Use of Cover Crops to Prepare for El Nino and Increase Water Infiltration into Soils

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Benefits of Cover Crops to the Soil

- Provide needed inputs of carbon to the soil:
  - Feeds the soil biota
  - Enhances increase nutrient cycling
- Enhances soil porosity
  - Increased infiltration and aeration
- Improves formation of water-stable aggregates (from polysaccharide gums exuded by roots)
  - Improves soil tilth and workability
  - Reduces crusting
- Nutrient cycling/scavenging
- Disease and weed suppression*

Economic Limitations

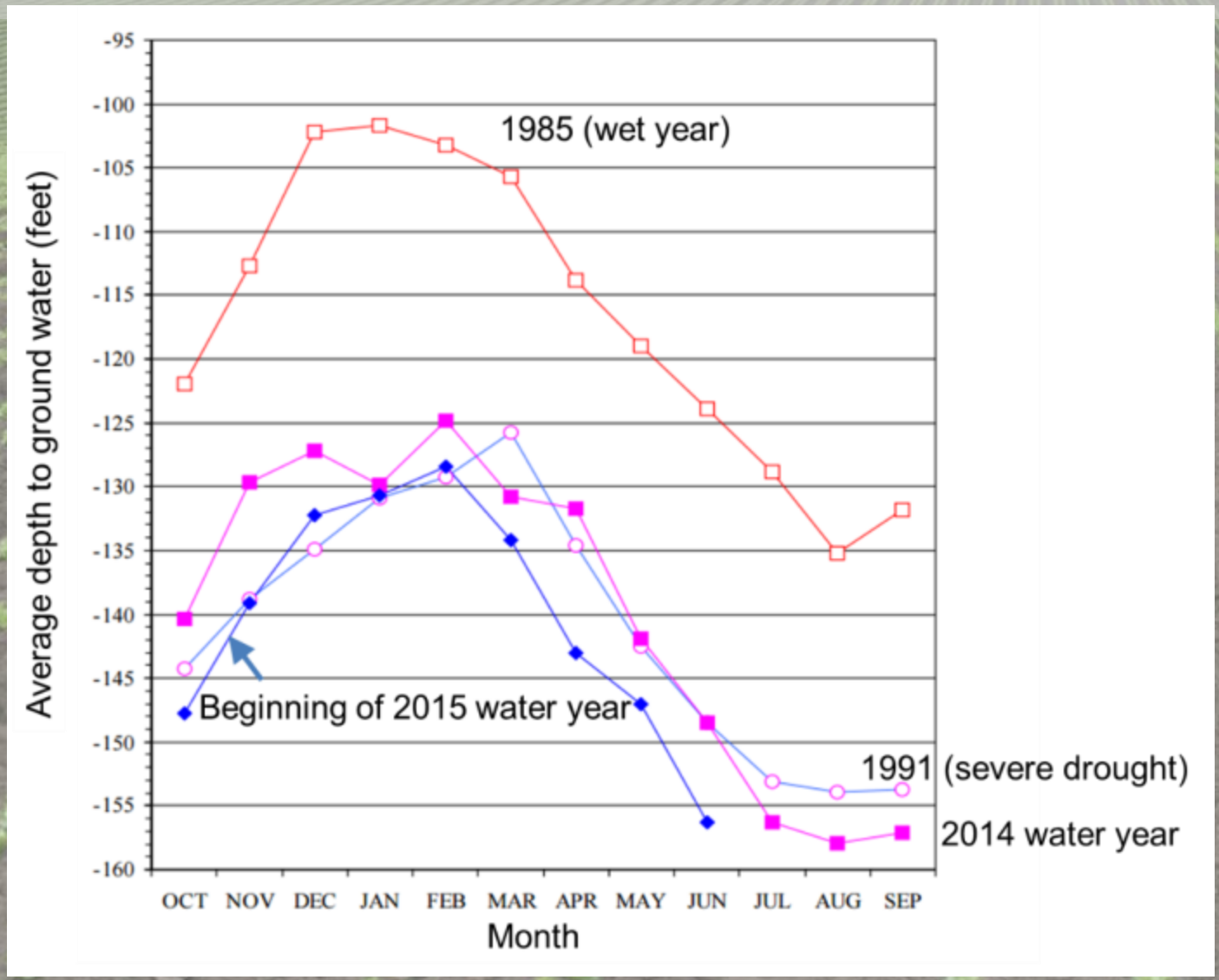
- Growers want to include cover crops, but land rents make it difficult to find opportunities to include cover crops in crop rotations
- Short-term economic considerations affect decisions about the use of cover crops
- Great pressure to cover the fixed costs of farming (e.g. land rents, overall expenses)
- Cover crops occupy time and space when a cash crop could be produced

