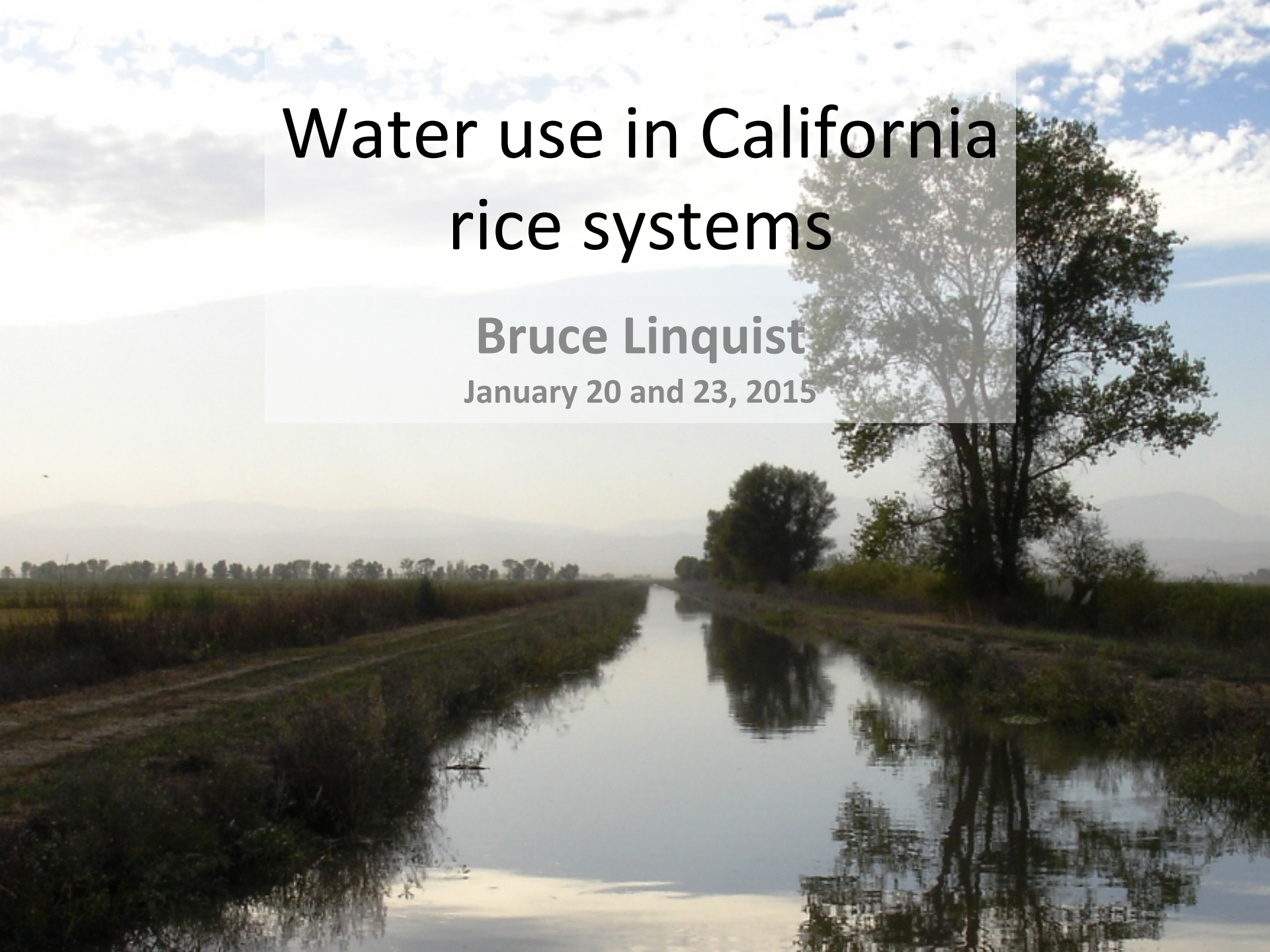


Water use in California rice systems

Bruce Linquist

January 20 and 23, 2015

Outline

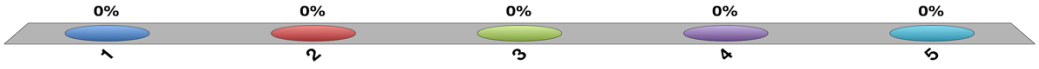
- Water use in rice systems
  - Based on 3 years of study
- Opportunities for using less water

In relation to cropping systems and water use, what does ET refer to?

1. The extra-terrestrial nature of crops and water
2. Losses of water due to evaporation and transpiration

What is the ET loss in a typical CA rice crop

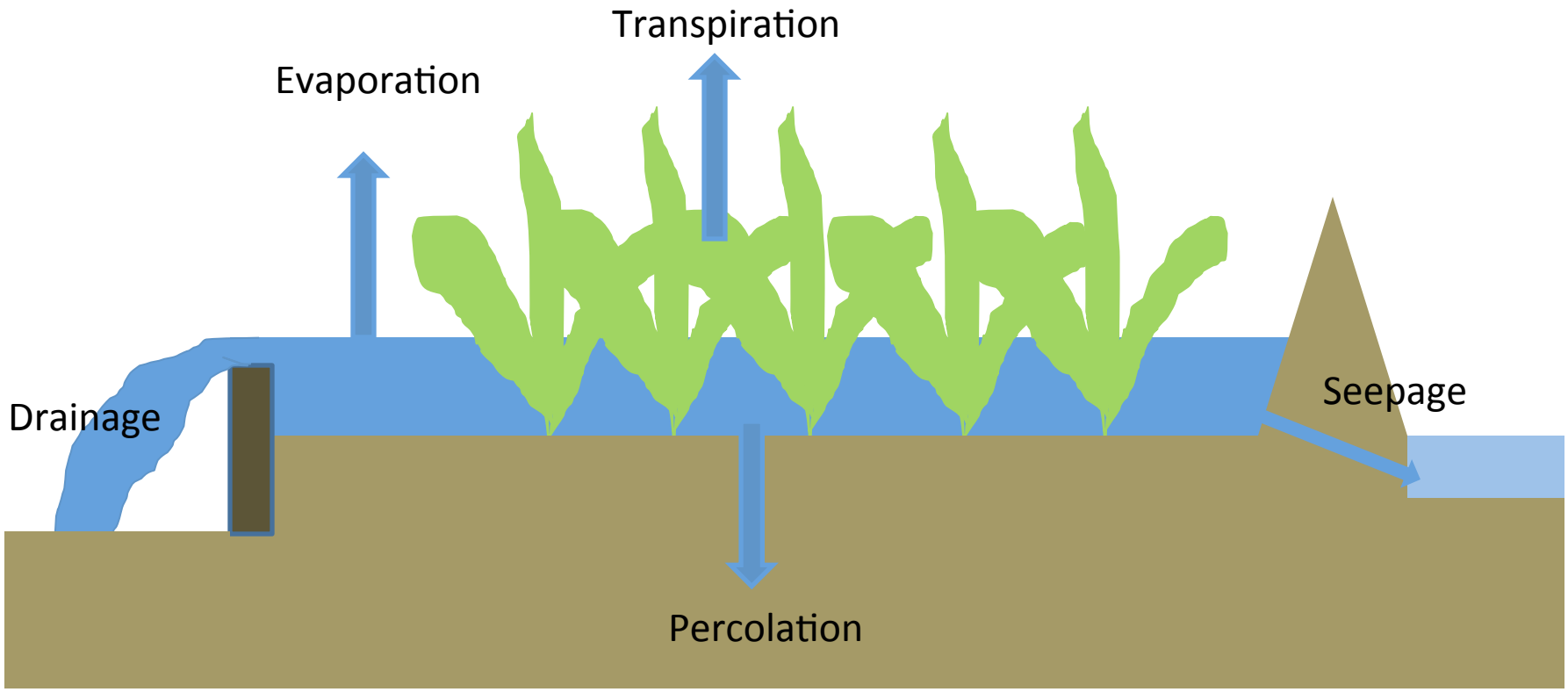
1. 20-25”
2. 25-30”
3. 30-35”
4. 35-40”
5. 45-50”



