Low Biomass Cover Crop Strategies for Protecting Water Quality and Recharging Groundwater in Vegetable Systems

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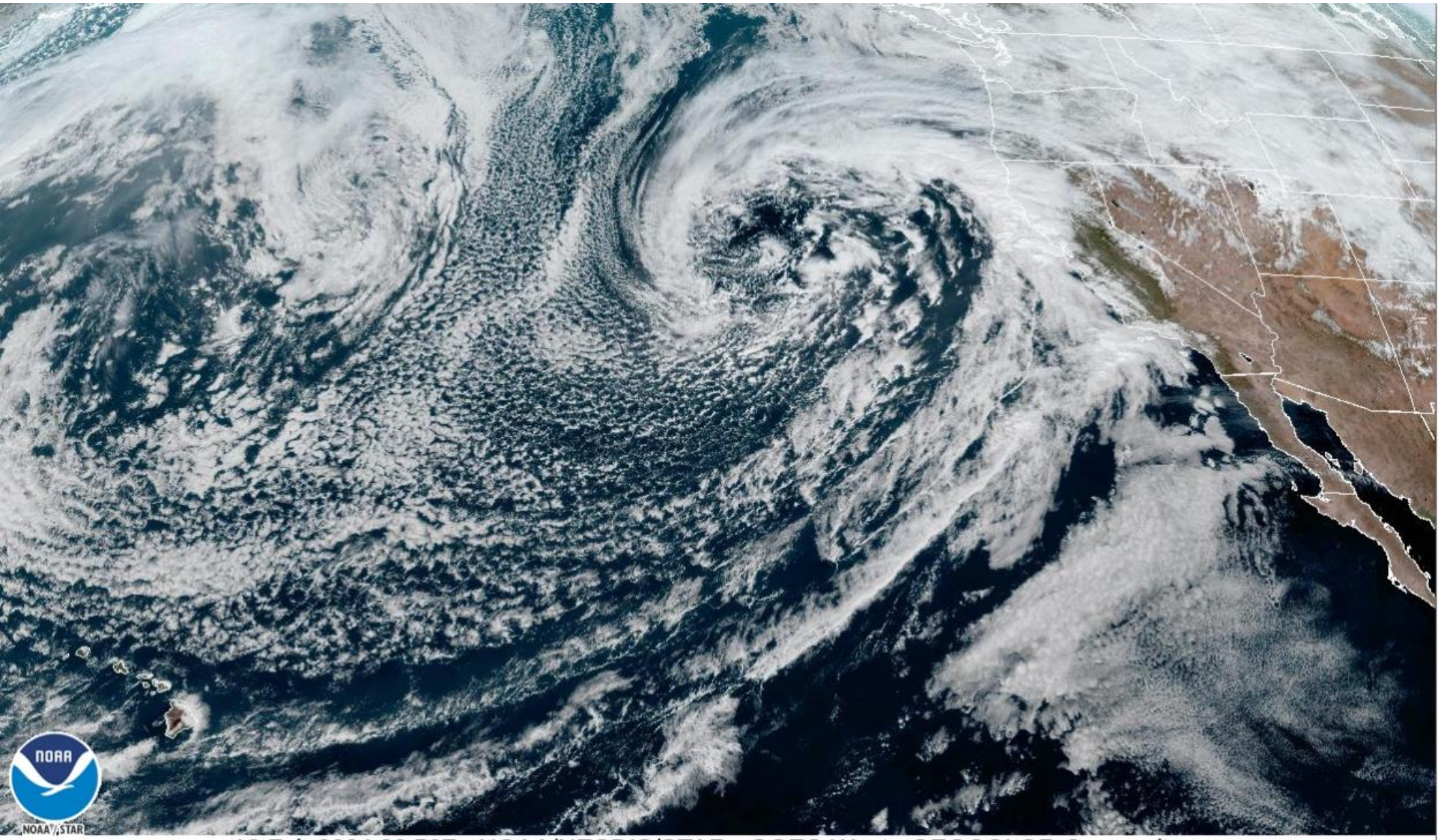
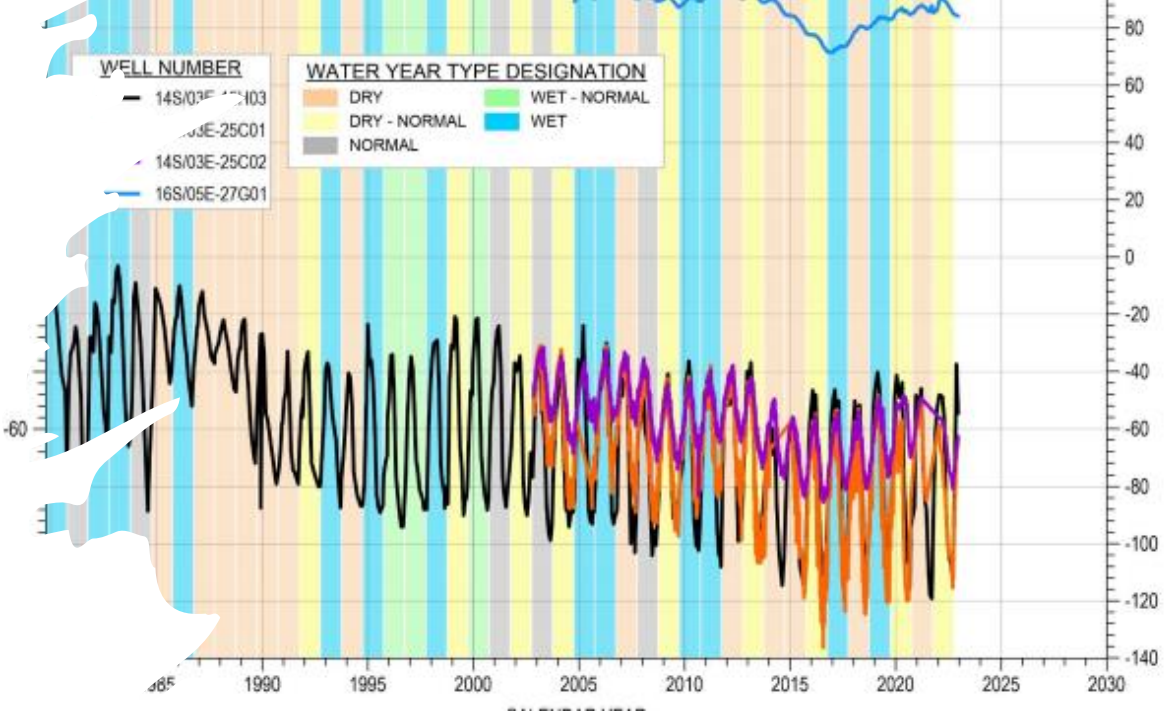
Atmospheric rivers can cause intense rainfall events that result in runoff

