

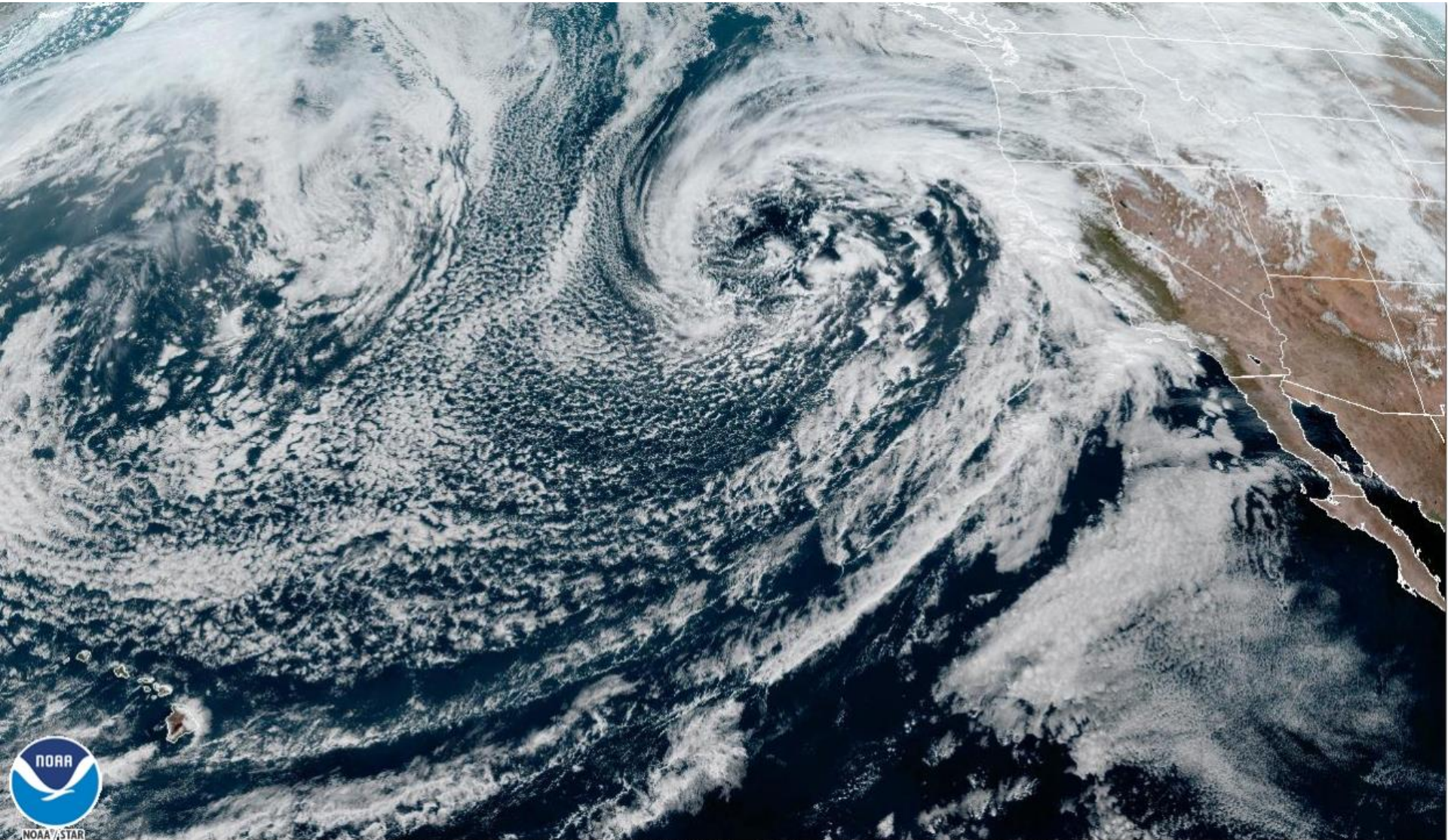
Low Biomass Cover Crop Strategies for Protecting Water Quality in Vegetable Systems



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Atmospheric rivers can cause intense rainfall events that that result in runoff