Cover Crop Alternatives

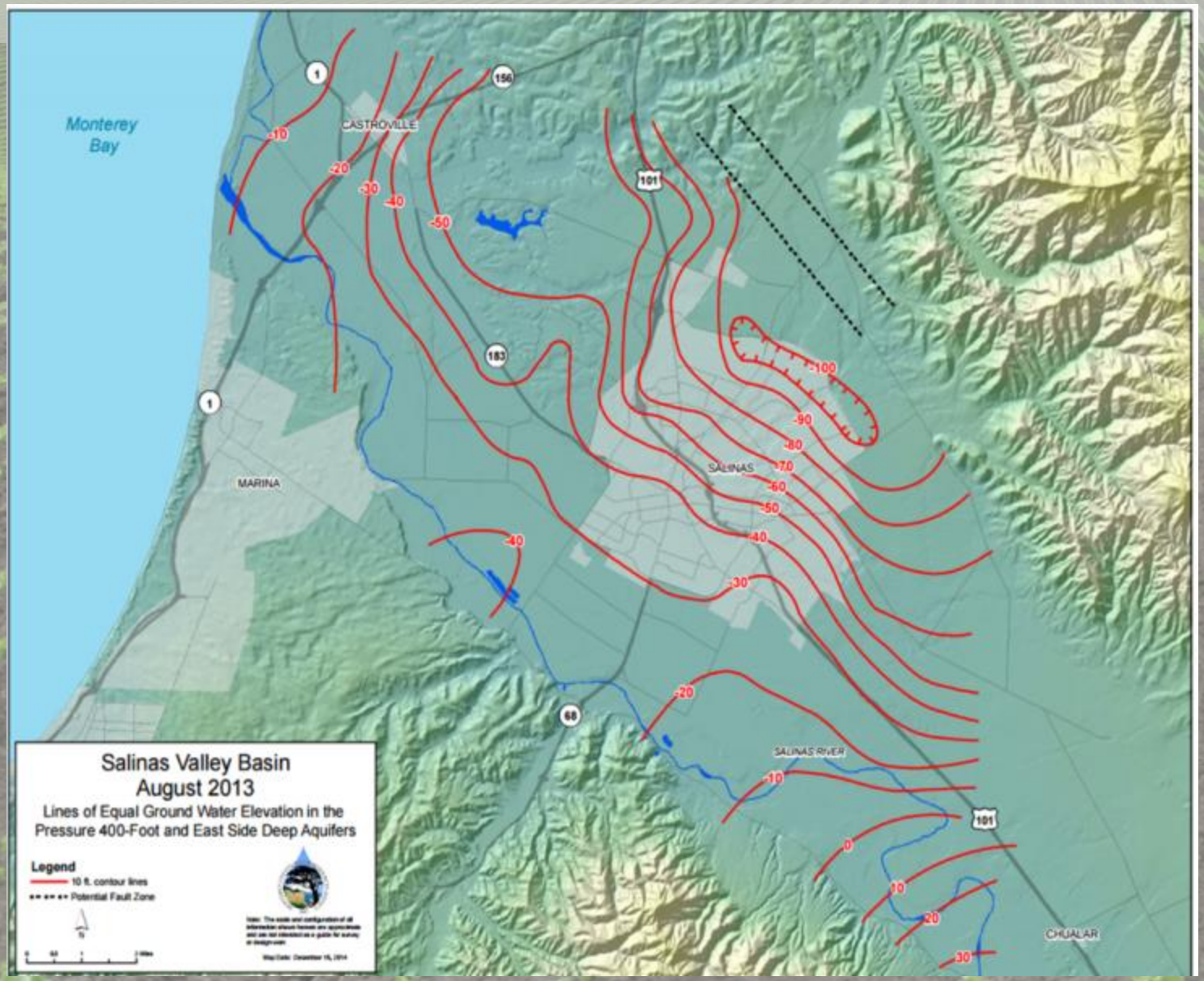
- **Full-season cover crops are not practical for many parts of the intensively cropped Central Coast region**
- **Low-residue cover crops offer an alternative way of fitting a cover crop into vegetable rotations**
  - **Fast maturing varieties 45 to 60 day windows (e.g. fall)**
  - **Residue breaks down to allow for field preparation**