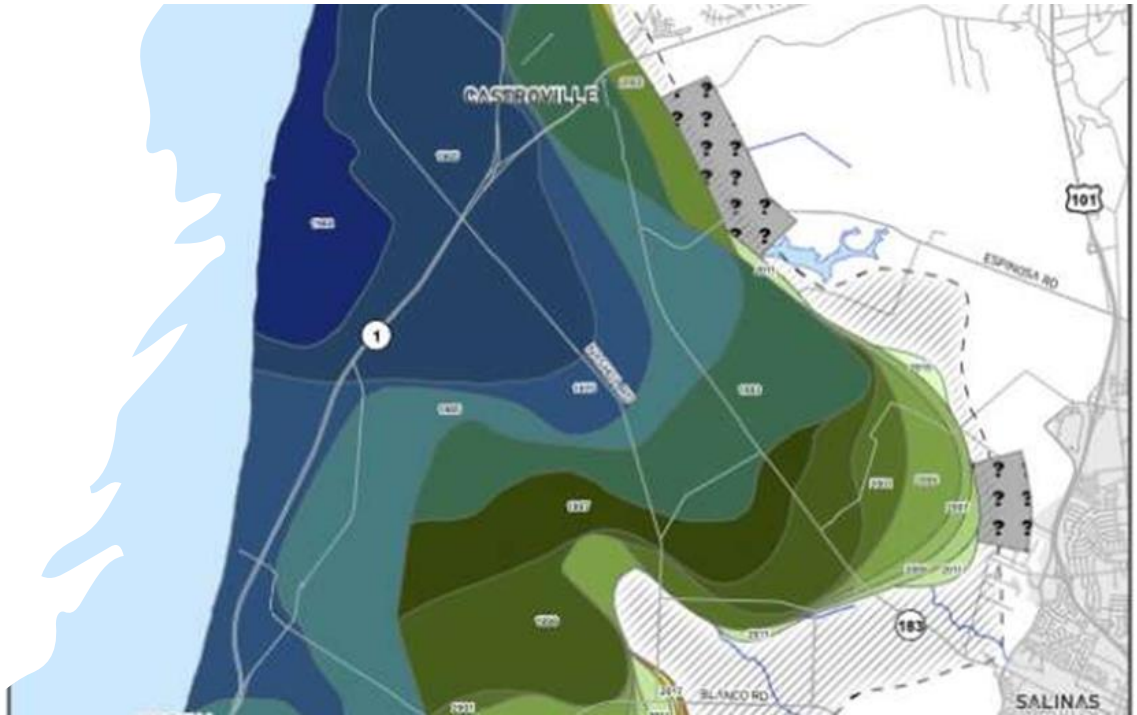


Which causes flooding

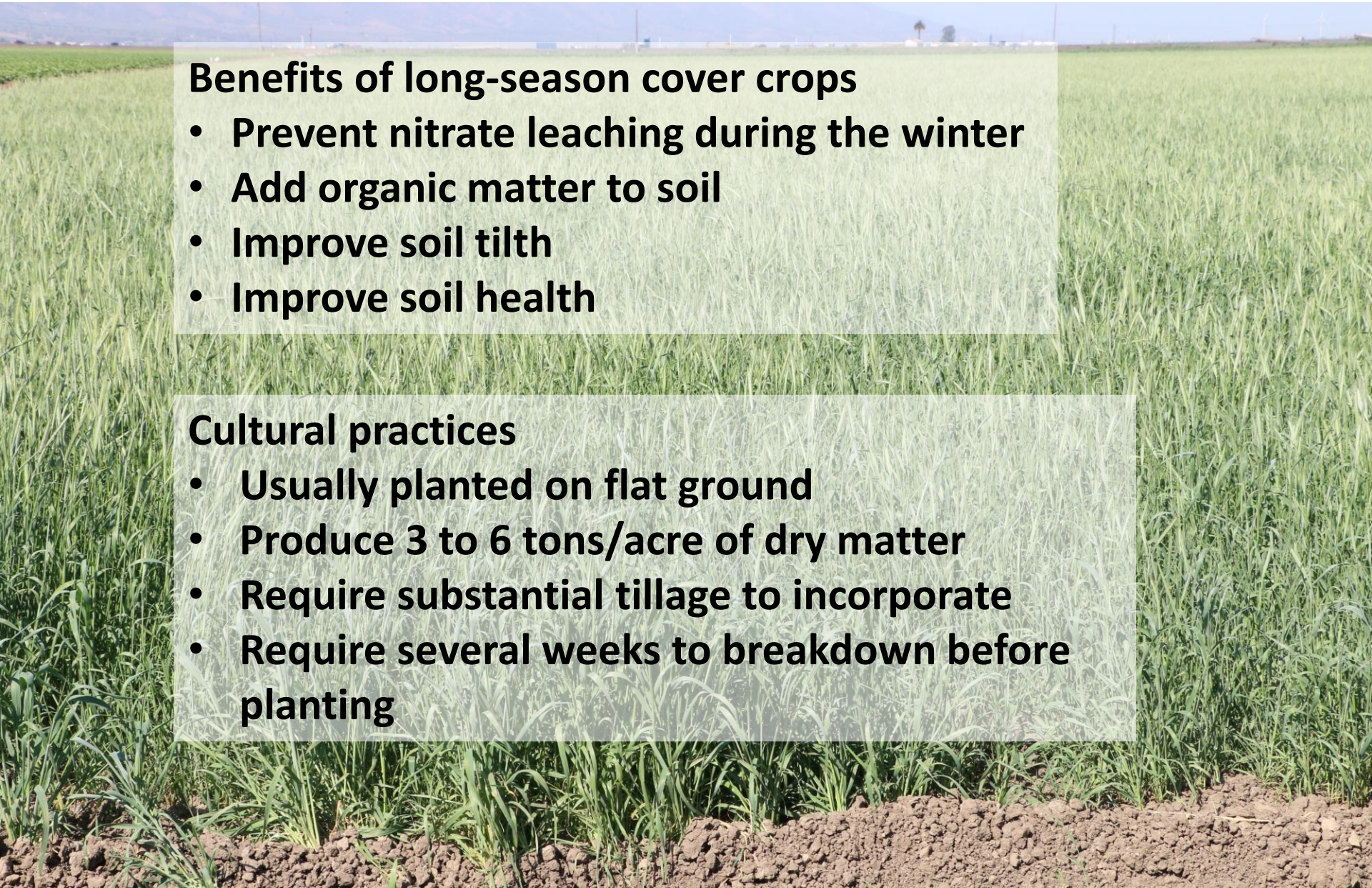
and soil erosion and water quality impacts