18 Feb 2024 20:56Z - NOAA/NESDIS/STAR - GOES-West - GEOCOLOR Composite

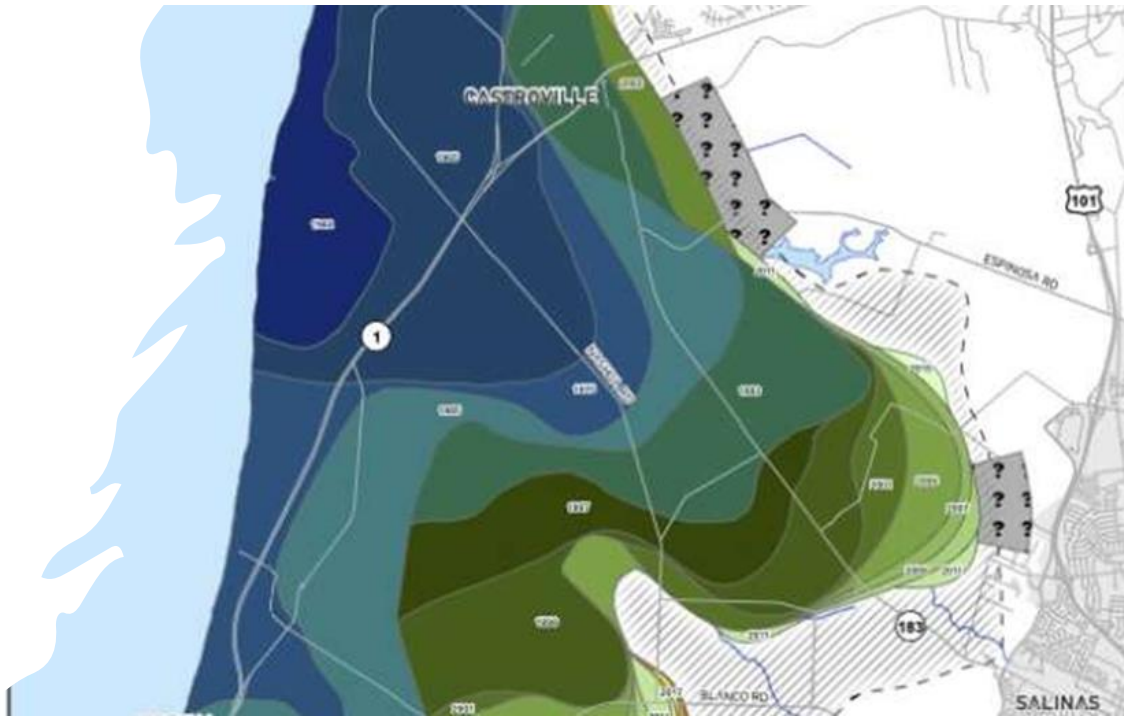
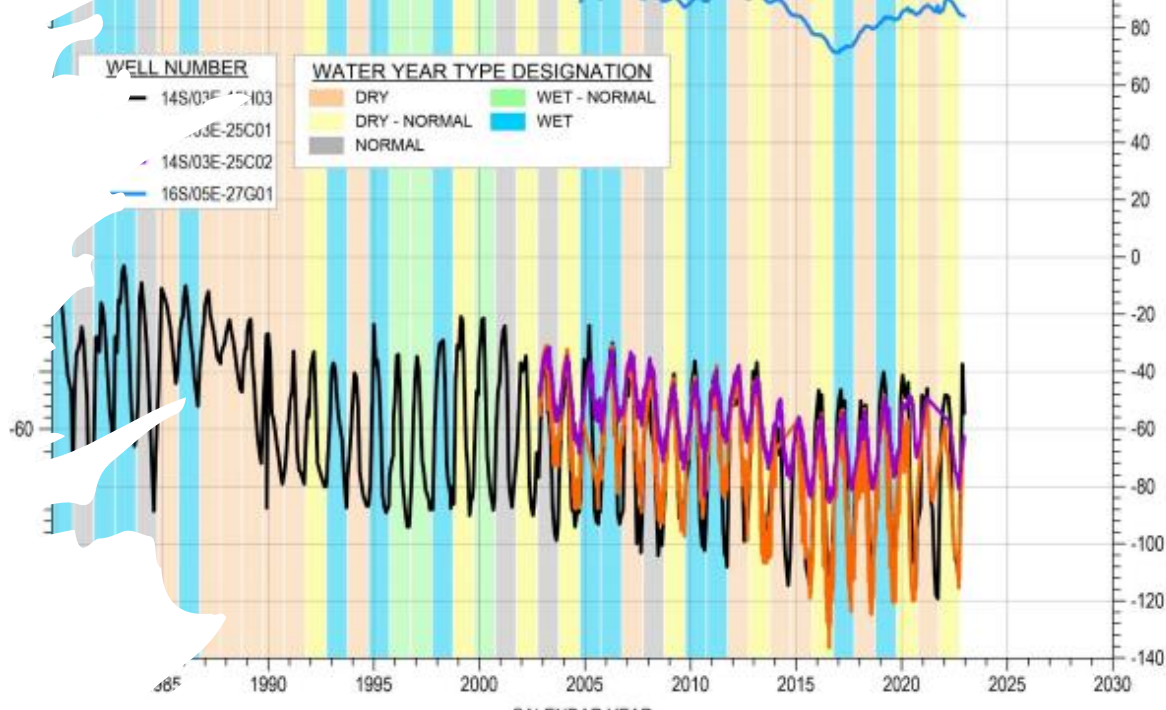
Which cause flooding



and soil erosion and water quality impacts



Challenges in Sustainable Management of 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

- Scavenge residual soil nitrate at the end of the season
- Add organic matter to soil
- Improve soil tilth
- Improve soil health