Why Consider Cover Crops to Increase Rainwater Infiltration

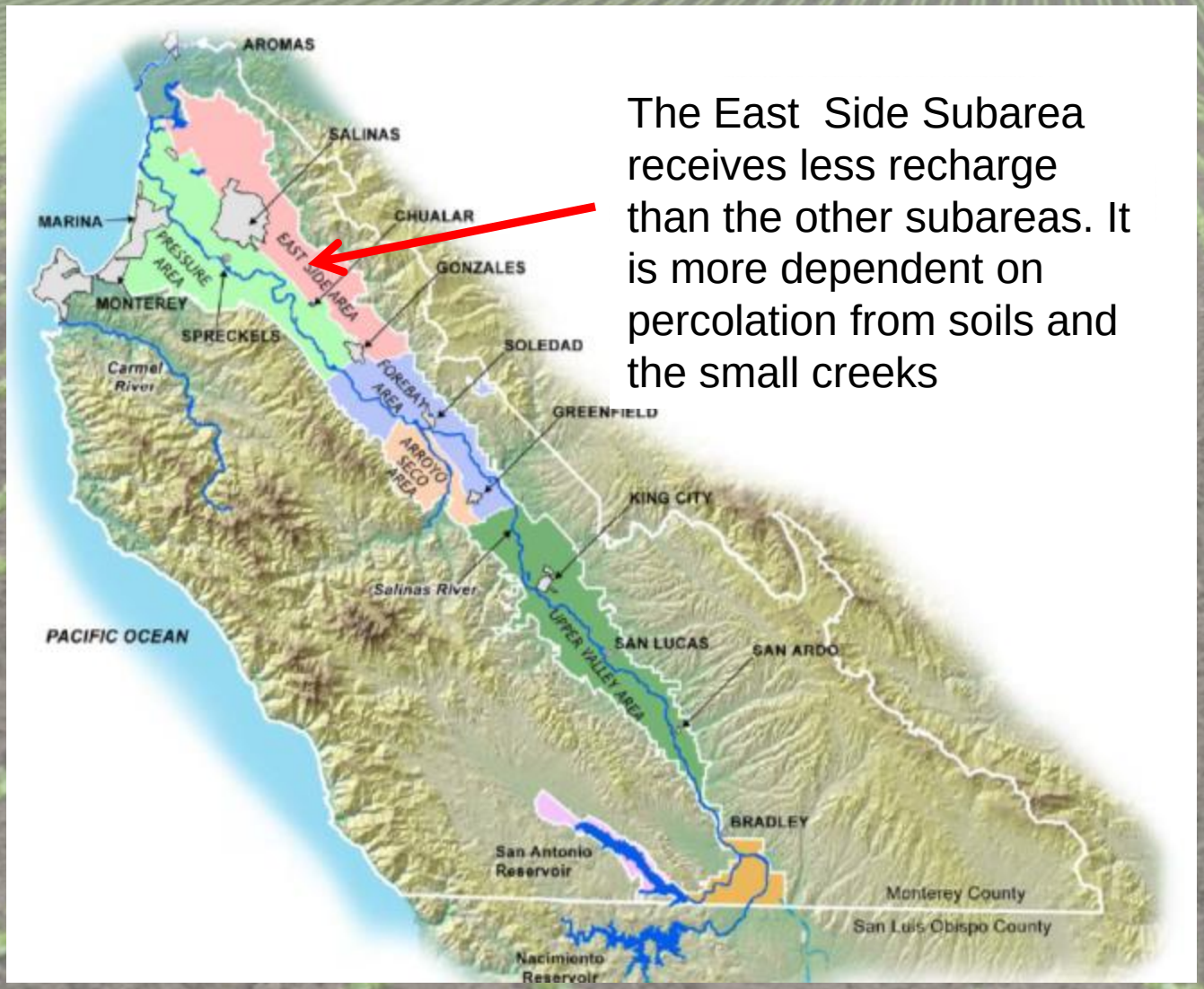
Groundwater Situation



Groundwater Situation



Increasing Infiltration in Salinas Valley Soils

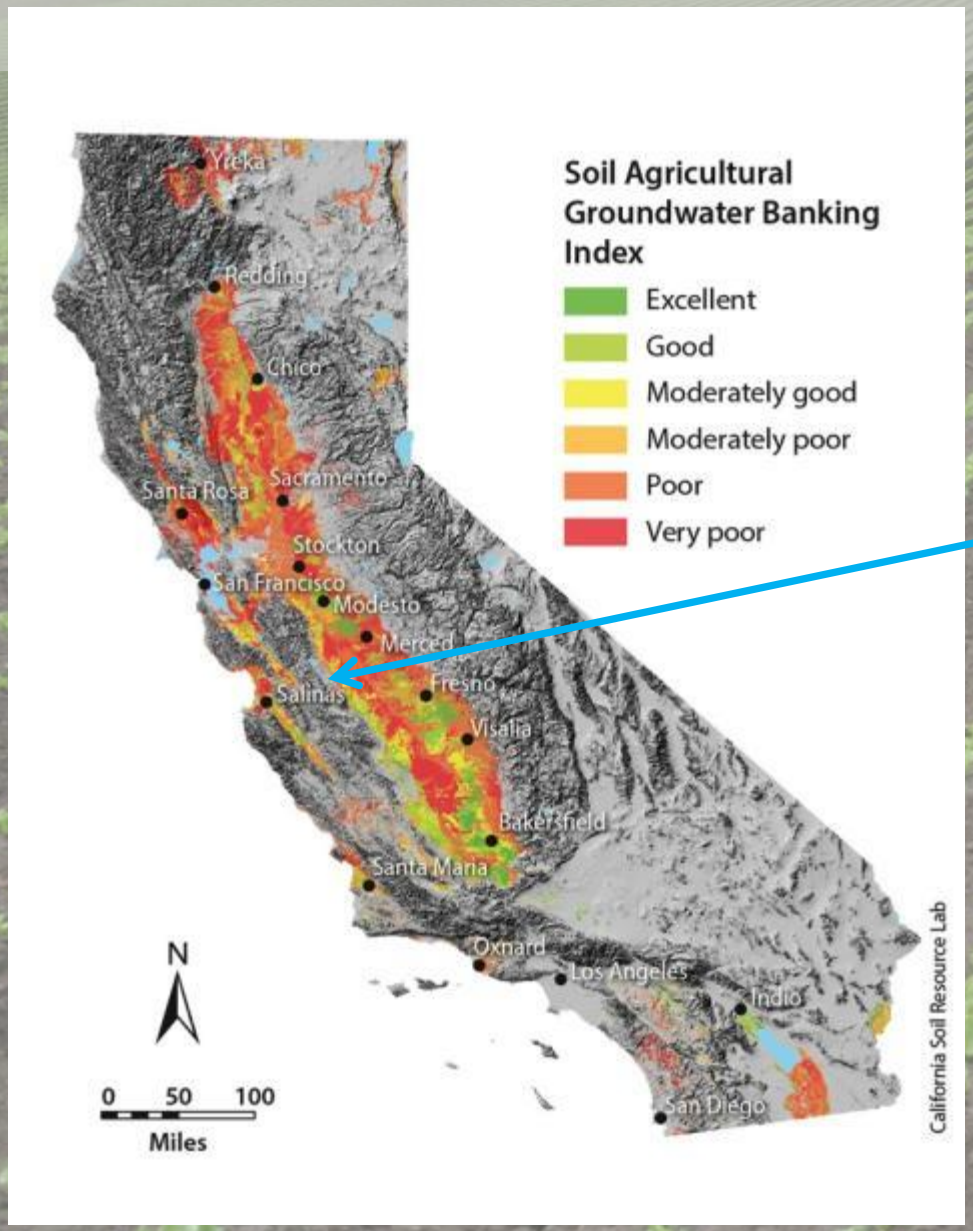


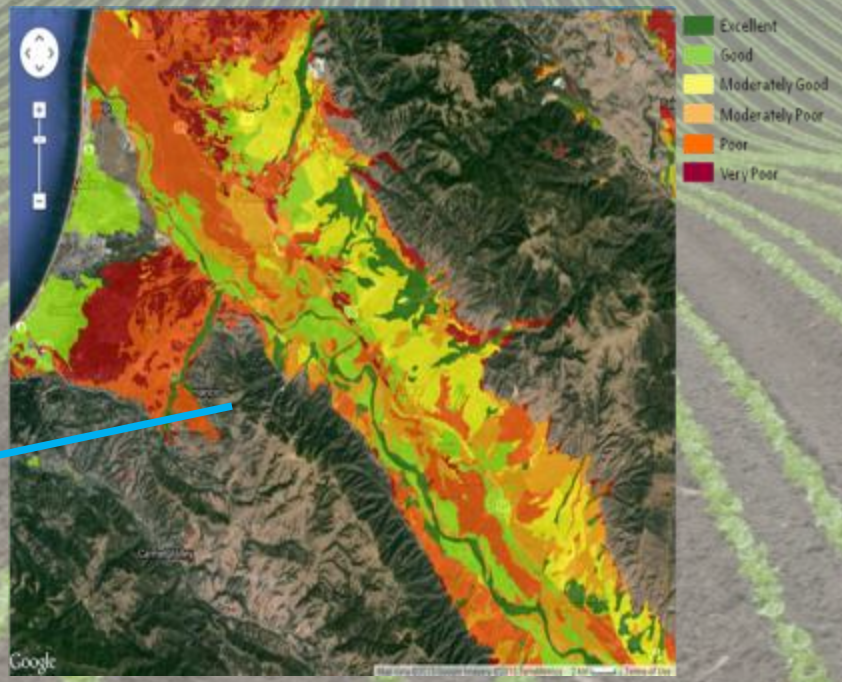
The East Side Subarea receives less recharge than the other subareas. It is more dependent on percolation from soils and the small creeks

East Side Soils vs Rainfall

- In large rainfall events (>2.0 inches) a great deal of runoff is generated on the east side soils for the following reasons:
  - Soil types
    - Good infiltration characteristics
  - Soil conditions
    - Tend to readily crust which reduces infiltration
  - Slope of the ground
    - The ground slopes to the west and runoff can be significant in large rain events