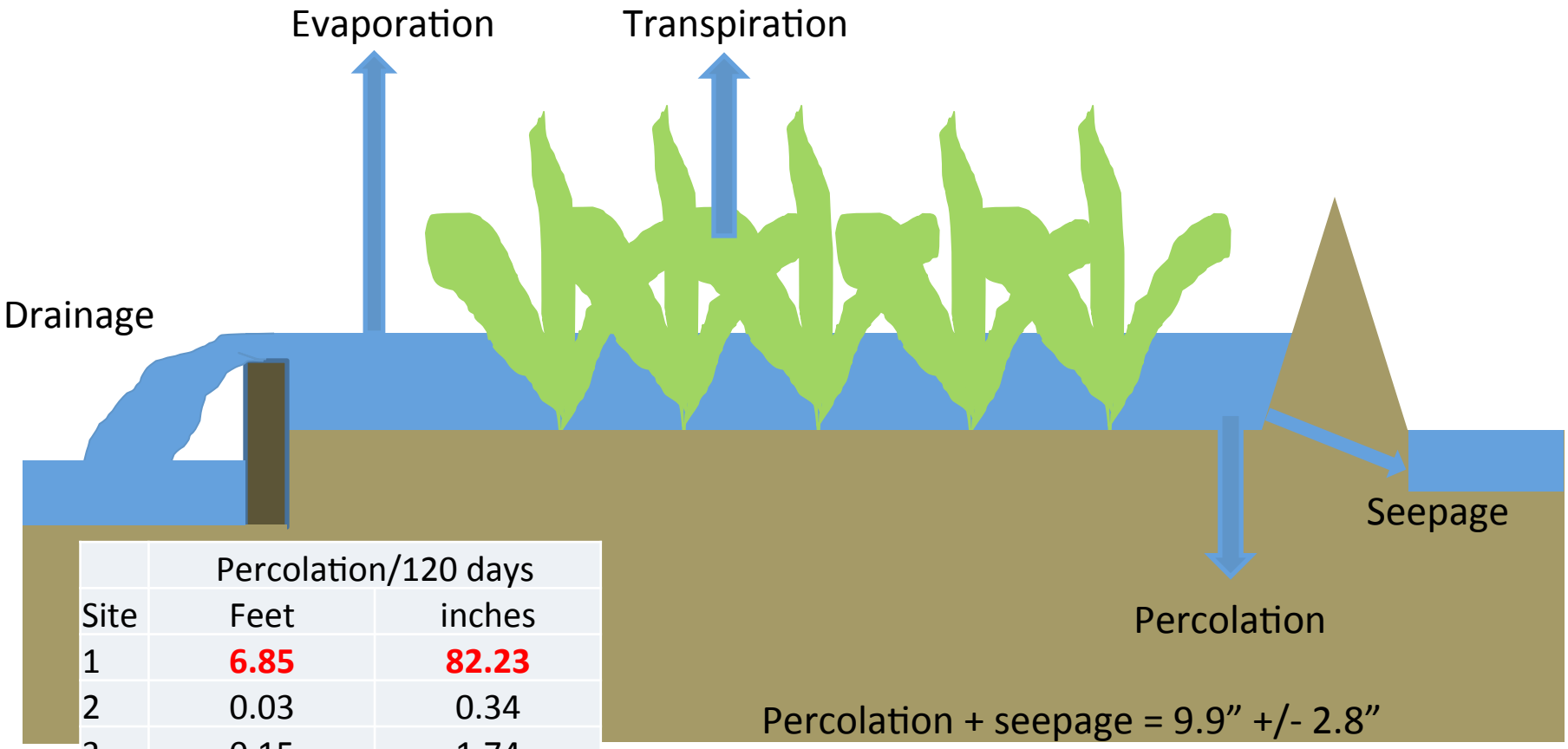
How many acre ft/acre of water are applied to grow rice and get the yields you typically expect?