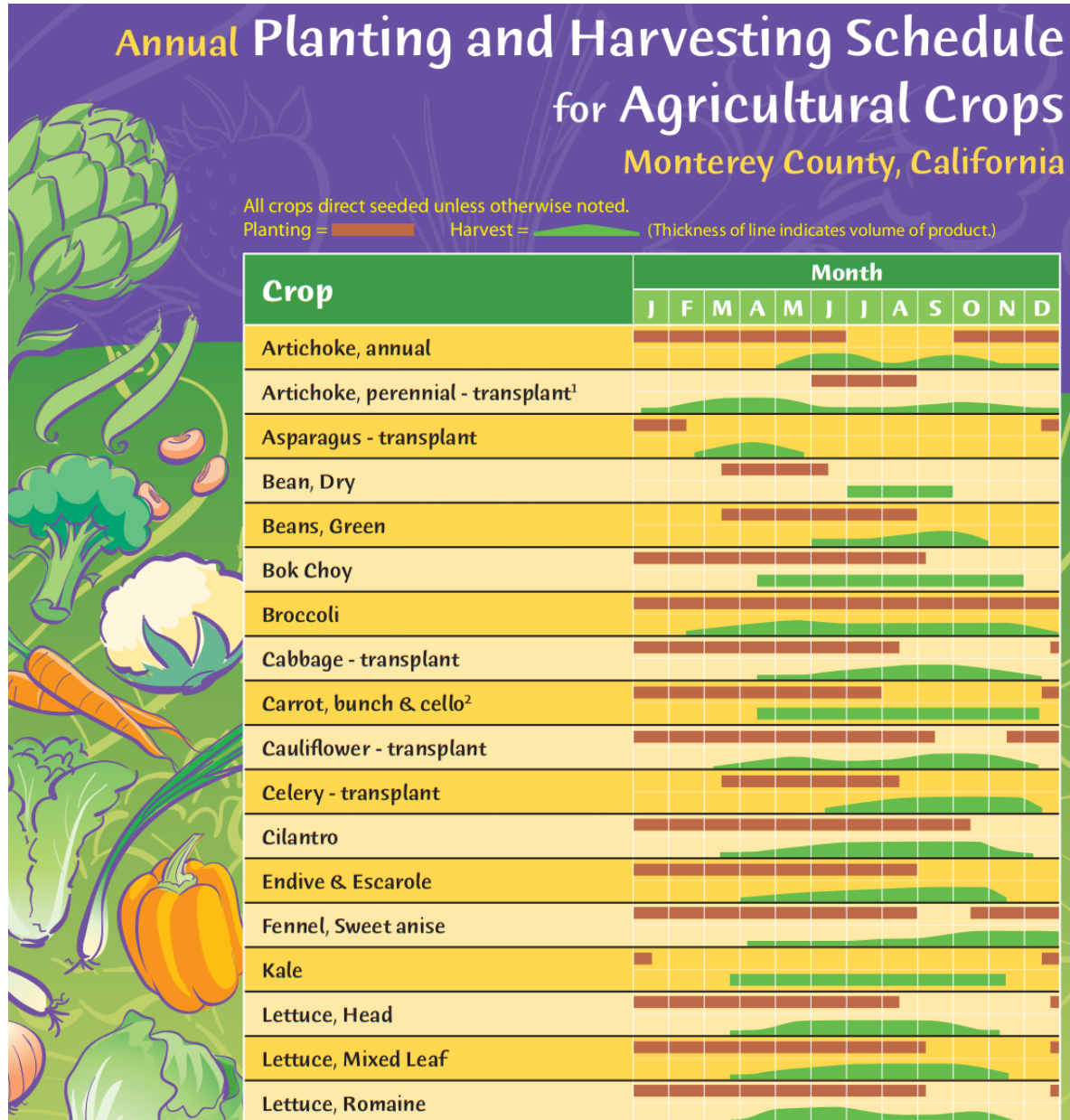
Cultural practices

- 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**



Vegetable planting begins early in the year



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

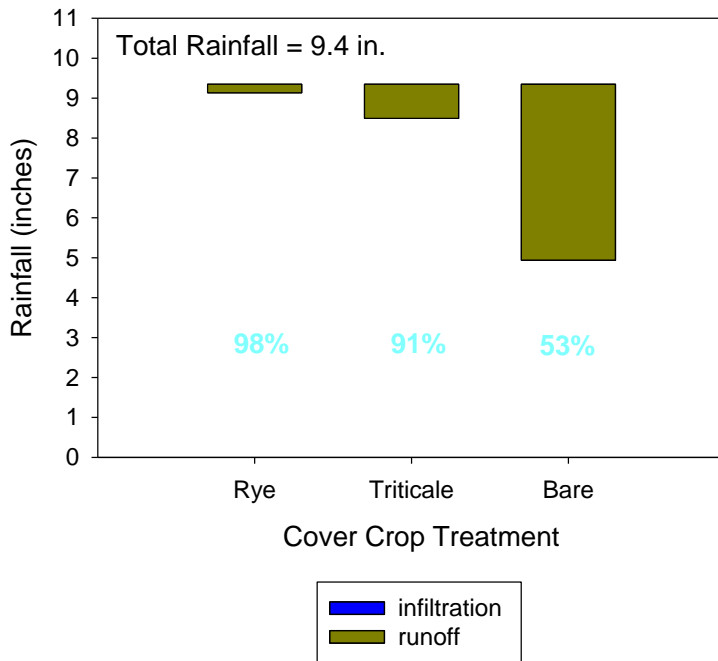


Equipment for monitoring runoff and rainfall