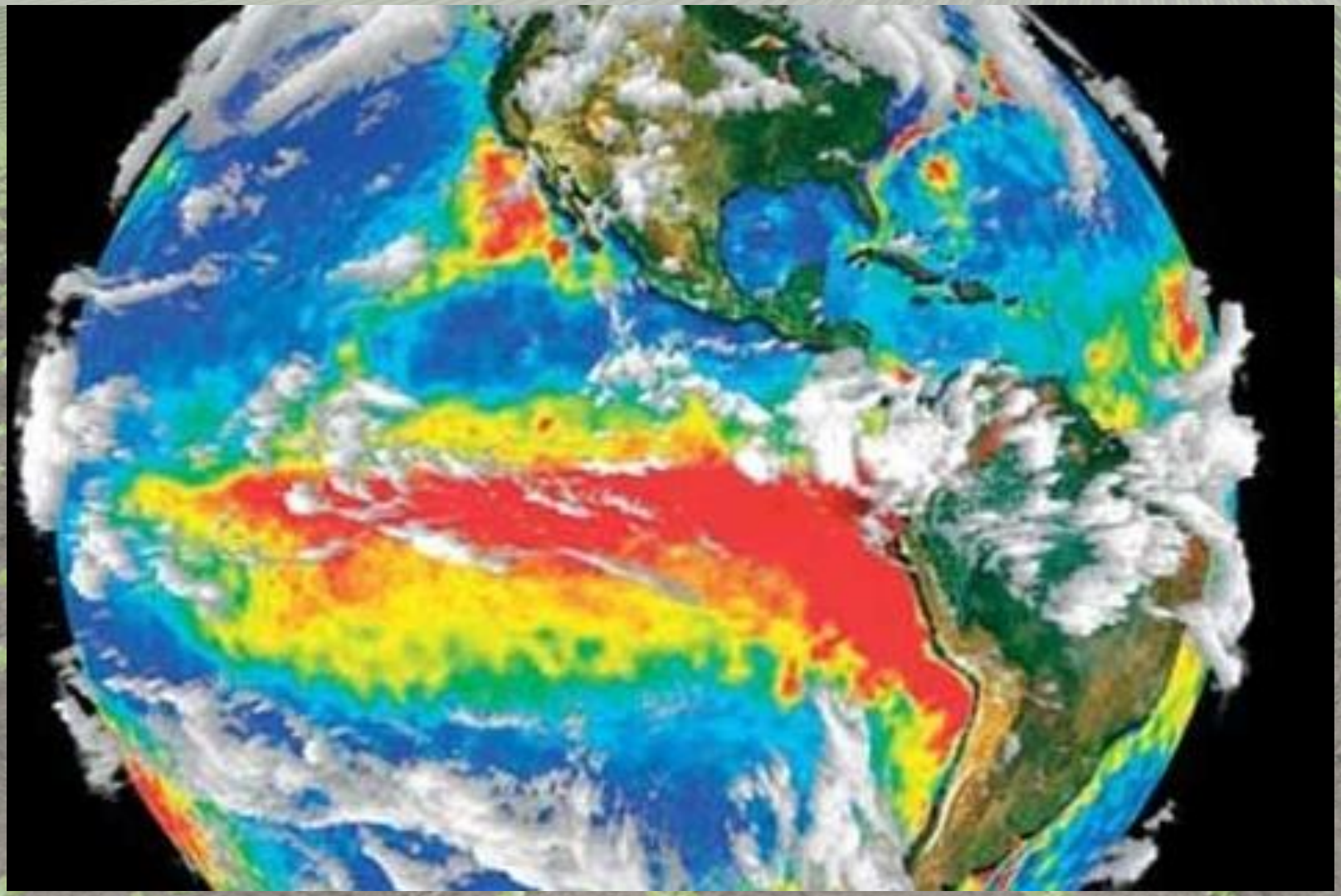
Soil Infiltration Characteristics





From O'Geen, et al California Agriculture April-June 2015

El Nino



Cover Crop to Increase Infiltration into East Side Soils

- Groundwater and reservoirs in the region are at record lows
- Predictions for an El Nino effect seem to be holding firm at present
- It seems prudent to plan ahead to employ some practices that can maximize infiltration of rainfall into soils to help replenish groundwater reserves
- The East Side hydrologic subarea seems like a key area to employ practices to increase infiltration, but other areas could benefit as well

Low Residue Cover Crops

- Low residue cover crops are planted in the fall (e.g. November) and grown for 60 days
- Cereals such as rye and winter dormant triticale have been evaluated and work well