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 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**

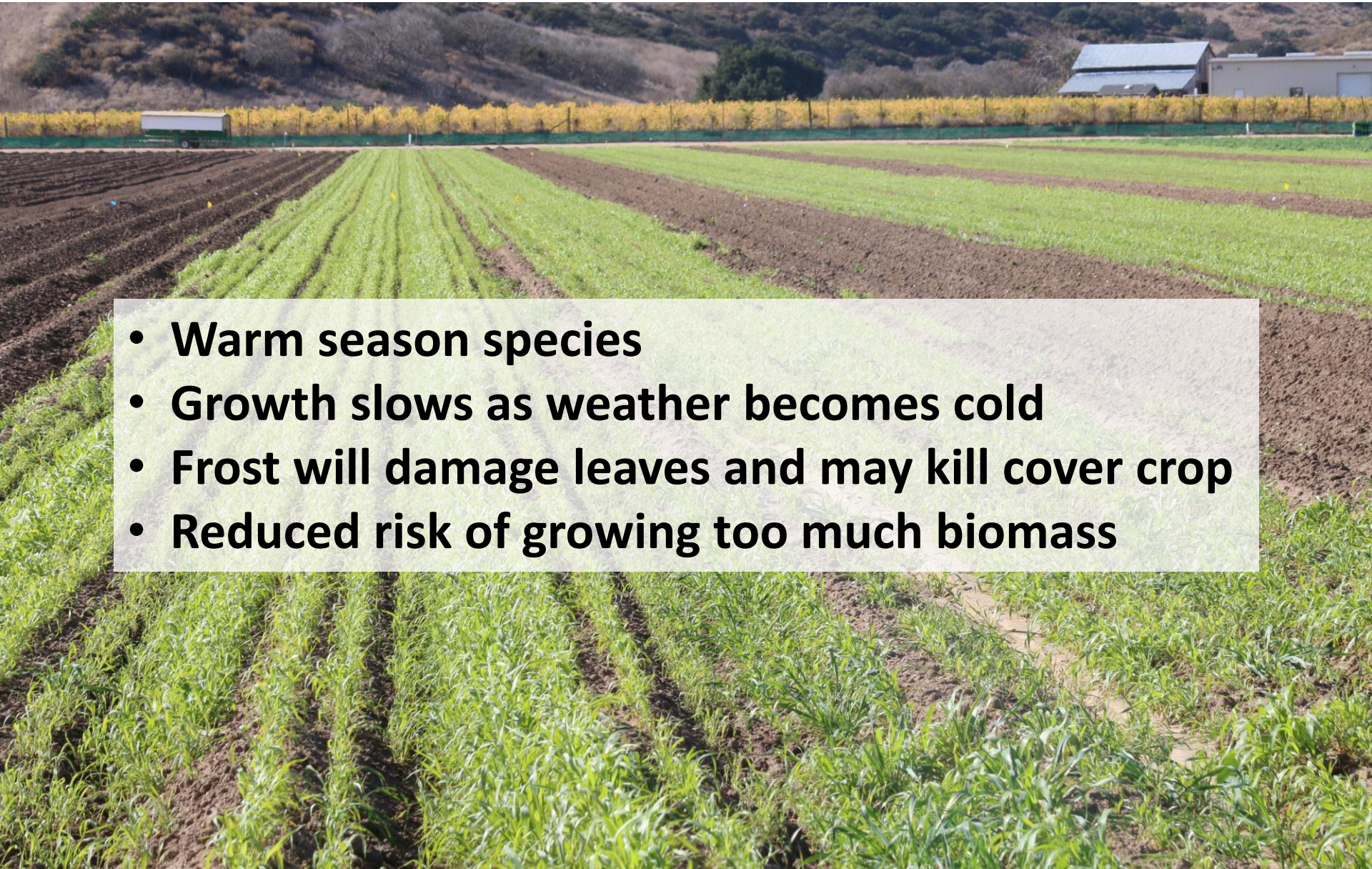
Low-Residue Cover Crops for Controlling Runoff