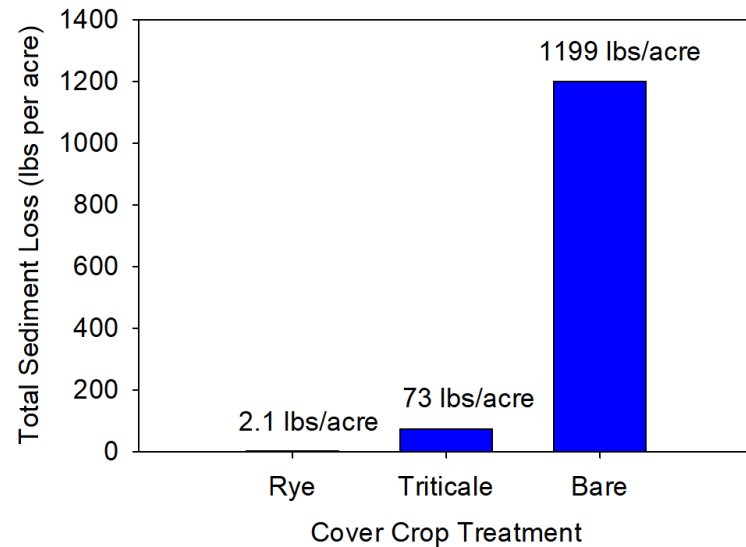


Low residue cover crops reduced runoff and soil erosion

Storm Water Recharge and Runoff



Soil Erosion

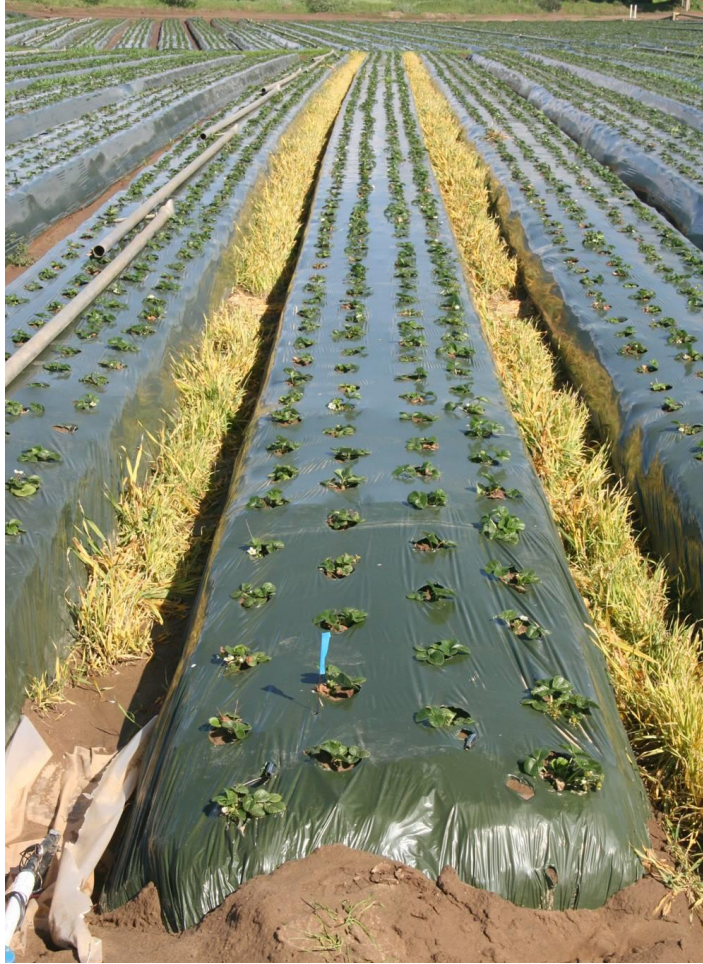


Low biomass cover crops reduced nutrient losses and potential water quality impacts