1. 2-3
2. 3-4
3. 4-5
4. 5-6
5. 6-7
6. 7-8

Rice field water losses



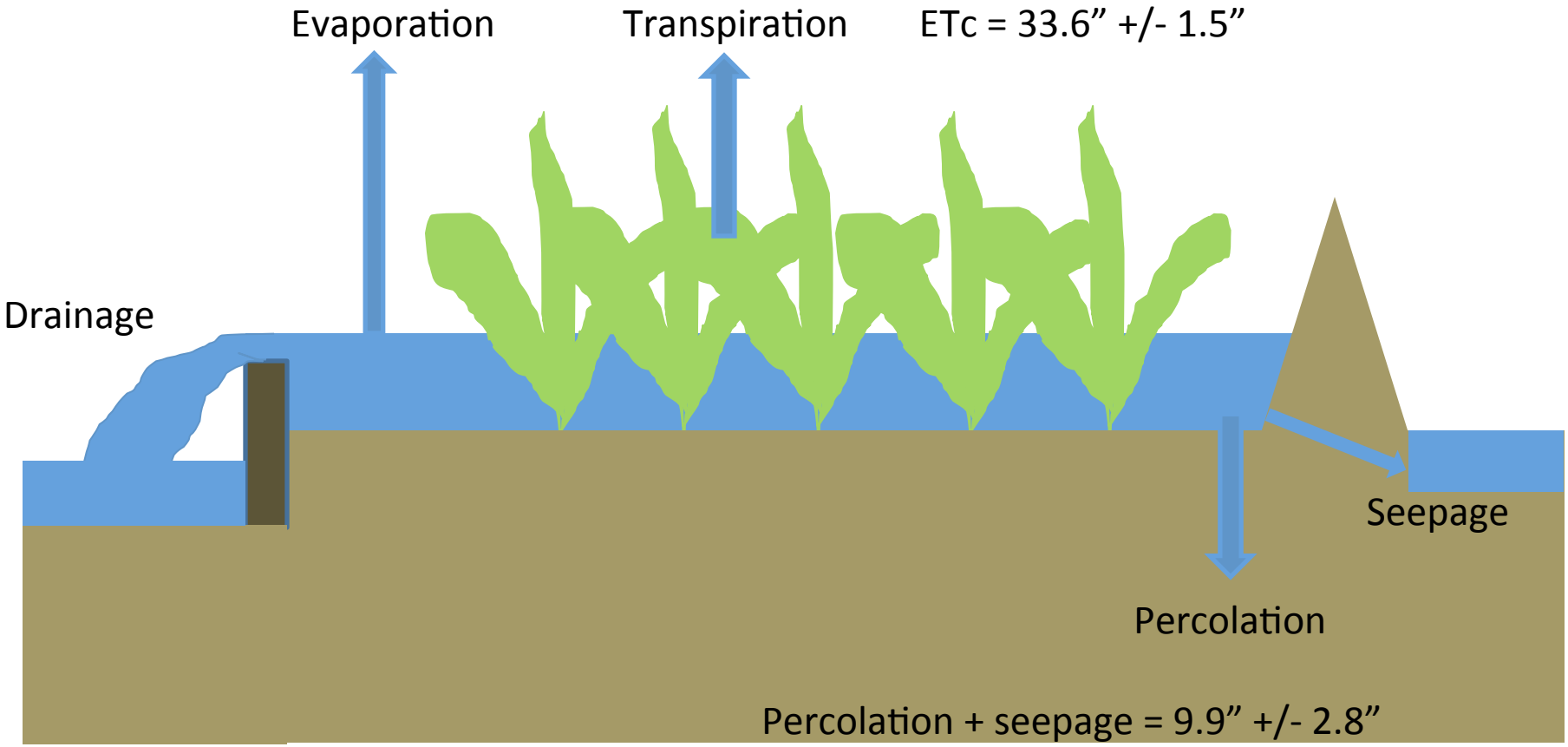
Seasonal rice field water losses



	Percolation/120 days	
Site	Feet	inches
1	**6.85**	**82.23**
2	0.03	0.34
3	0.15	1.74
4	0.29	3.49
5	0.01	0.14
6	0.24	2.92
7	0.11	1.28
8	0.04	0.52

Percolation = 2”
Seepage = 8”

Seasonal rice field water losses



Total water input = 77” (1960 mm)

Options to reduce ET

- Shorter duration variety
  - M206 requires approximately 1” less water than M202
- Plant later
  - Later in season results in warmer temps and faster crop development
  - May 30 planting dates require about 1” less water than May 1
- Drill seeding instead of water seeding
  - Depends

Water seeded vs drill seeded

Water Seeded Rice

This is the predominant method for growing rice in California.

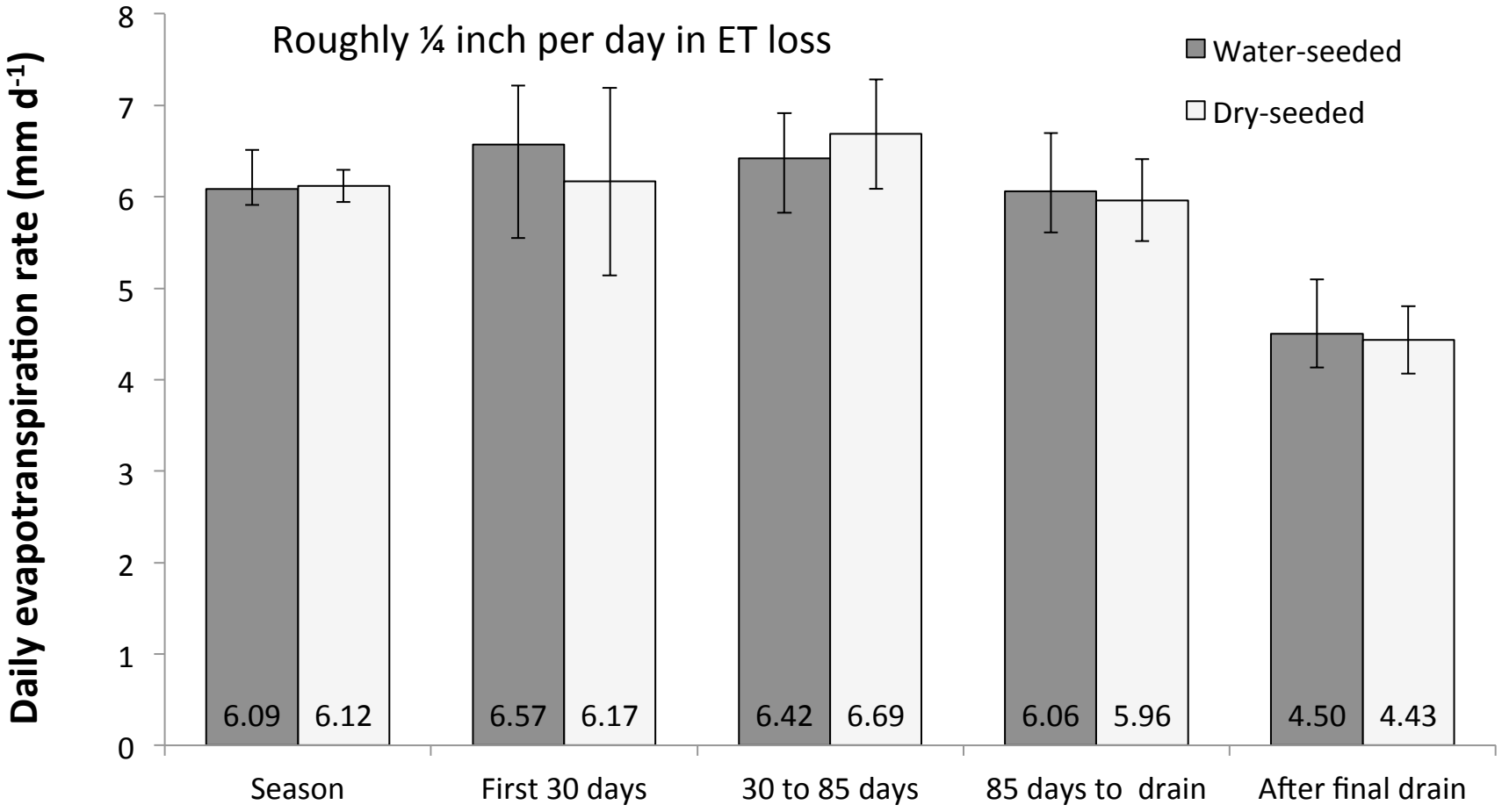
Field flooded for planting and remains so for rest of season.