Triticale planted in Furrows

Merced Rye planted in Furrows and Beds

Herbicide Application 60 Days after Planting

Using Sudangrass and Sorghum sudangrass as winter low biomass cover crops

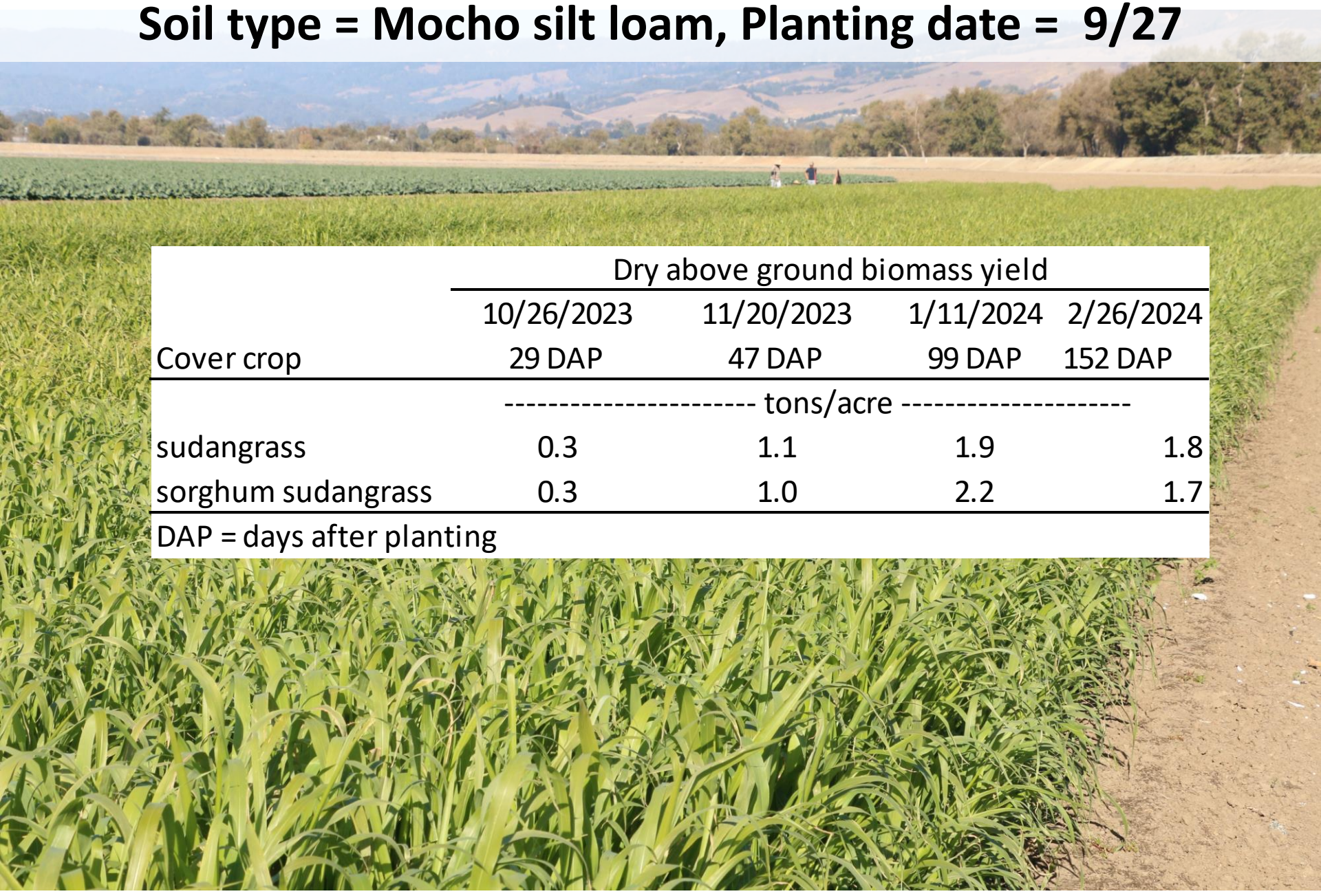


- Warm season species
- Growth slows as weather becomes cold
- Frost will damage leaves and may kill cover crop
- Reduced risk of growing too much biomass