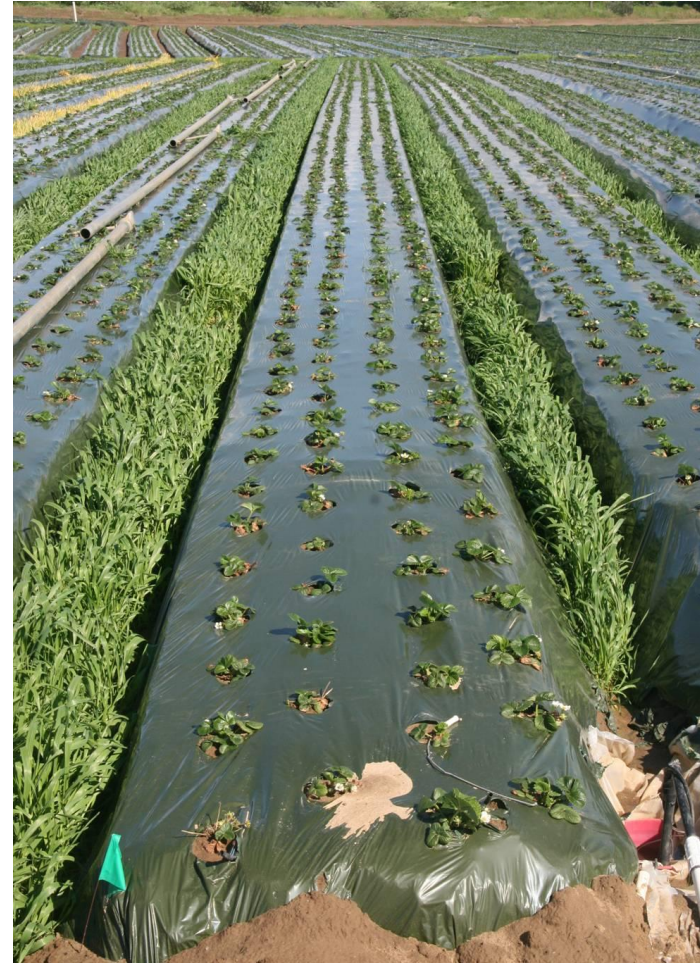
Treatment	Total N	Ammonium-N	Nitrate-N	Soluble-P	Total P	K
	----- lbs/acre -----					
Rye	0.23	0.05	0.04	0.19	0.22	0.89
Triticale	0.67	0.06	0.04	0.26	0.53	1.45
Control	5.35	0.13	0.55	1.19	4.16	4.62
	----- % reduction in loss compared to control -----					
Rye	96	59	92	84	95	81
Triticale	87	58	93	78	87	69