Dry/Drill Seeded Rice

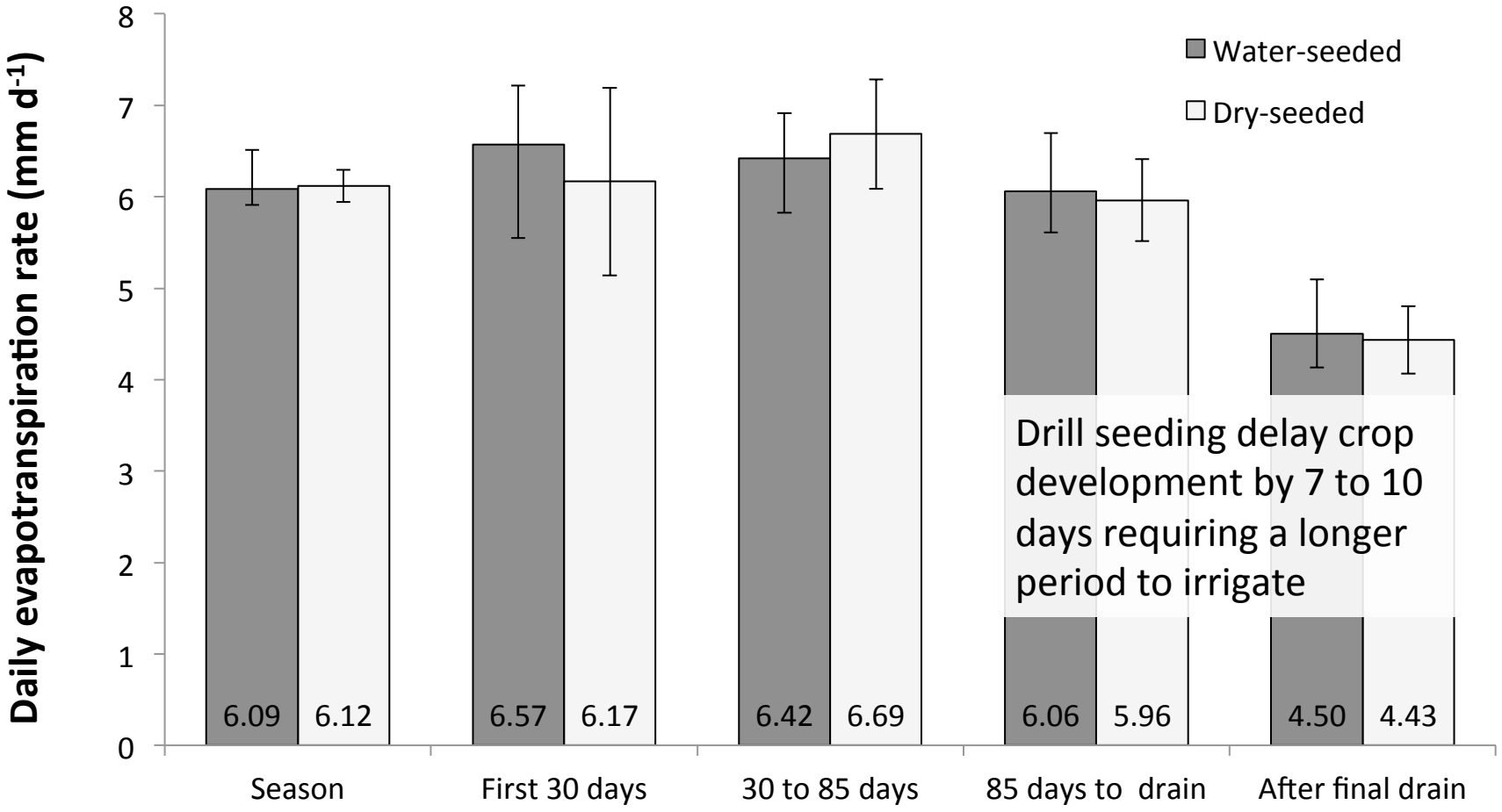
This method of growing rice is rare in California.

Rice is seeded like wheat. Field is flushed to germinate seed. Permanent flood after one month.