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

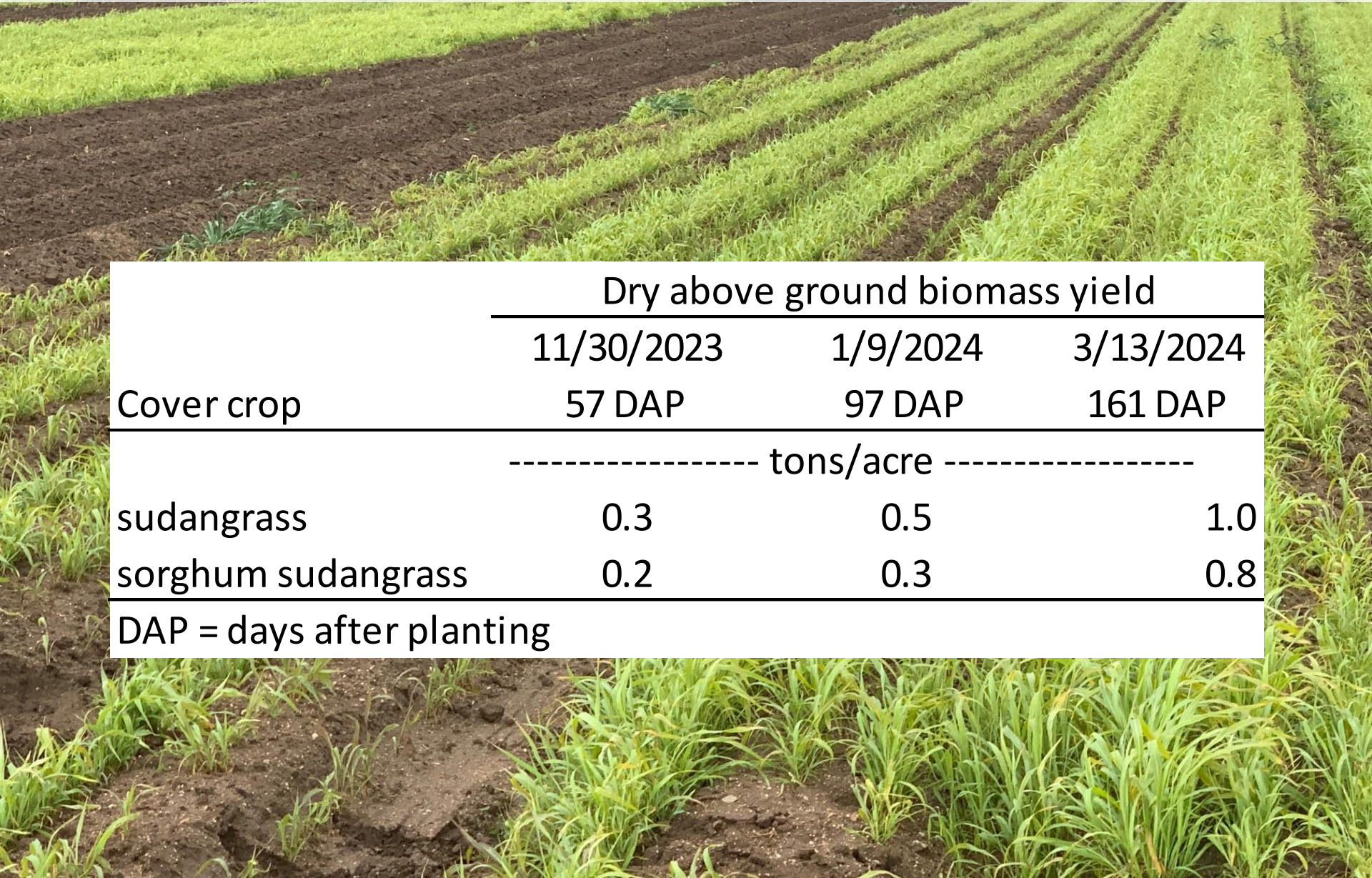


	Dry above ground biomass yield			
	10/26/2023	11/20/2023	1/11/2024	2/26/2024
Cover crop	29 DAP	47 DAP	99 DAP	152 DAP
	---------- tons/acre ----------			
sudangrass	0.3	1.1	1.9	1.8
sorghum sudangrass	0.3	1.0	2.2	1.7

DAP = days after planting

Trial 2 Arroyo Seco

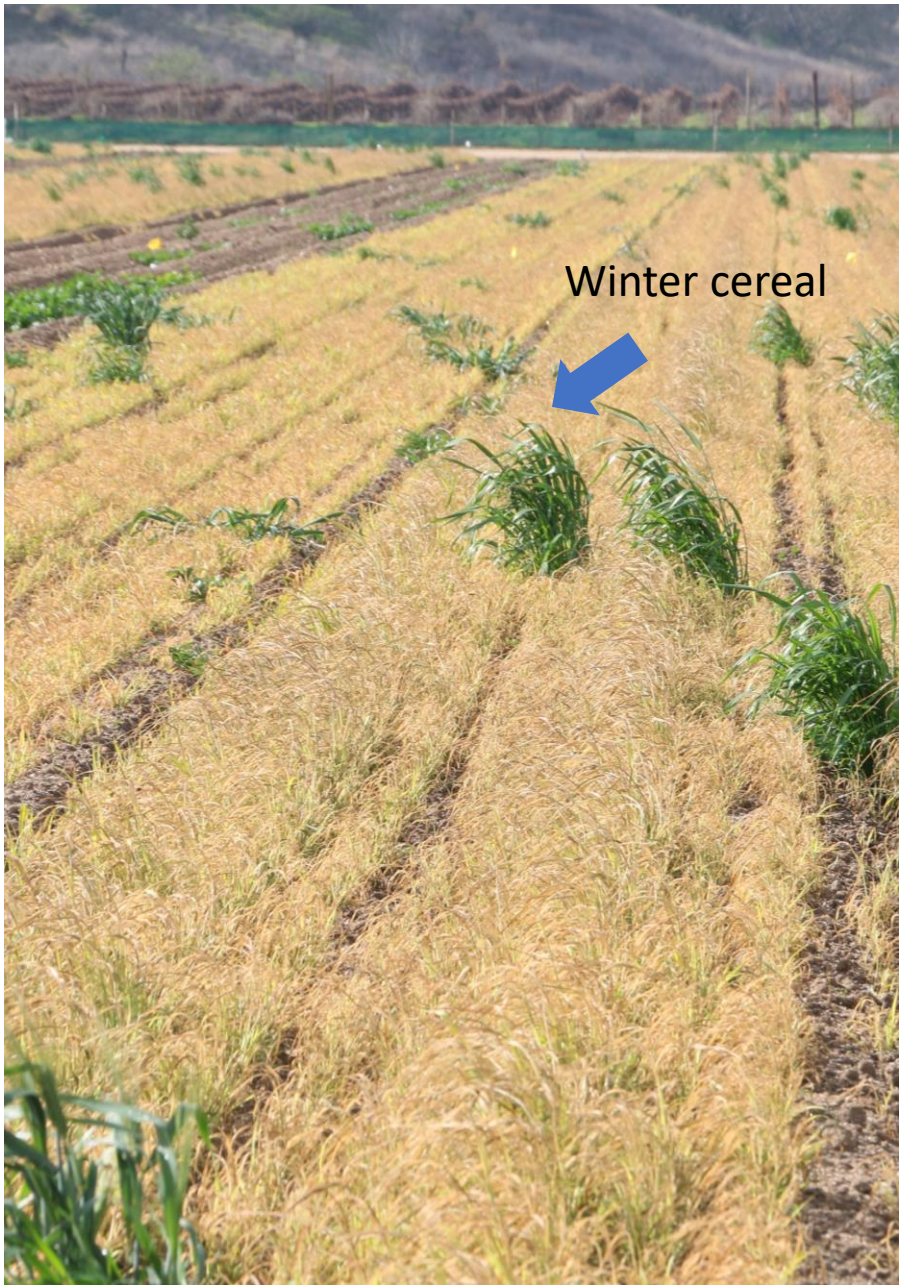
Soil type: Arroyo seco gravelly loam, Planting date = 10/4

