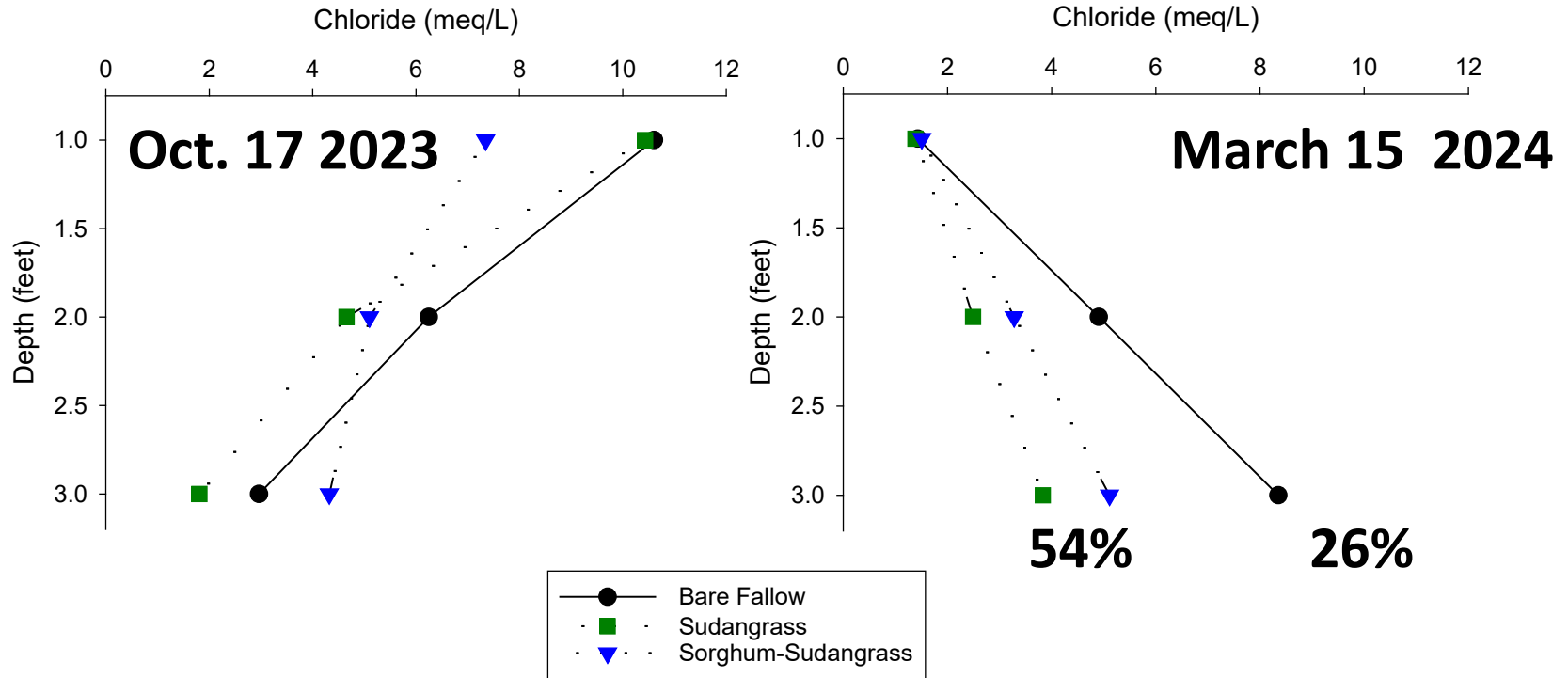
95% reduction in sediment loss



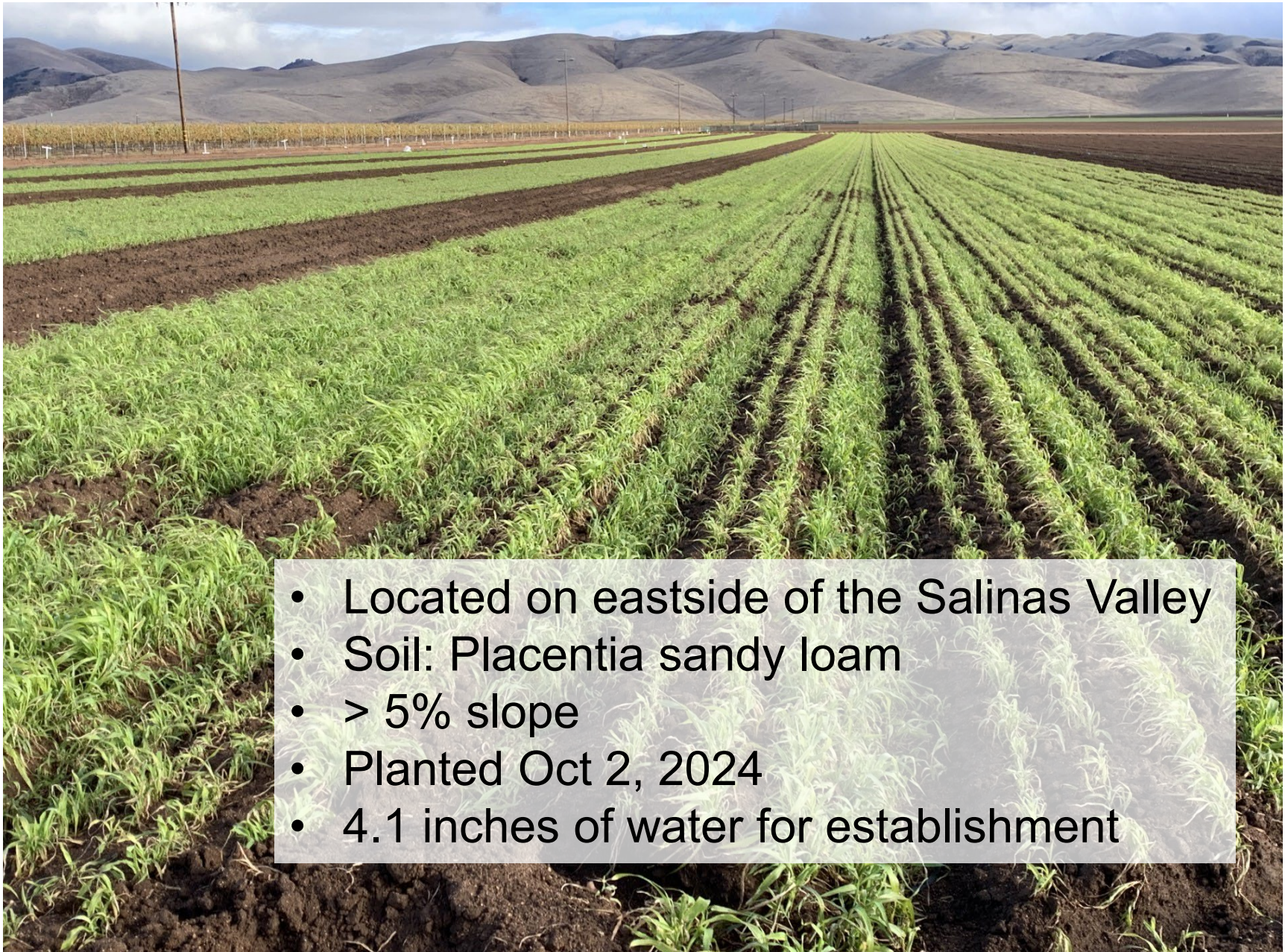
Greater reduction in soil salinity in cover crop plots compared to bare fallow