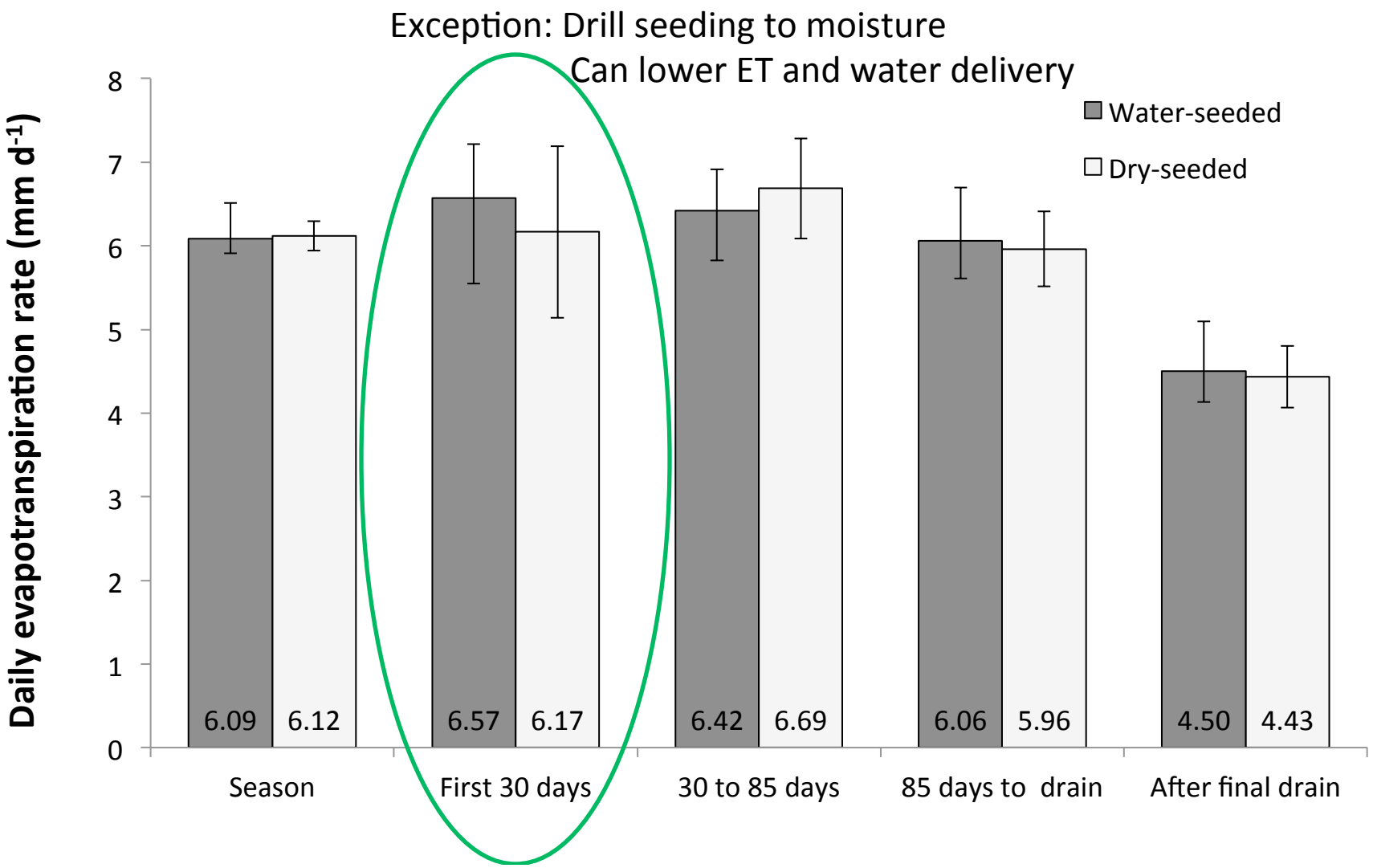
Water vs drill seeding



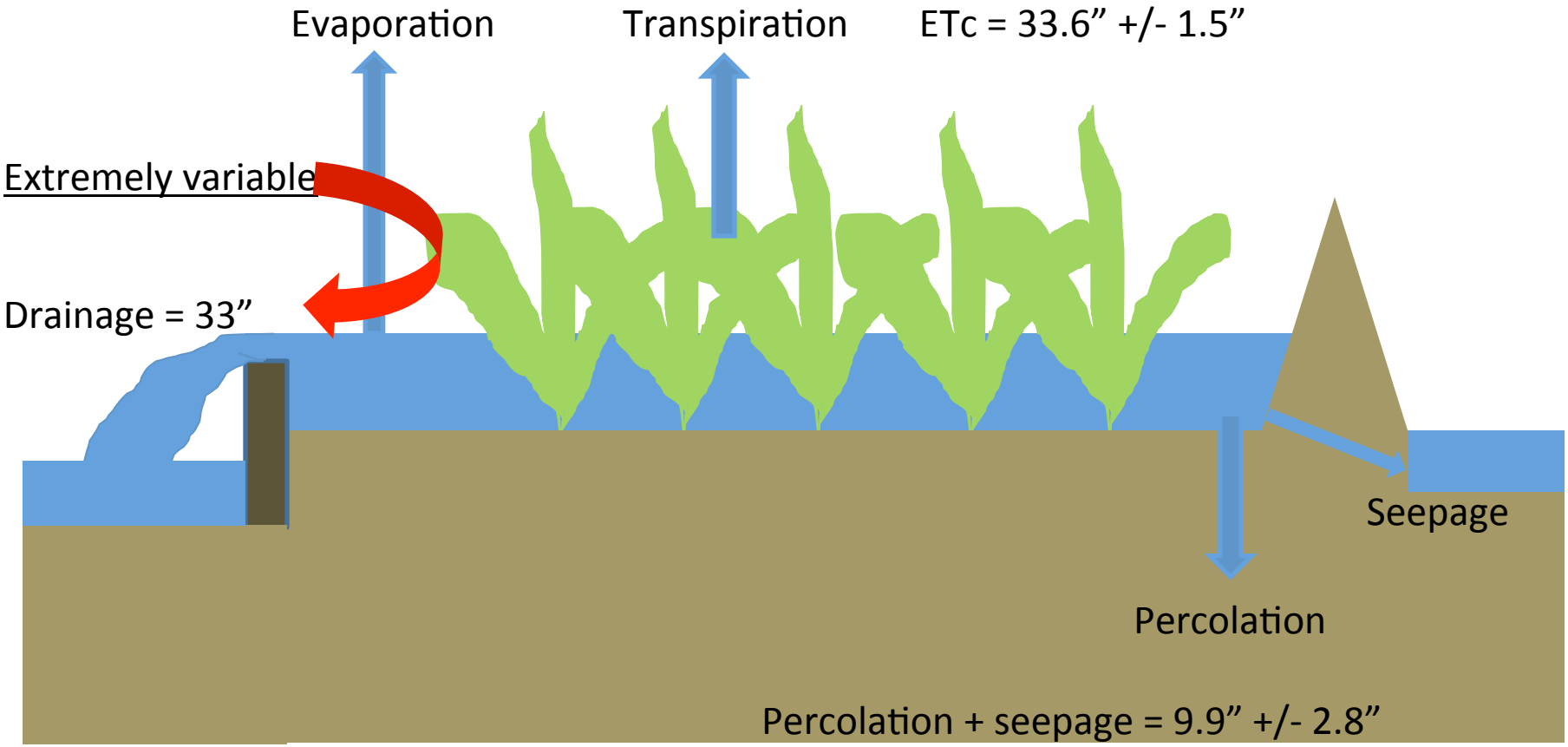
Water vs drill seeding



Water vs drill seeding



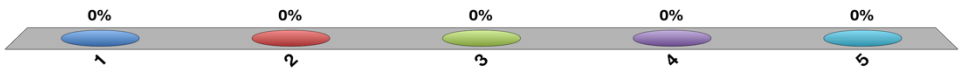
Seasonal rice field water losses



Total water input = 77”
If no spill we can reduce to 43.5”

What is the main reason you allow a maintenance flow of water in your rice fields?