Winter Furrow Cover Crops in Strawberry

Barley + Poast Herbicide

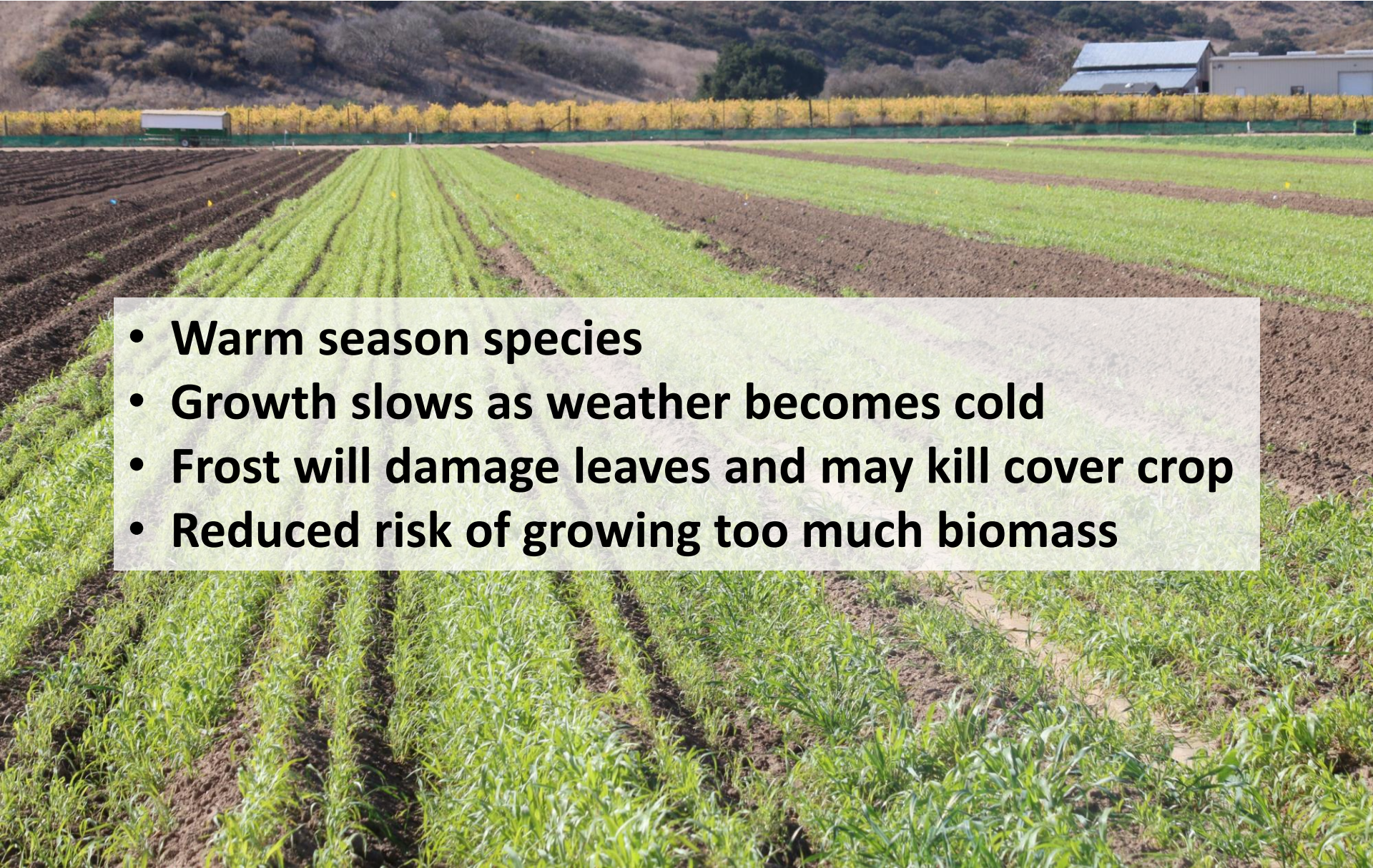


Trios (Triticale)



- **80% Reduction in Sediments**
- **40% to 60% reduction in Total P and Total N**

Using Sudangrass and Sorghum sudangrass as winter low biomass cover crops

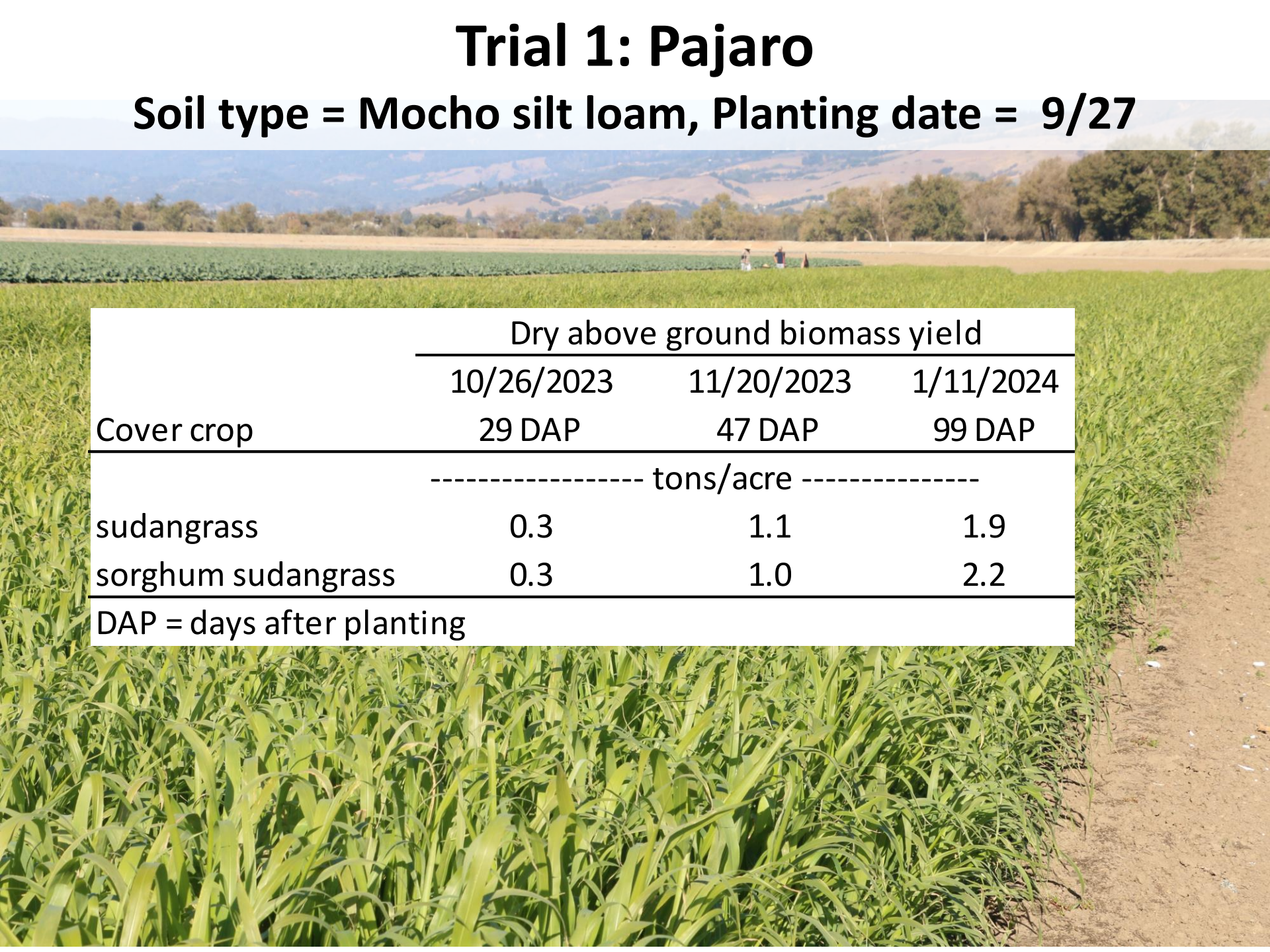
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- Warm season species
 - Growth slows as weather becomes cold
 - Frost will damage leaves and may kill cover crop
 - Reduced risk of growing too much biomass