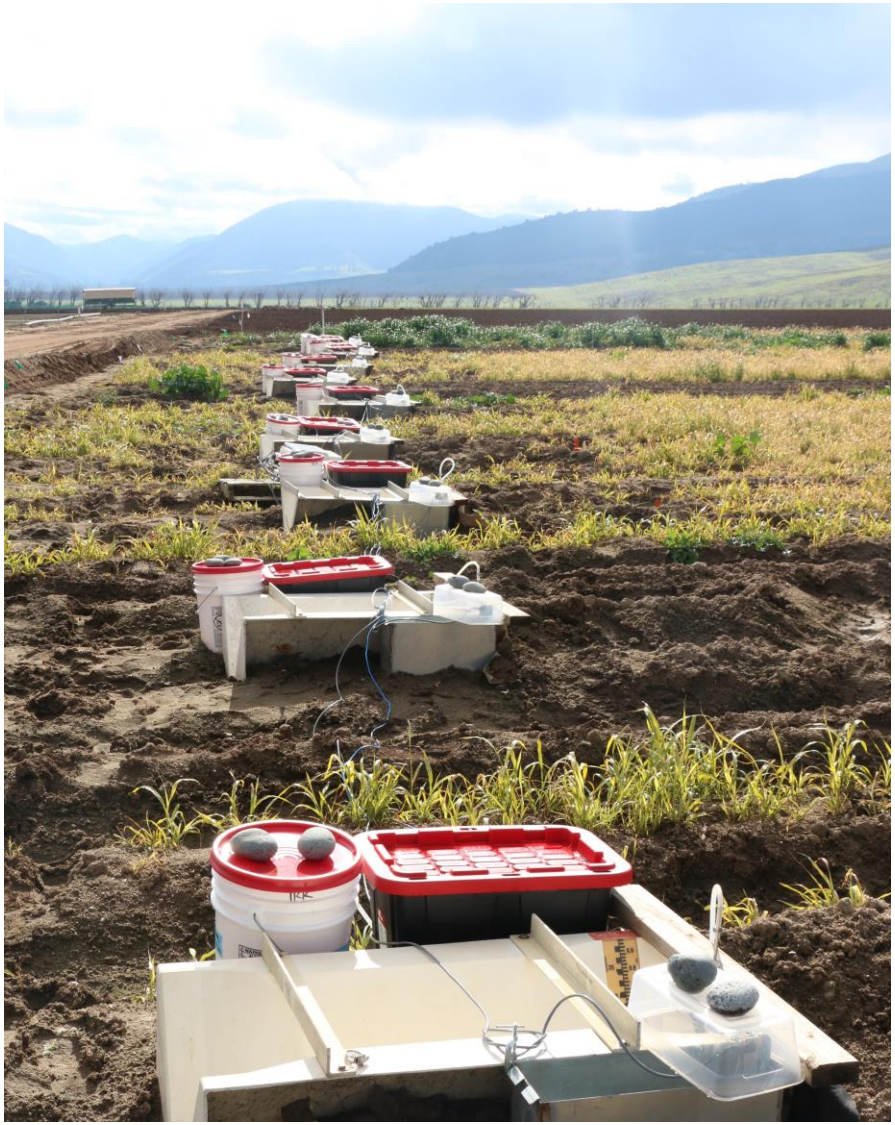


	Dry above ground biomass yield		
	11/30/2023	1/9/2024	3/13/2024
Cover crop	57 DAP	97 DAP	161 DAP
	---------- tons/acre ----------		
sudangrass	0.3	0.5	1.0
sorghum sudangrass	0.2	0.3	0.8