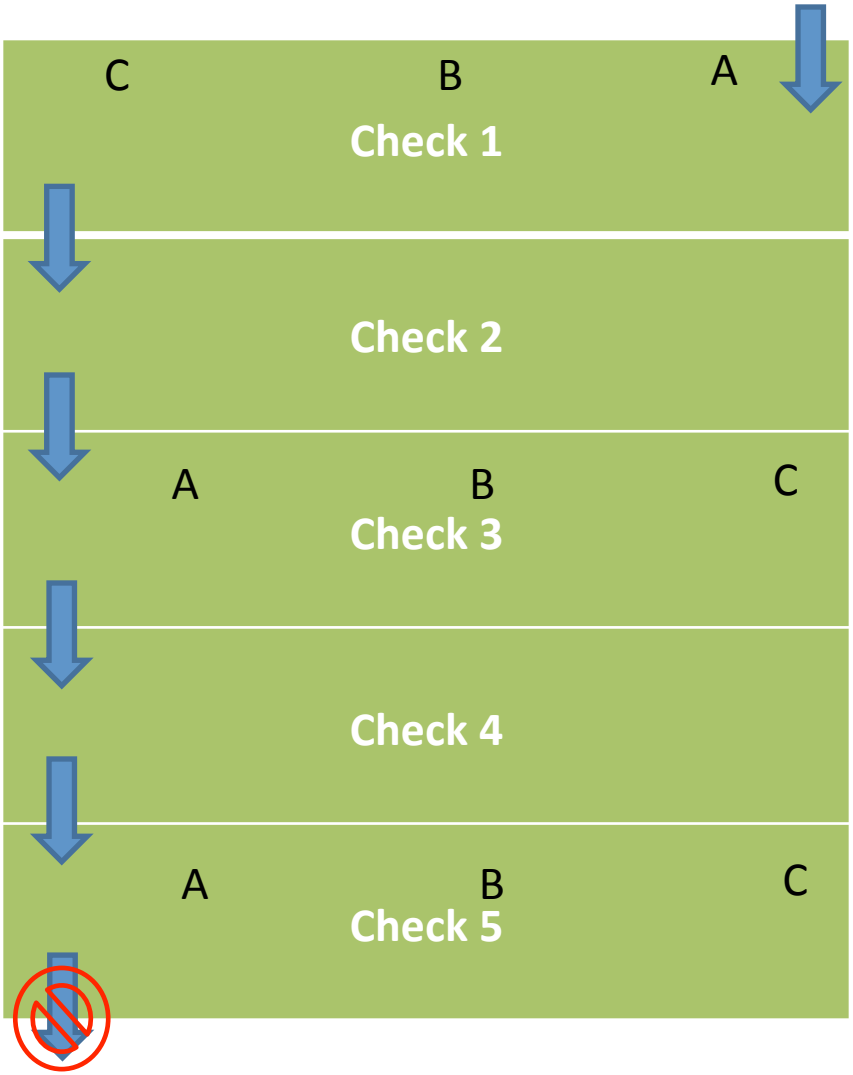
1. I do not allow a maintenance flow of water
2. Everyone else does it
3. Easier to maintain the desired flood water height in field
4. Reduce salinity build up in fields
5. Other



No-spill water management

- Maintenance flow management
  - Minimize salinity
  - Maintain water levels
- No-spill
  - Does salinity increase due to evapo-concentration?
    - If so, enough to reduce crop yield?