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



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

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
Cover crop	57 DAP	97 DAP
	----- tons/acre -----	
sudangrass	0.3	0.5
sorghum sudangrass	0.2	0.3

DAP = days after planting

Cold weather and frost limited growth of Sudangrass

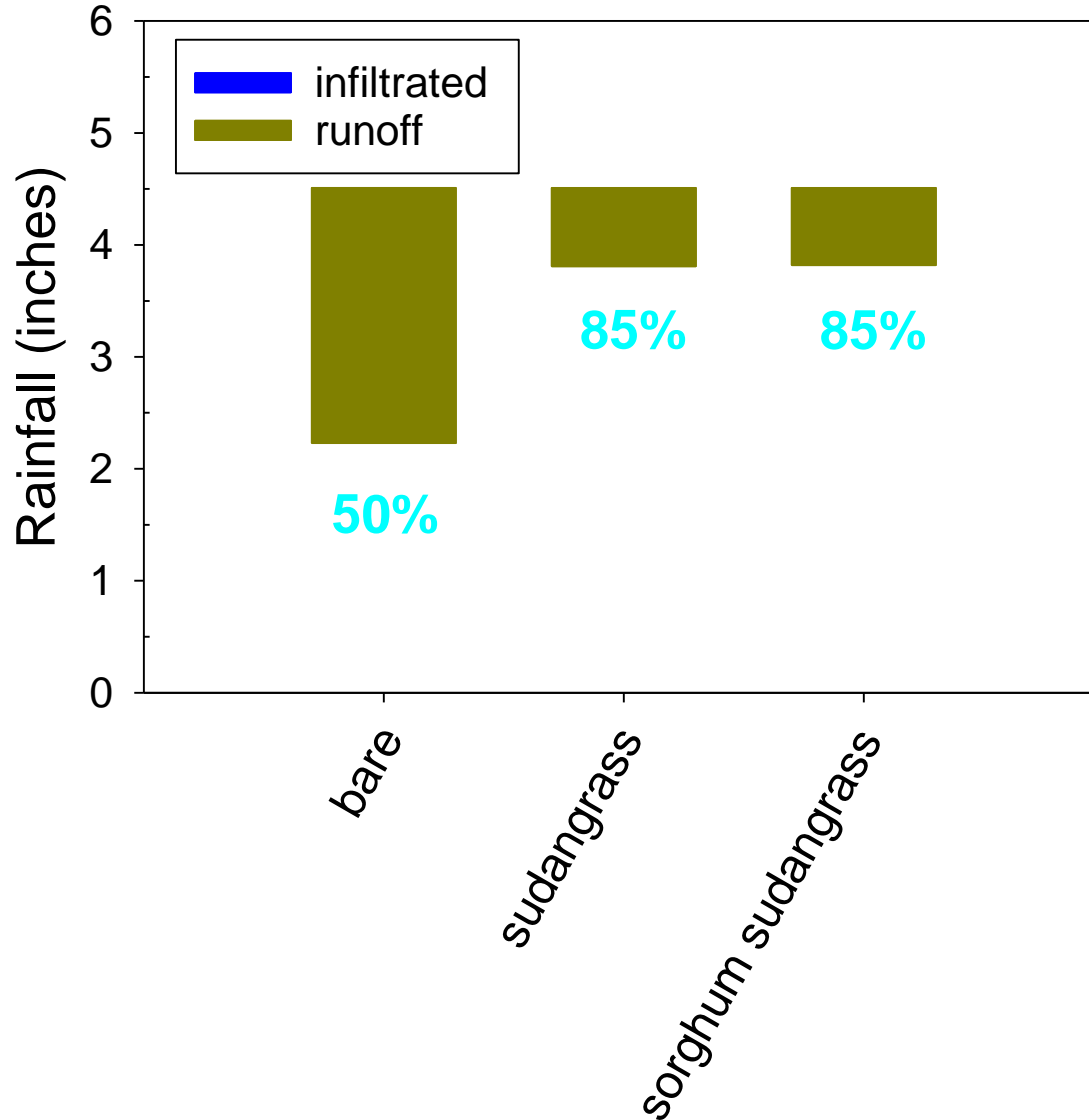




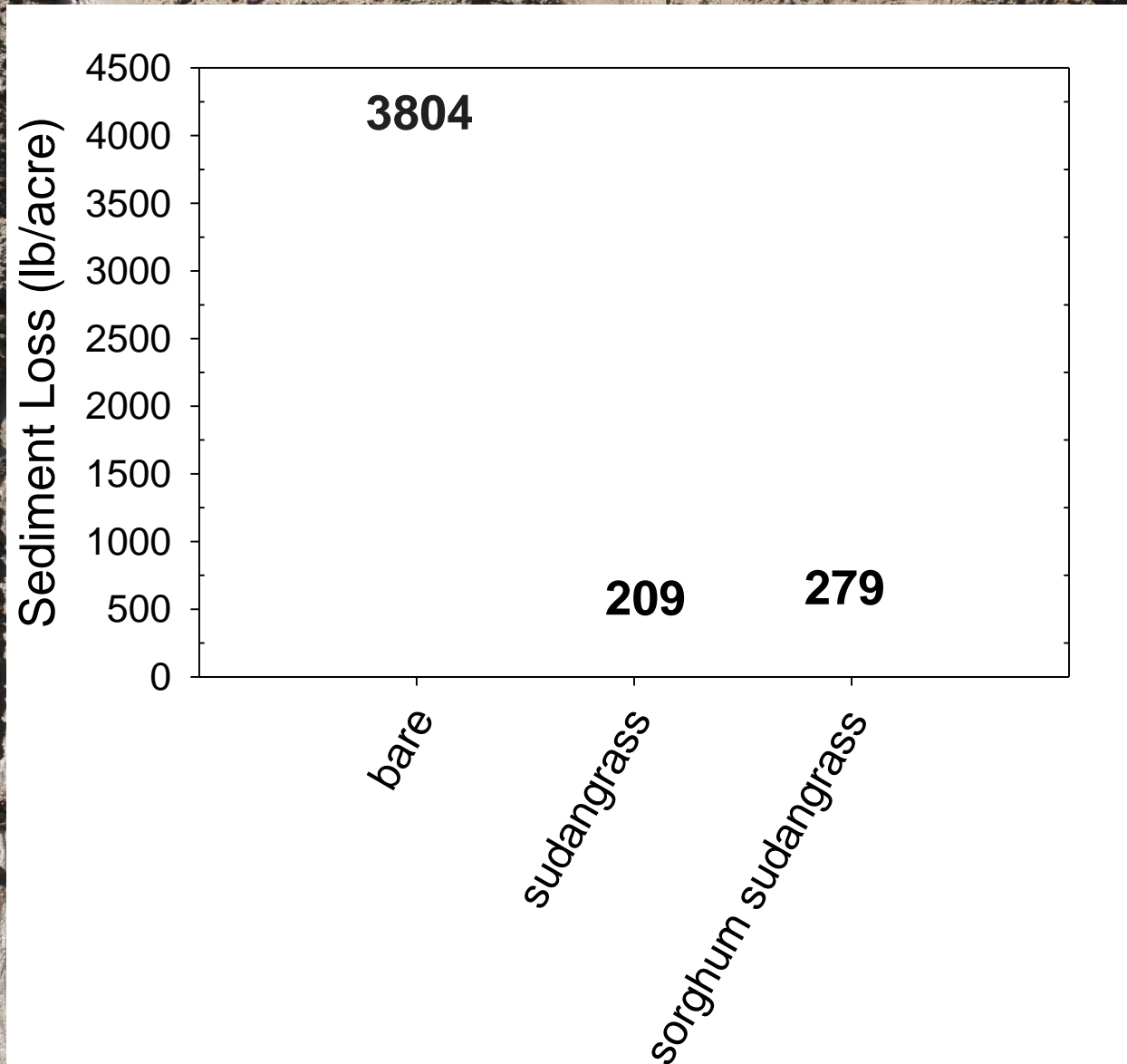
Storm runoff monitoring

- 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

Preliminary data show a 70% reduction in runoff volume



Preliminary data show about a 90% reduction in erosion



Lessons learned

- ✓ Most runoff and flooding occurs during intense storm events such as atmospheric rivers
- ✓ Low biomass cover crops can increase infiltration of storm water and reduce runoff and erosion
- ✓ Sudangrass produced sufficient biomass for erosion and runoff control and cold weather greatly slowed or stopped growth
- ✓ A post emergent herbicide application is needed for controlling weeds in the cover crop
- ✓ Plant sudangrass early (before mid October) and not too deep (< 1/2 inch)
- ✓ Using a grain drill set up to plant on peaked beds and in furrows would likely result in better crop establishment

Optimizing grain drill for peaked beds



Could new types
of tillage
equipment
increase flexibility
for using winter
cover crops?



An aerial photograph of a large agricultural operation. In the foreground, a large, dark-colored barn with a green roof stands on the left. To its right, a line of various agricultural machinery, including tractors and large tankers, is parked on a dirt road. The middle ground is dominated by vast, rectangular fields of crops, some appearing green and others brown, separated by a network of dirt roads. In the background, rolling hills and mountains are visible under a clear blue sky.

Thank you!

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