- In conventionally produced vegetable production, they are killed with an herbicide (glyphosate or a grass selective herbicide) in January when they have produced about 0.5 ton biomass
- The dead residue is very succulent and high in nitrogen and decomposes quickly on moist soil

Low Residue Cover Crops

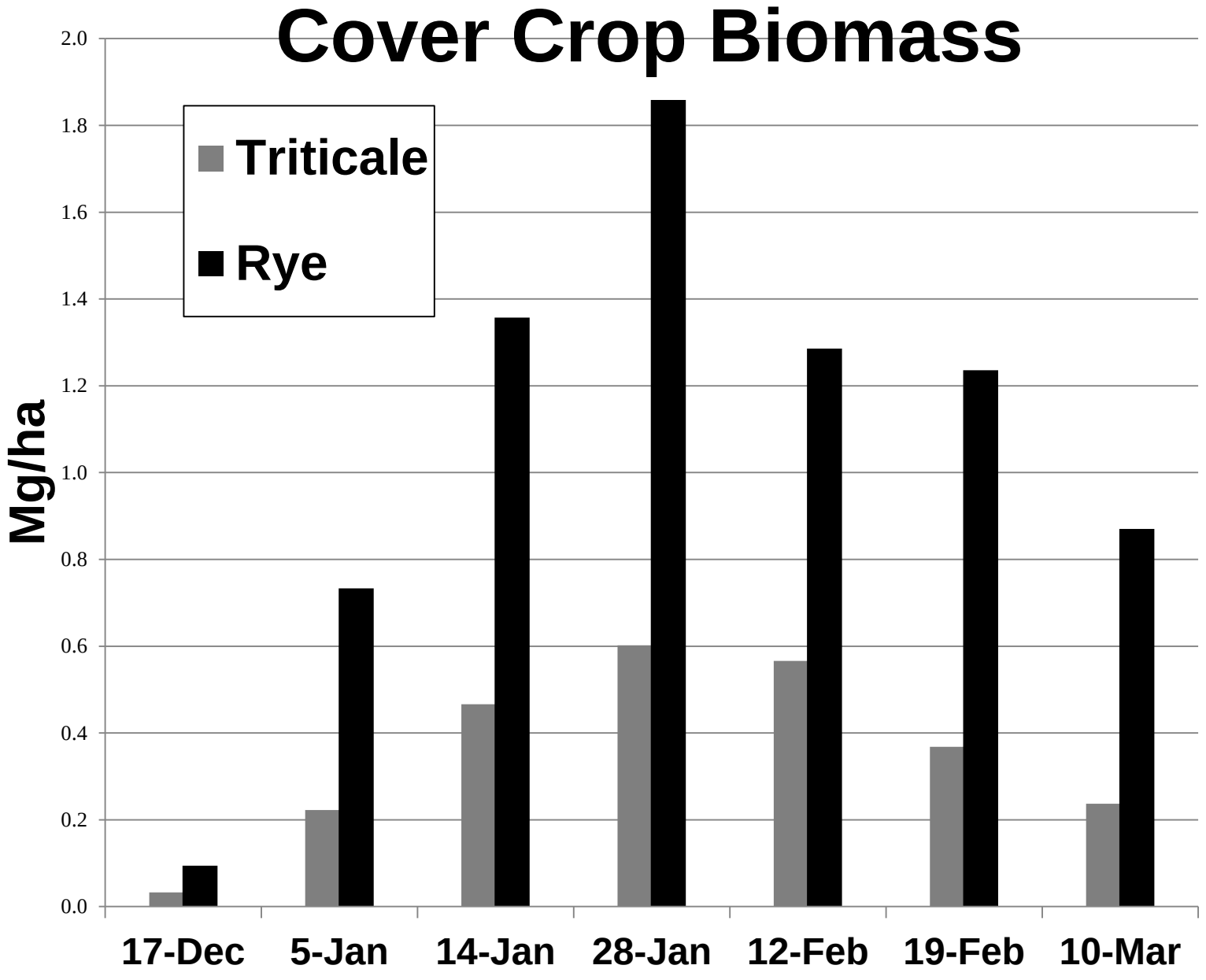
- These cover crops increase infiltration into the soil by protecting the soil surface and reducing crusting, creating macropores, and slowing the flow of the water which allows for greater infiltration
- Other materials could be used to protect the soil (e.g. compost, straw – but how practical)
- Winter cole crops will also protect the soil
- Fallow 80 inch beds were observed to have less runoff as well
- Other ideas: Gypsum, unlisted fields, etc