No-spill water management

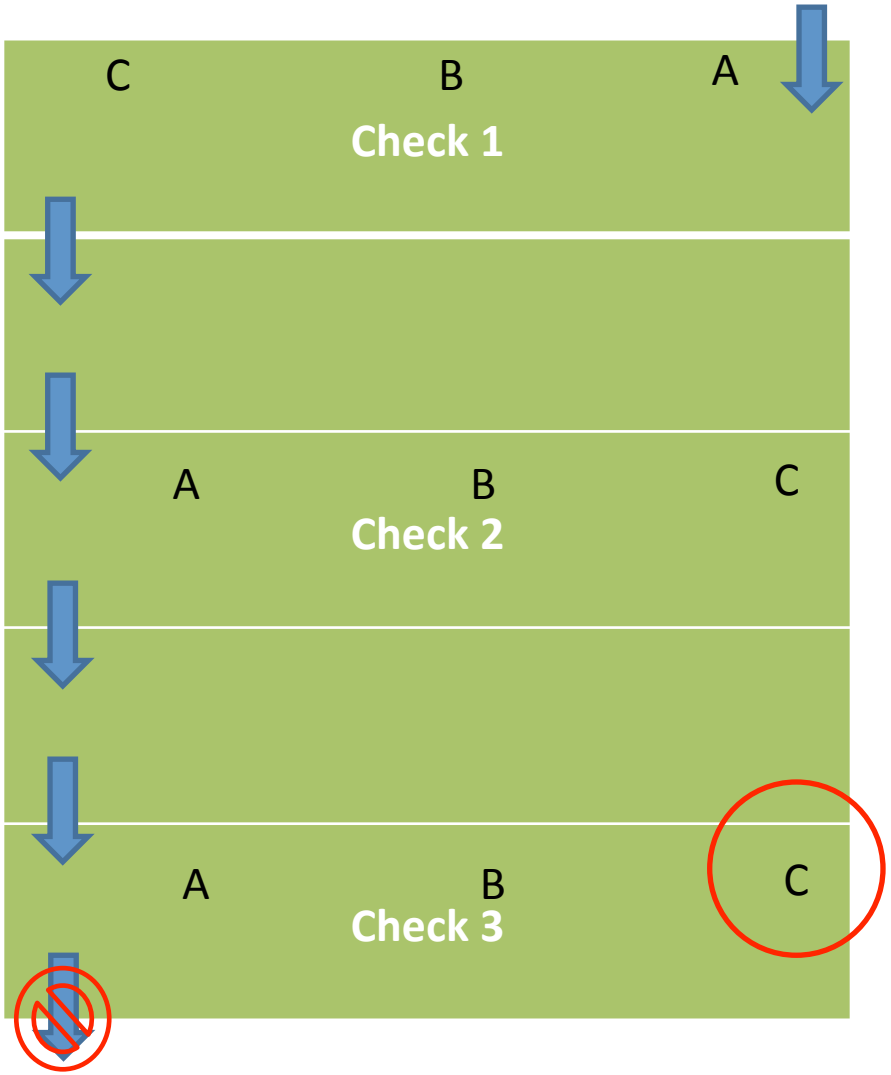


- 6 fields in 2014
- All fields received fresh water

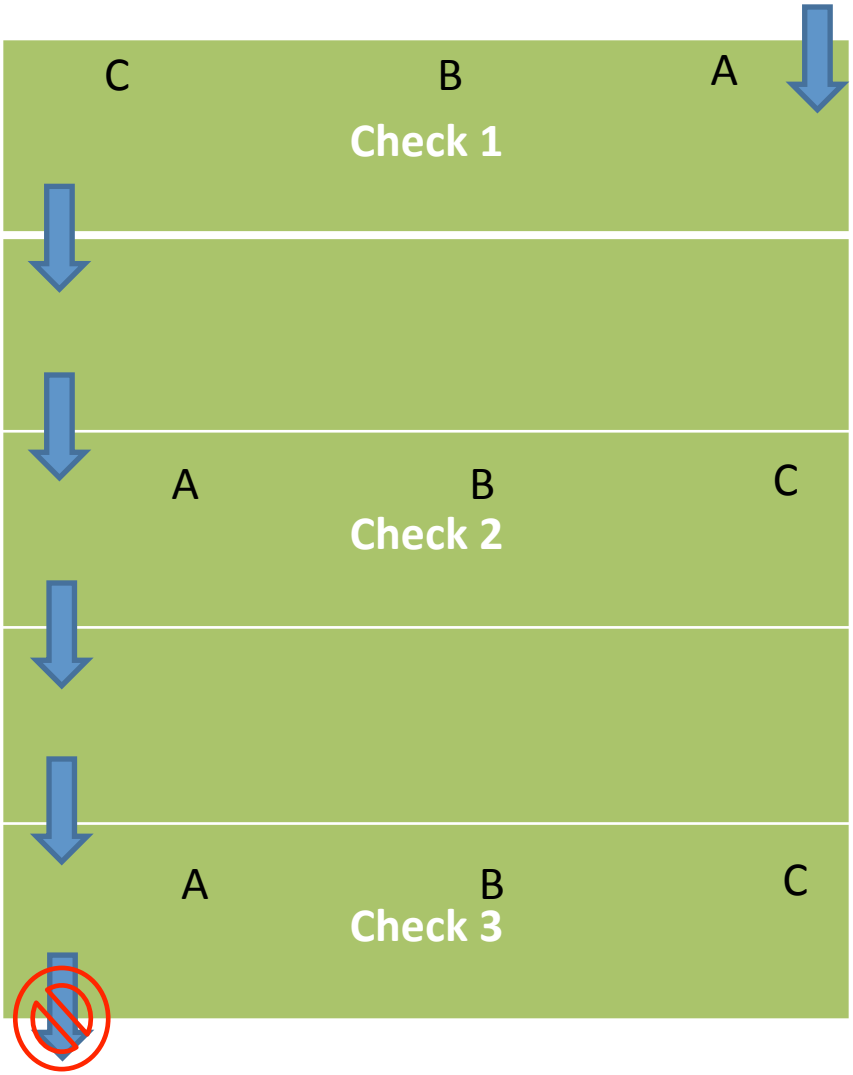
Water and Soil EC

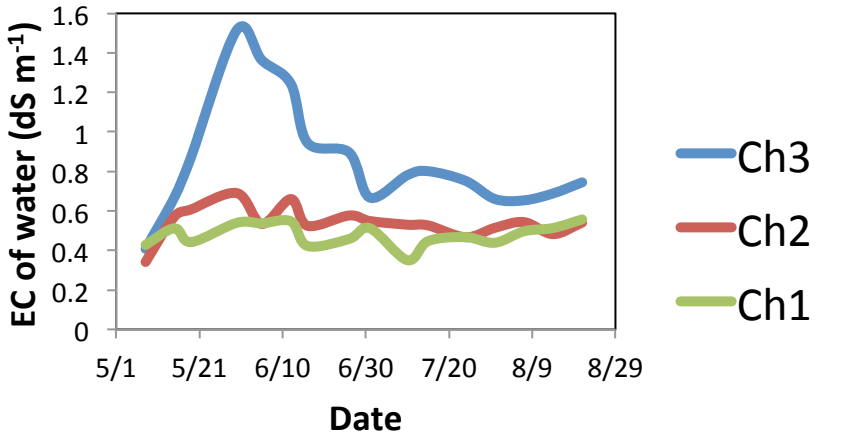
	Water EC (dS/m)				Soil EC (dS/m)			
Field	Min	Location	Max	Location	Min	Location	Max	Location
B1	0.33	1-A	1.64	3-B	0.43	1-A	**3.69**	3-C
B2	0.33	1-A	**2.45**	2-C	0.73	1-A	**2.30**	3-C
Glenn	0.08	3-C	0.36	3-A	0.10	2-B	1.36	3-C
Levi	0.06	2-A	0.39	3-A	0.08	1-A	**2.17**	3-C
F4	0.19	1-C	0.72	3-C	0.24	1-A	1.56	3-C
F8	0.18	1-A	0.80	3-B	0.32	1-A	**2.81**	3-C

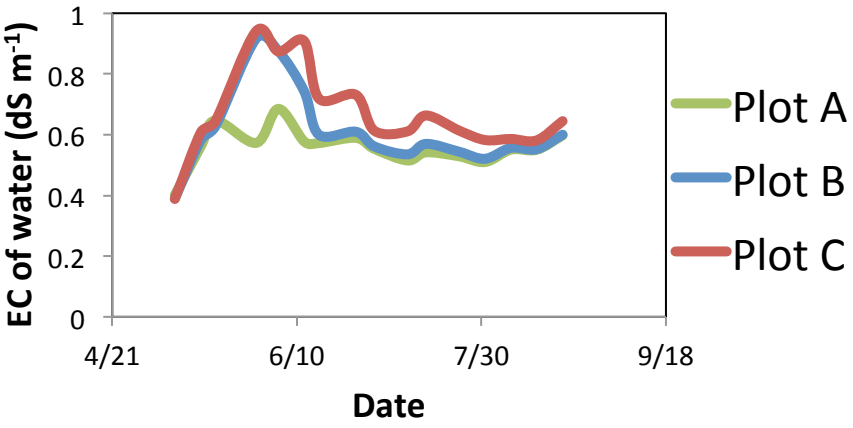
*** 1= Top Check, 2= Middle check, 3= Bottom check; A=closest to check inlet and C=furthest from check inlet**