DAP = days after planting

Cold weather and frost limited growth of Sudangrass

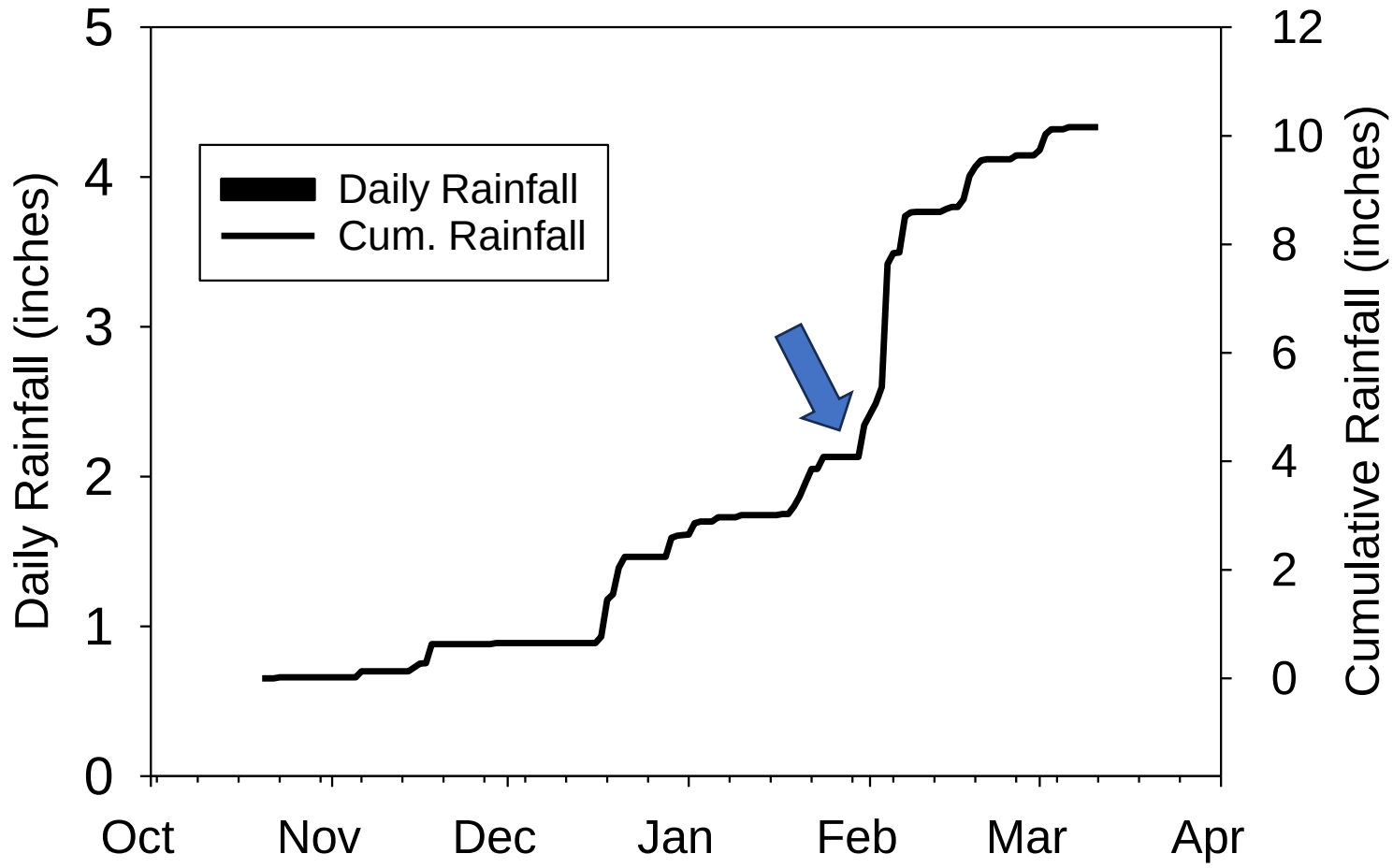




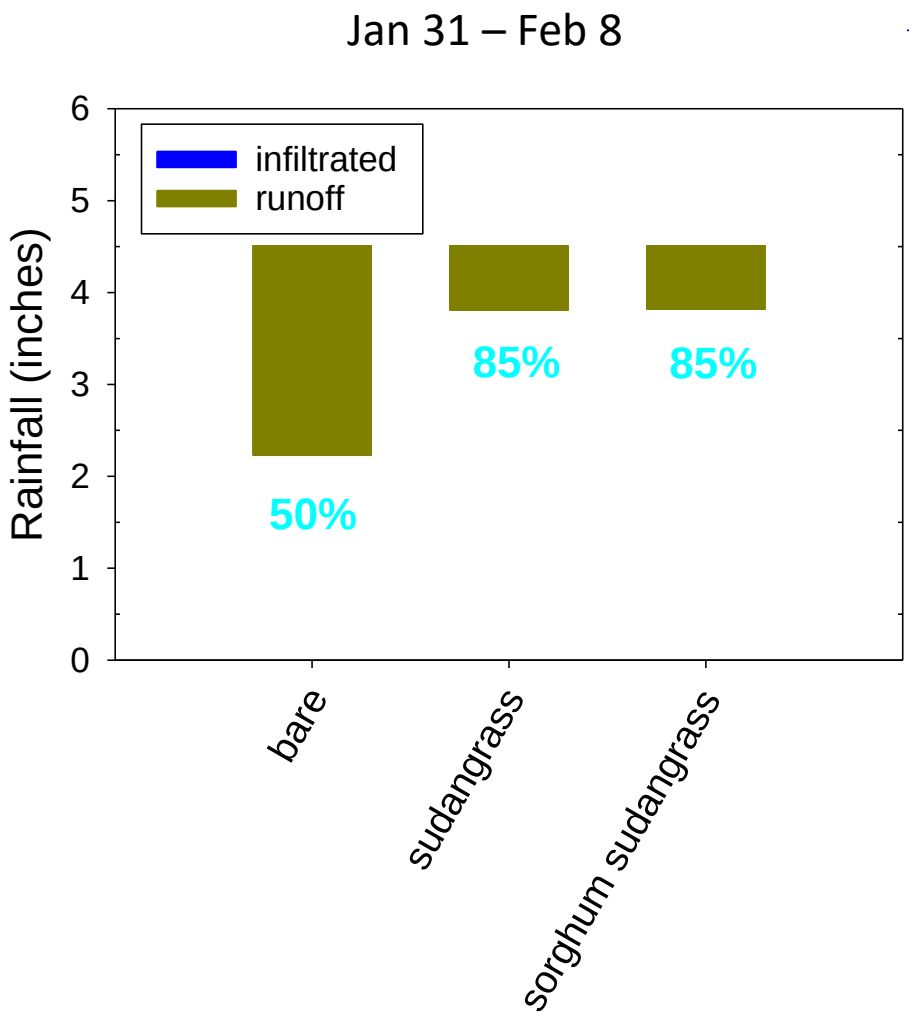
Storm runoff monitoring

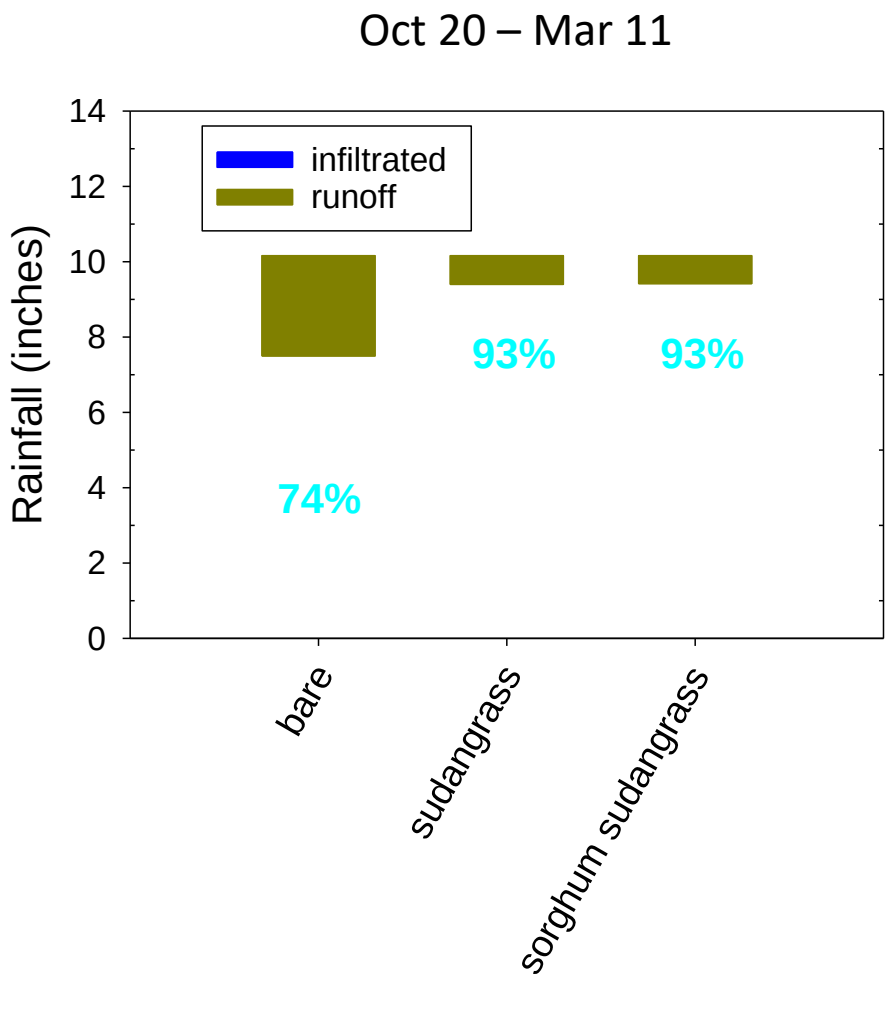
- Flumes at the lower end of the plots were used to monitor the volume of runoff
- pumps were automatically activated to sample runoff at 5-minute intervals during flow events

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

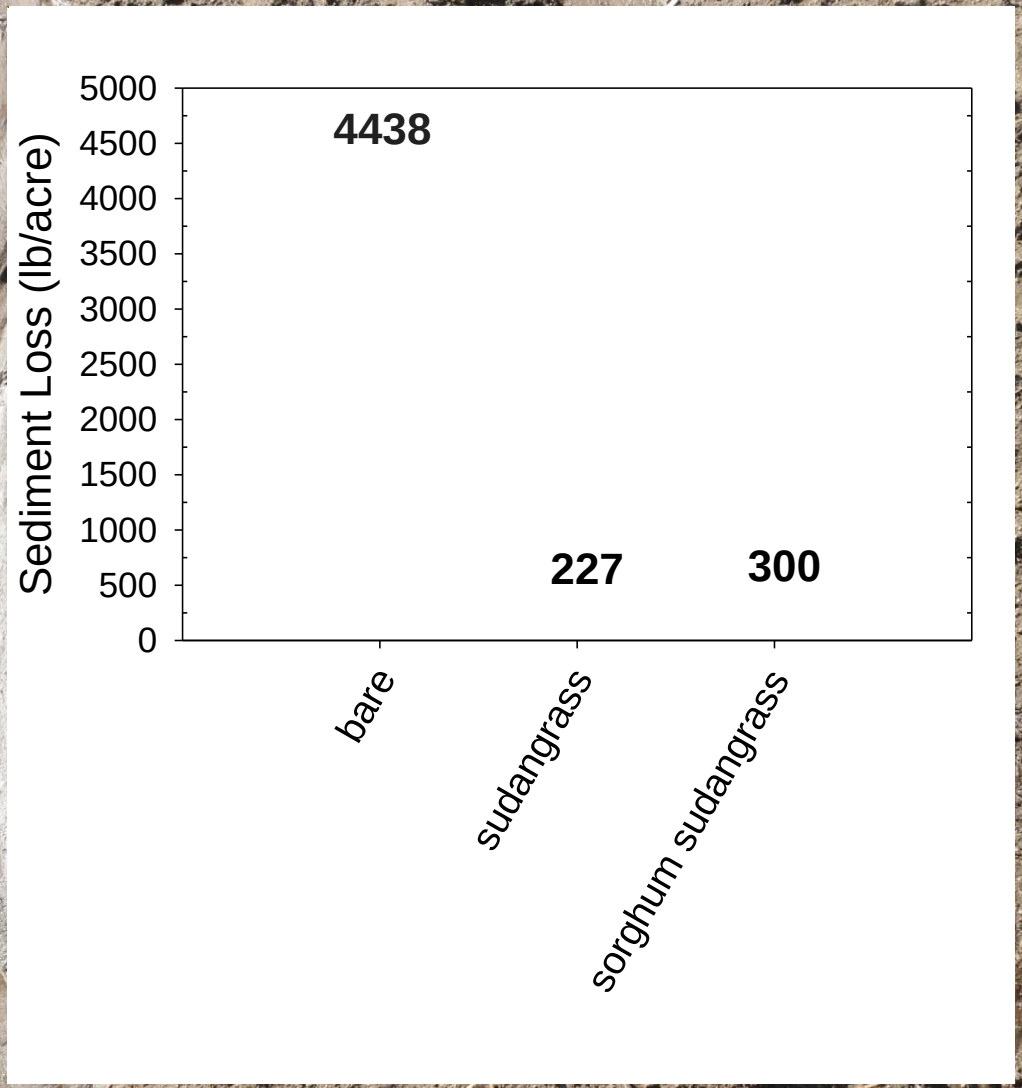


Preliminary data show a 72% reduction in runoff volume





Preliminary data show a 94% reduction in sediment loss



Currently evaluating tillage implements for soil incorporation of sudangrass

Lessons learned

- ✓ Most field runoff occurred during intense rain events such as atmospheric river storms
- ✓ Sudangrass and sorghum sudangrass cover crops significantly increased infiltration of rainfall and reduced runoff and soil erosion during intense storm events.
- ✓ 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 dry matter/acre
- ✓ Planting before mid October allowed enough time to accumulate sufficient biomass for runoff and erosion benefits
- ✓ Planting ½ inch deep using a grain drill set up for peaked beds would likely optimize crop establishment

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