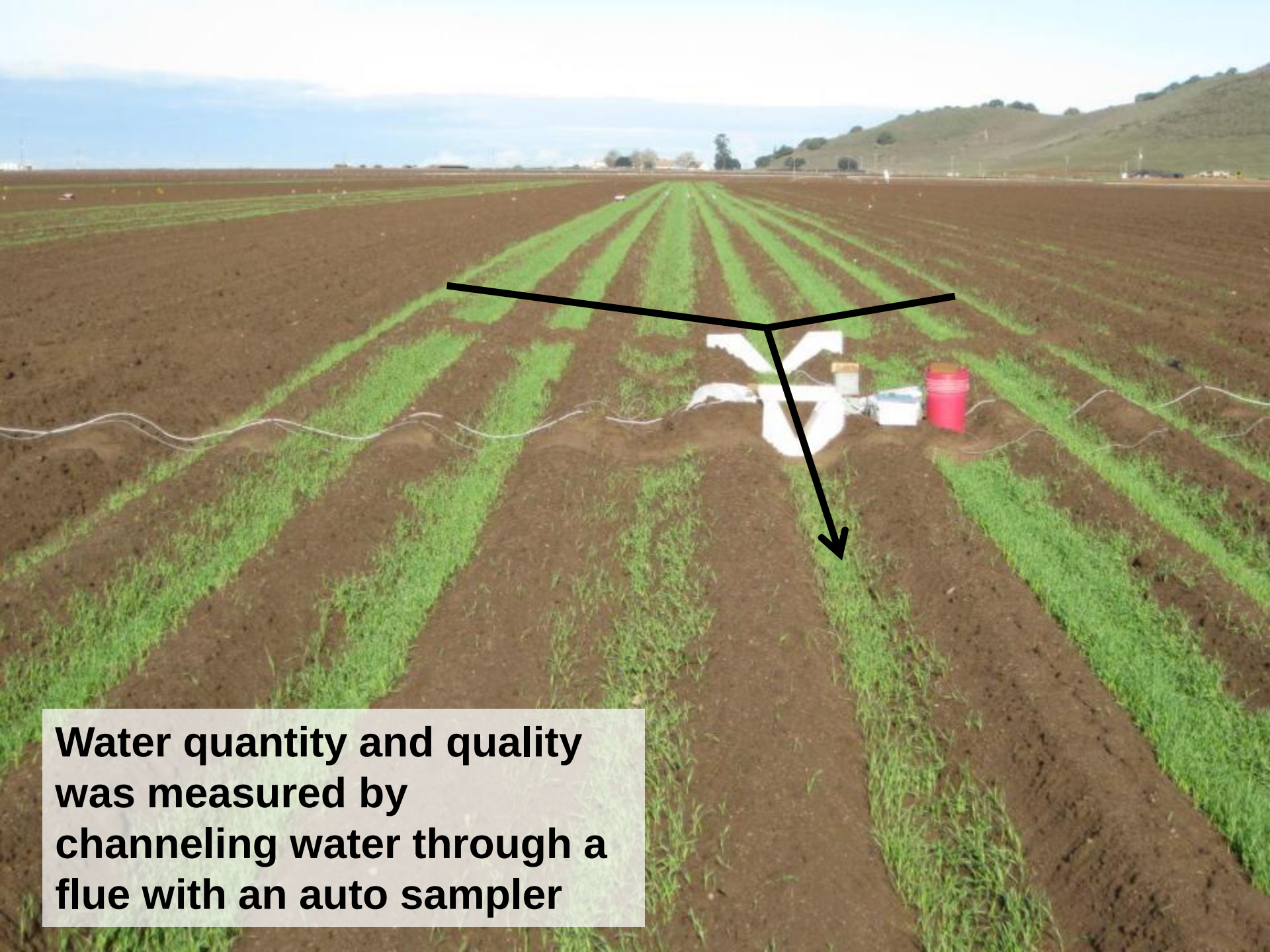

January 7
Triticale 888


February 4
Triticale 888

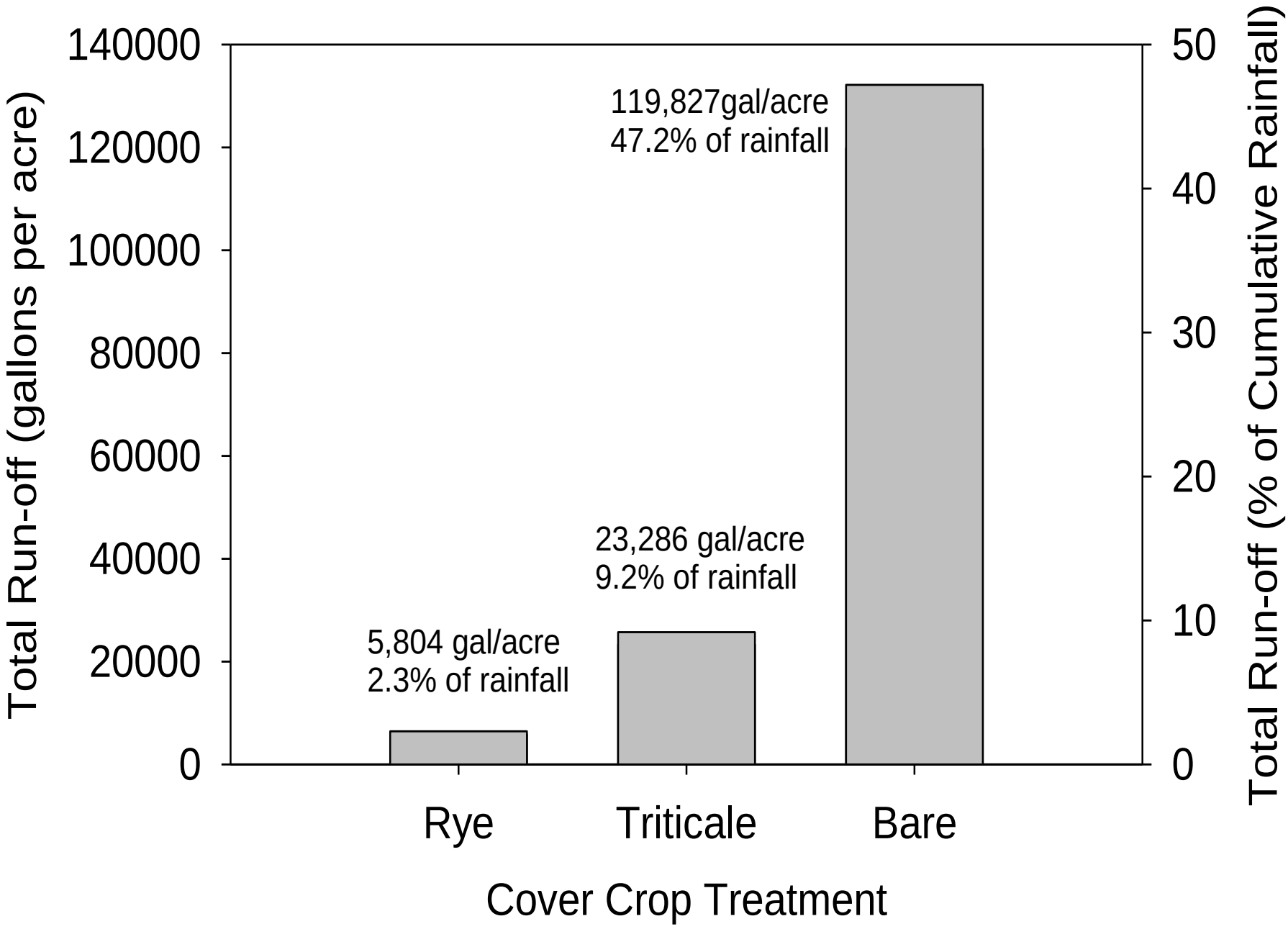

AGS 104 Rye


AGS 104 Rye


Cover Crop Biomass
Triticale
Rye
Mg/ha
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
17-Dec
5-Jan
14-Jan
28-Jan
12-Feb
19-Feb
10-Mar



Water quantity and quality was measured by channeling water through a flue with an auto sampler