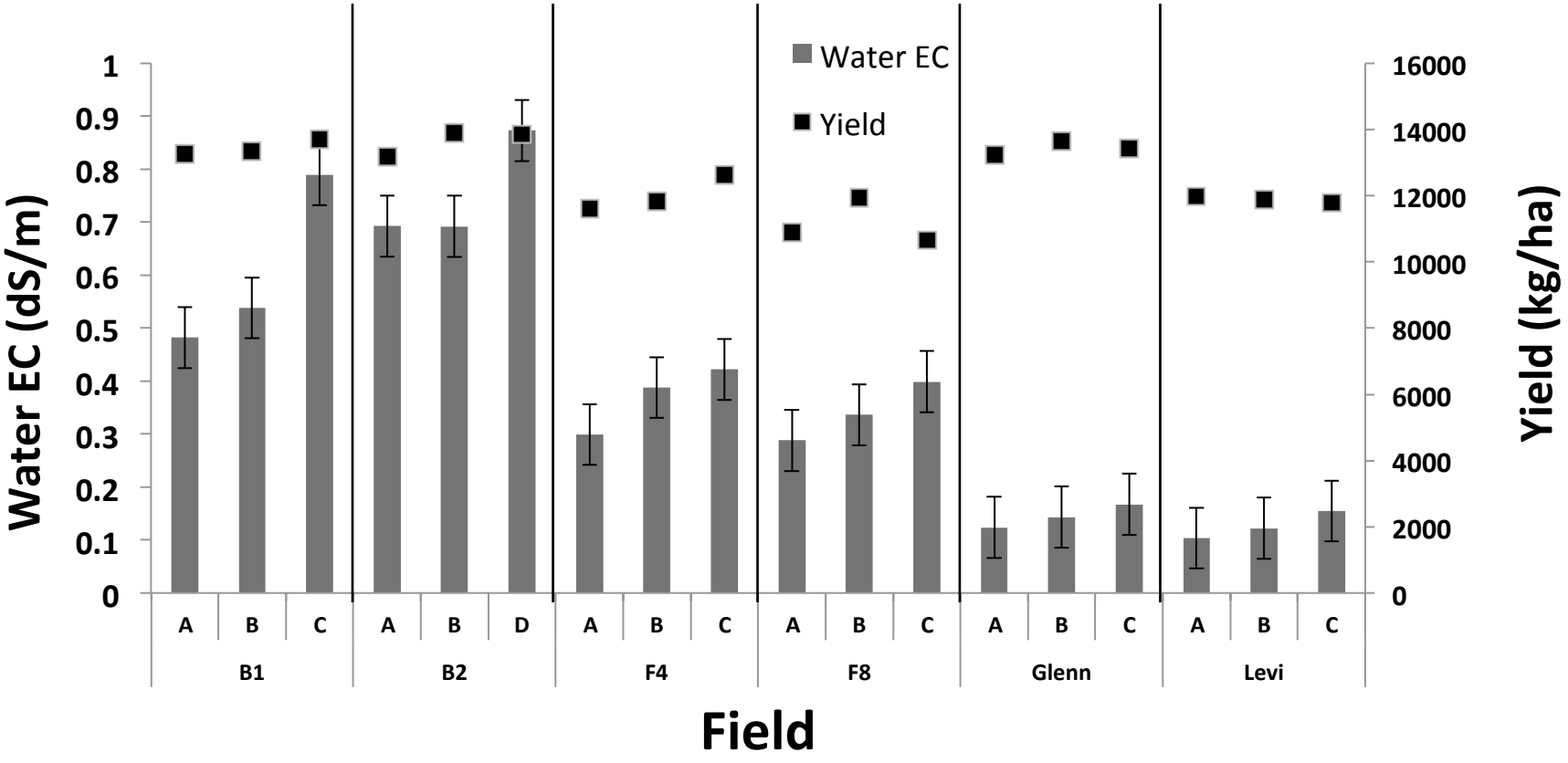
No-spill: Salinity build up within a rice field







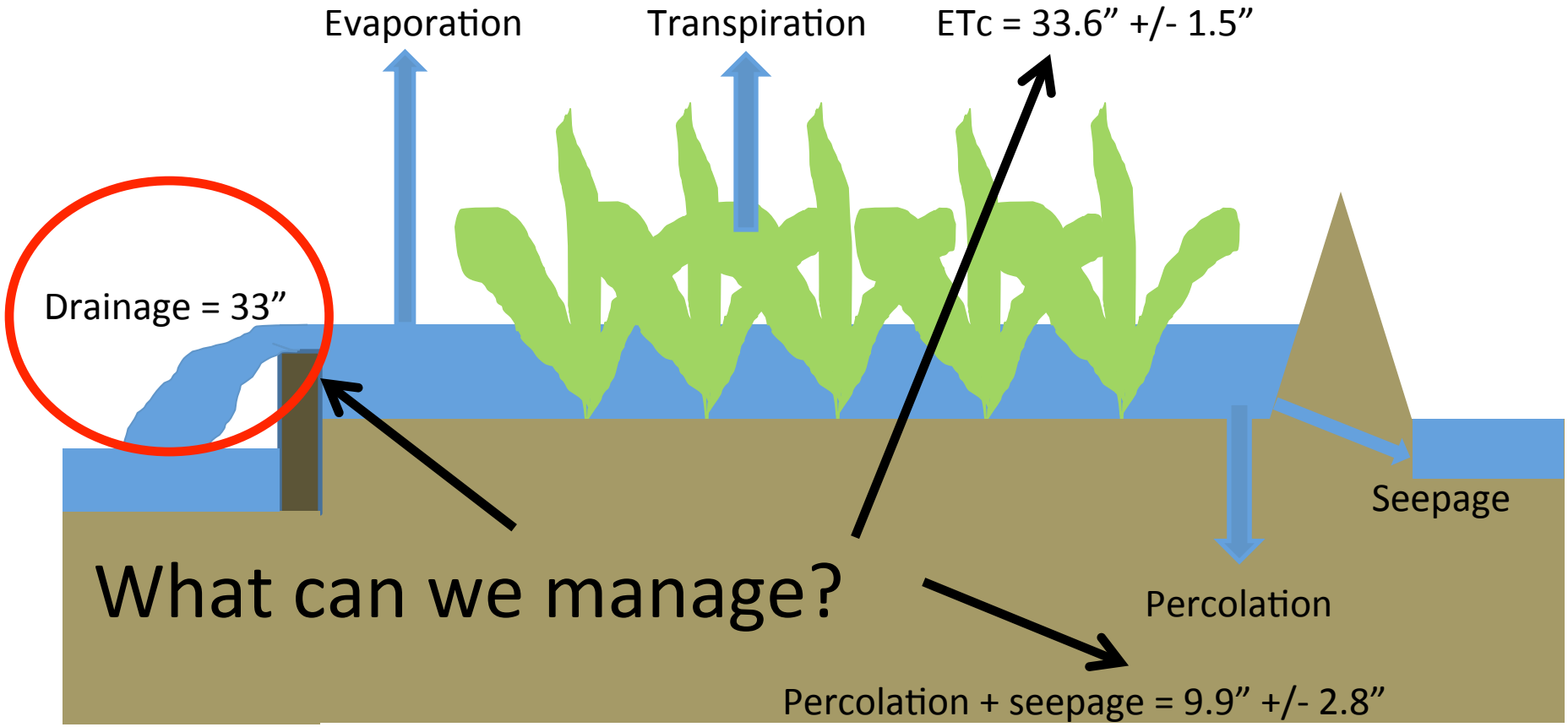
Yields and average water EC



Planning end of season drain

- Rice fields can be safely drained 24 days after heading
  - No flood water remaining in field but soil saturated
- There can be 2 to 6” of water in field at this time.
  - Planning to pull boards at that time results in loss of that water
  - Draining 3” at end of season represents 7% of required seasonal water use (43.5”).
- To save water turn of irrigation early so that water subsides through ET, percolation and seepage losses.
- Guideline (fields will vary!):
  - 3” flood water
  - 0.3” day water loss (ET, percolation and seepage)
  - 10 days for water to subside
  - Turn off irrigation water 14 days after heading and leave boards in place.

Seasonal rice field water losses



Growing rice with less water

- Field selection
  - Sites with low percolation and seepage
  - Sites without salinity problems
- Shorter duration varieties
- Plant later in season if possible
- In fields receiving fresh water with low salinity no-spill water management
- Do not pull boards at end of season to drain field
  - Fields can be safely drained 24 days after 50% heading
  - Turn off irrigation before this time and allow water to slowly subside so field is at drained conditions at 24 days after heading.


Thank you
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