Greater reduction in chloride in cover crop plots compared to bare fallow

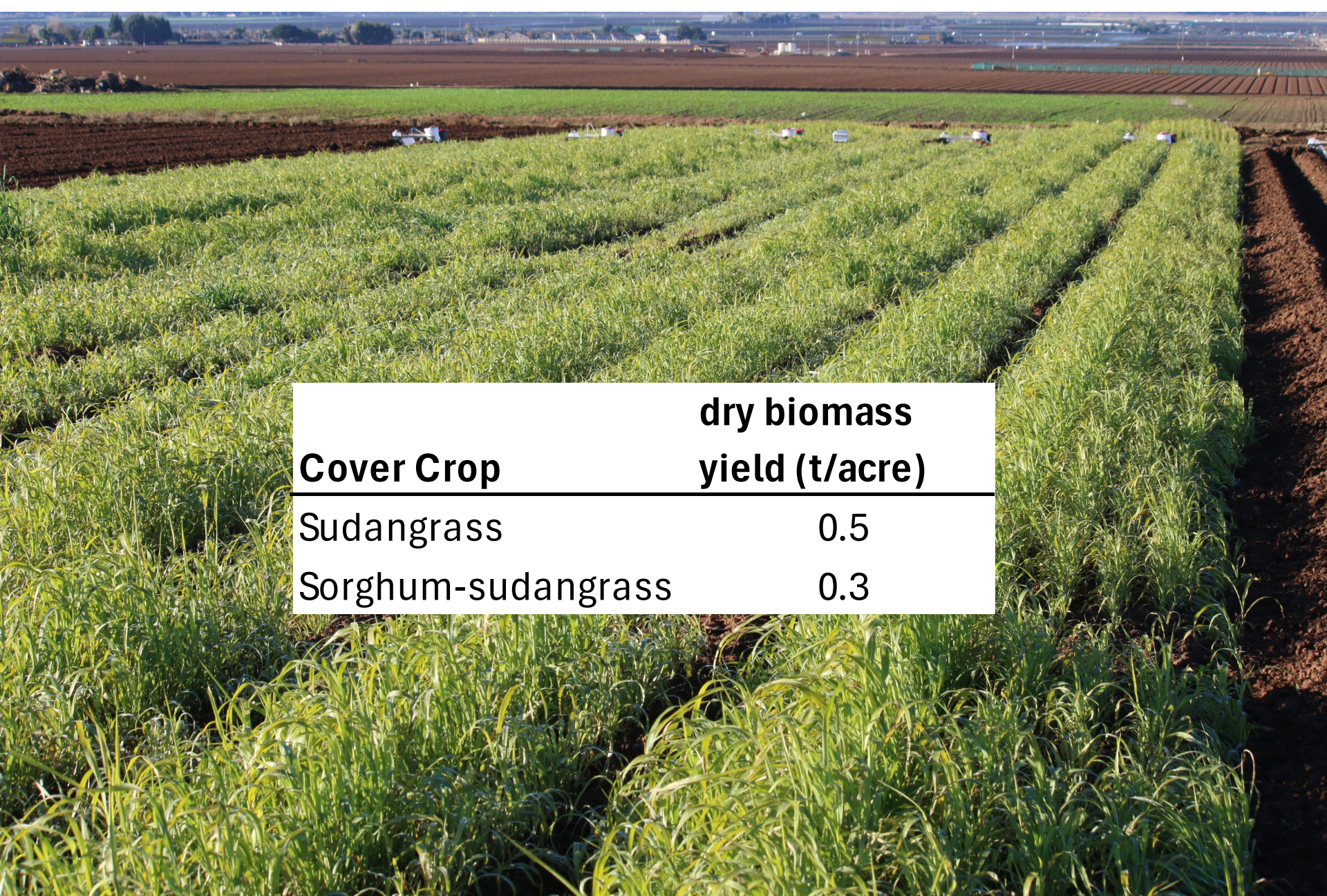


2024-2025 Sudangrass/Sorghum-Sudangrass Trial



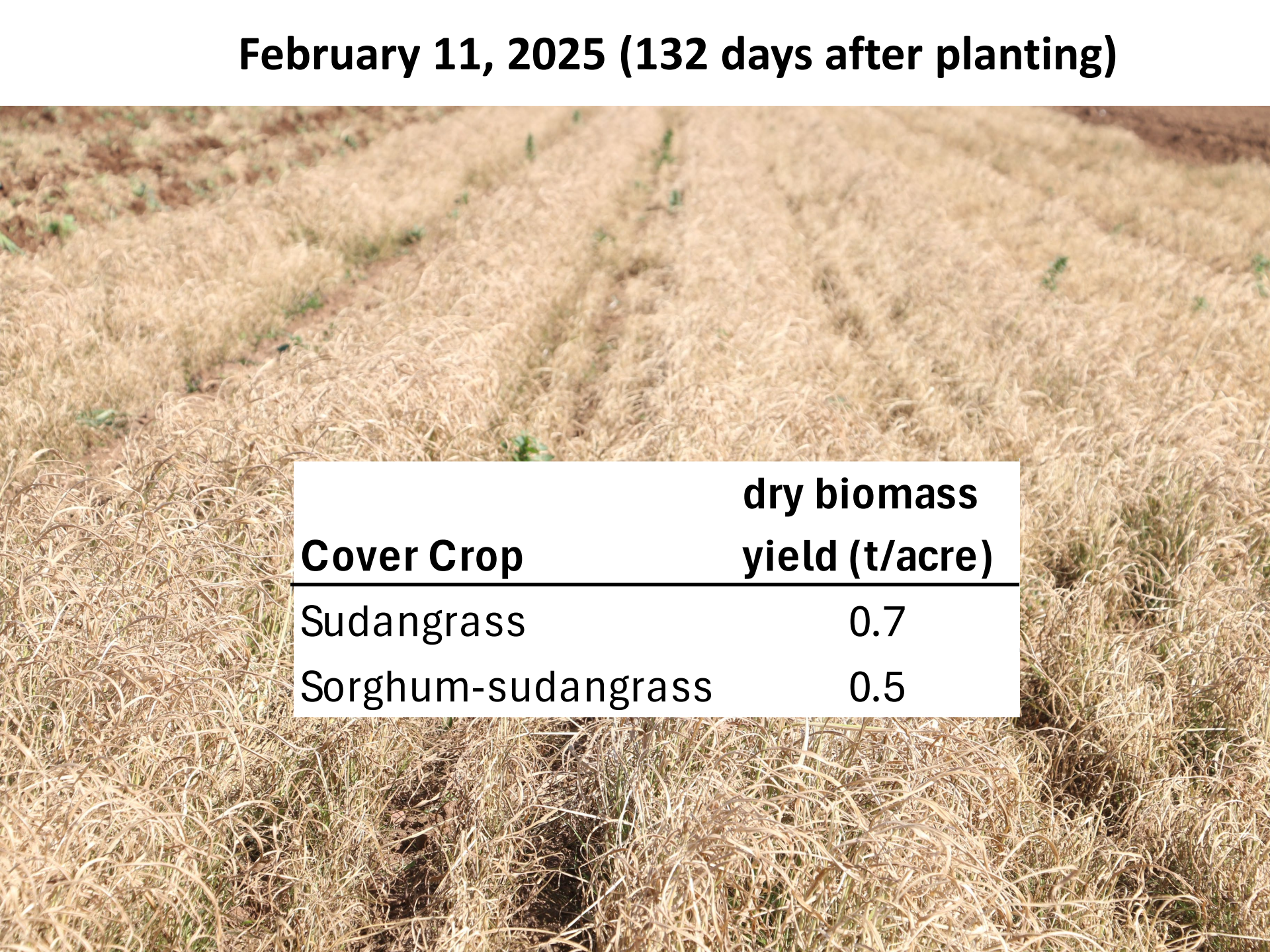
- Located on eastside of the Salinas Valley
- Soil: Placentia sandy loam
- > 5% slope
- Planted Oct 2, 2024
- 4.1 inches of water for establishment

January 7, 2025 (97 days after planting)



Cover Crop	dry biomass yield (t/acre)
Sudangrass	0.5
Sorghum-sudangrass	0.3

February 11, 2025 (132 days after planting)



Cover Crop	dry biomass yield (t/acre)
Sudangrass	0.7
Sorghum-sudangrass	0.5

Next steps: evaluating strategies for efficient soil incorporation



Lessons learned

- ✓ Most storm water runs off from vegetable fields during intense rain events such as atmospheric river weather systems
- ✓ Sudangrass and sorghum sudangrass cover crops significantly increased infiltration of rainfall and reduced runoff and soil erosion during intense storm events.
- ✓ Sudangrass and sorghum sudangrass winter cover crops can potentially scavenge significant amounts of residual nitrate in the soil thereby reducing potential leaching losses
- ✓ Cold weather slowed or stopped growth of sudangrass, and sorghum sudangrass planted in the early fall which limited residue to 0.5 to < 2 tons of dry matter/acre
- ✓ Planting before mid October allowed time for the crop to accumulate enough biomass for runoff and erosion benefits
- ✓ Planting ½ inch deep using a grain drill set up for peaked beds optimizes crop establishment
- ✓ Weed control can be a challenge after establishment

A wide-angle photograph of a lush green agricultural field, likely corn, with rows of plants stretching into the distance. A small blue flag is visible in the lower right foreground. The background features rolling hills under a clear sky, with utility poles and a fence line visible in the mid-ground.

Thank you!

Gracias!

Questions?

¿Preguntas?