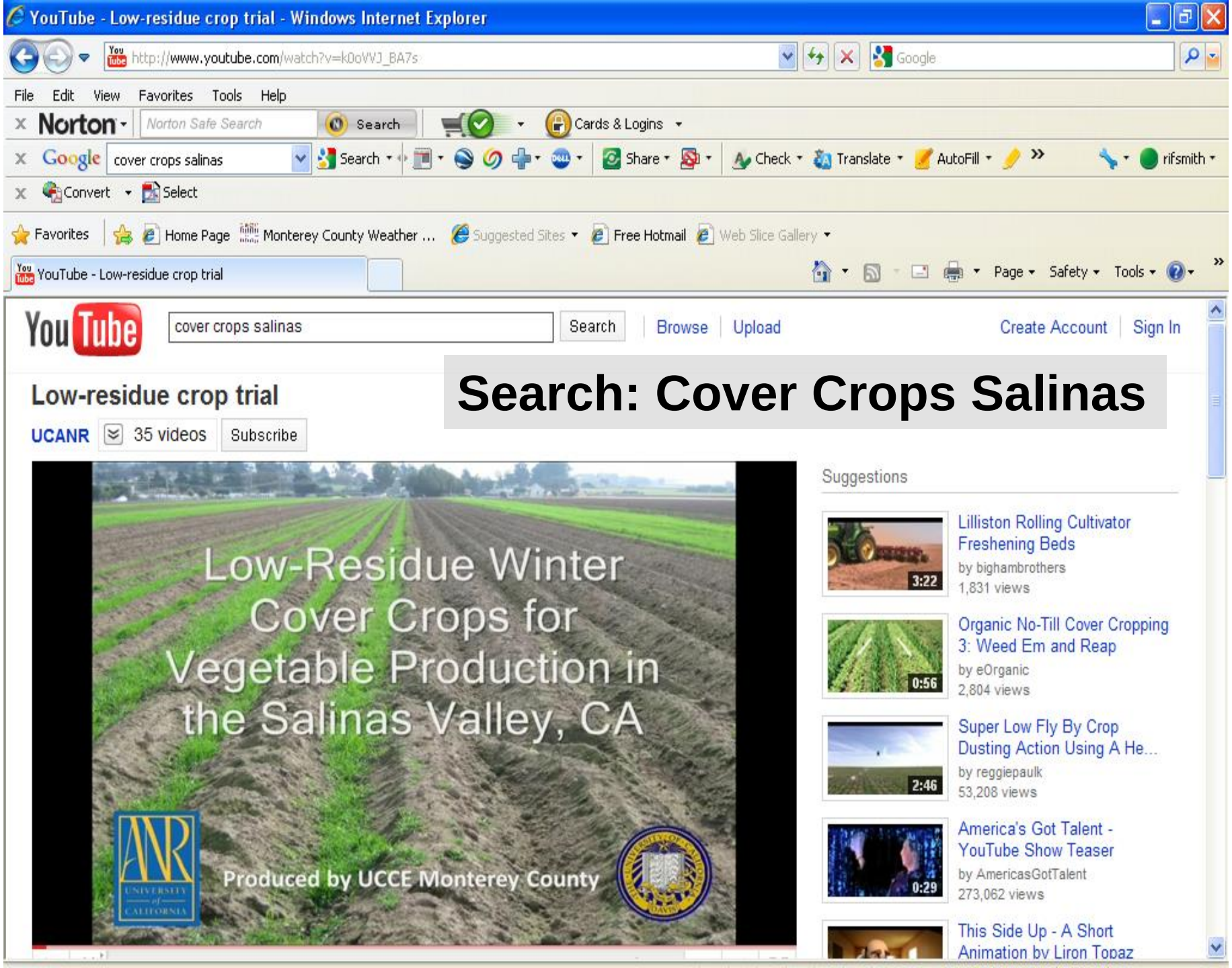

140000
120000
100000
80000
60000
40000
20000
0
Total Run-off (gallons per acre)
50
40
30
20
10
0
Total Run-off (% of Cumulative Rainfall)
119,827gal/acre
47.2% of rainfall
23,286 gal/acre
9.2% of rainfall
5,804 gal/acre
2.3% of rainfall
Rye
Triticale
Bare
Cover Crop Treatment

Ground Water Recharge

- The Rye low residue cover crop infiltrated 4.4 acre inches more water than the bare fallow treatment
- The cover crop was actively protecting the soil from December through March
- The cover crop residue decomposed and allowed for lilistoning the beds to prepare for planting in late March
- Blocks where this technique is used should be carefully considered

Ground Water Recharge

- Given that this is a new technique for most growers it should be used on later planted fields to allow for adequate breakdown of the residue
- Soils should have good infiltration characteristics
- Weed control should be carefully considered
  - Lilistoning the beds (keeping sweeps off the furrow bottom to protect the cover crop residue
  - Glyphosate application used to kill the cover crop can remove many weeds, but will be weak on malva and burning nettle



Search: Cover Crops Salinas

Blog Post

Google: Cooperative Extension Monterey County and go to the blog:

Groundwater Recharge on East Side Soils of the Salinas Valley

Published on: September 2, 2015

Authors: Richard Smith[1], Michael Cahn[1], Tamara Voss[2], Toby O'Geen[3], Eric Brennan[4], Karen Lowell[5] and Mark Bolda[6]

Mustards for Organic Strawberry Production
Easier to Kill Mechanically

February 6
53 days