Irrigation Management in Strawberry

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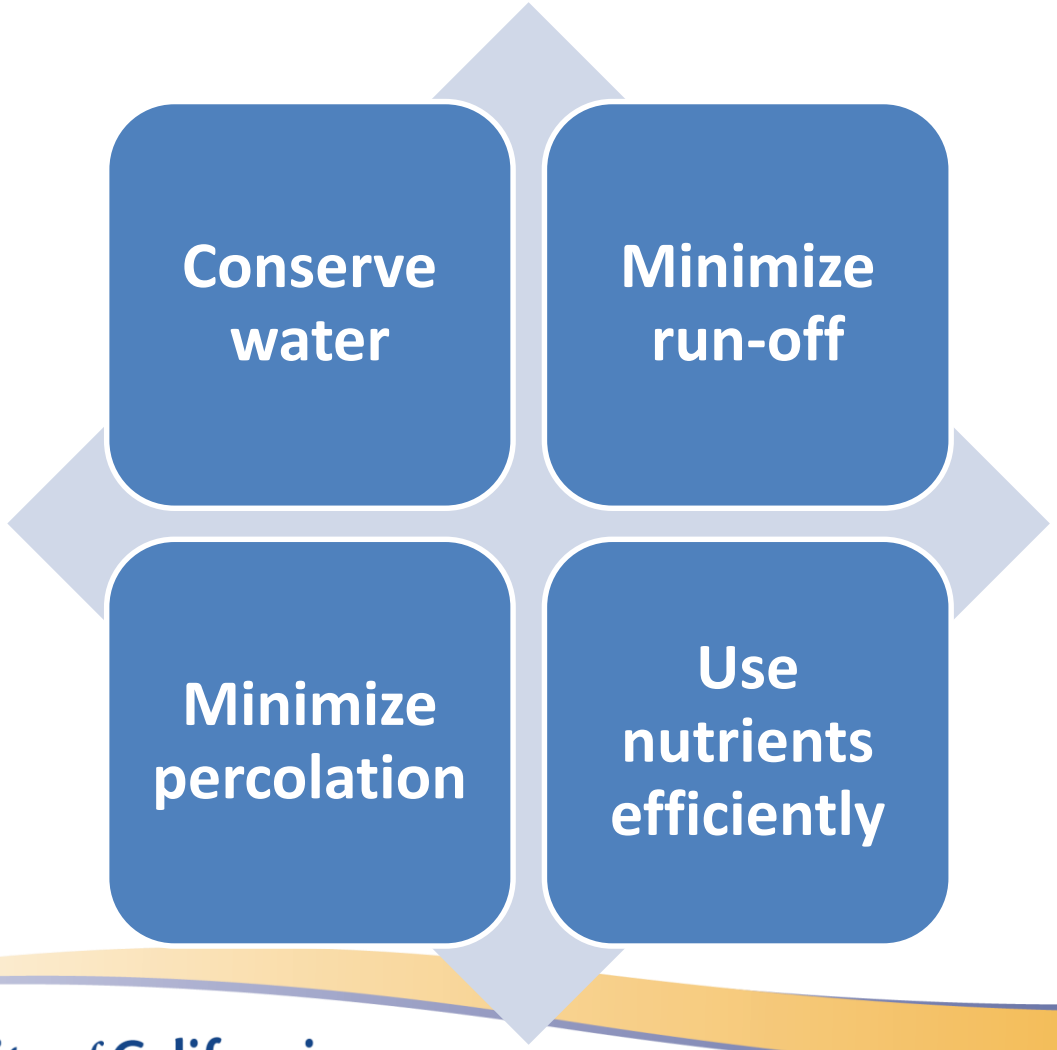
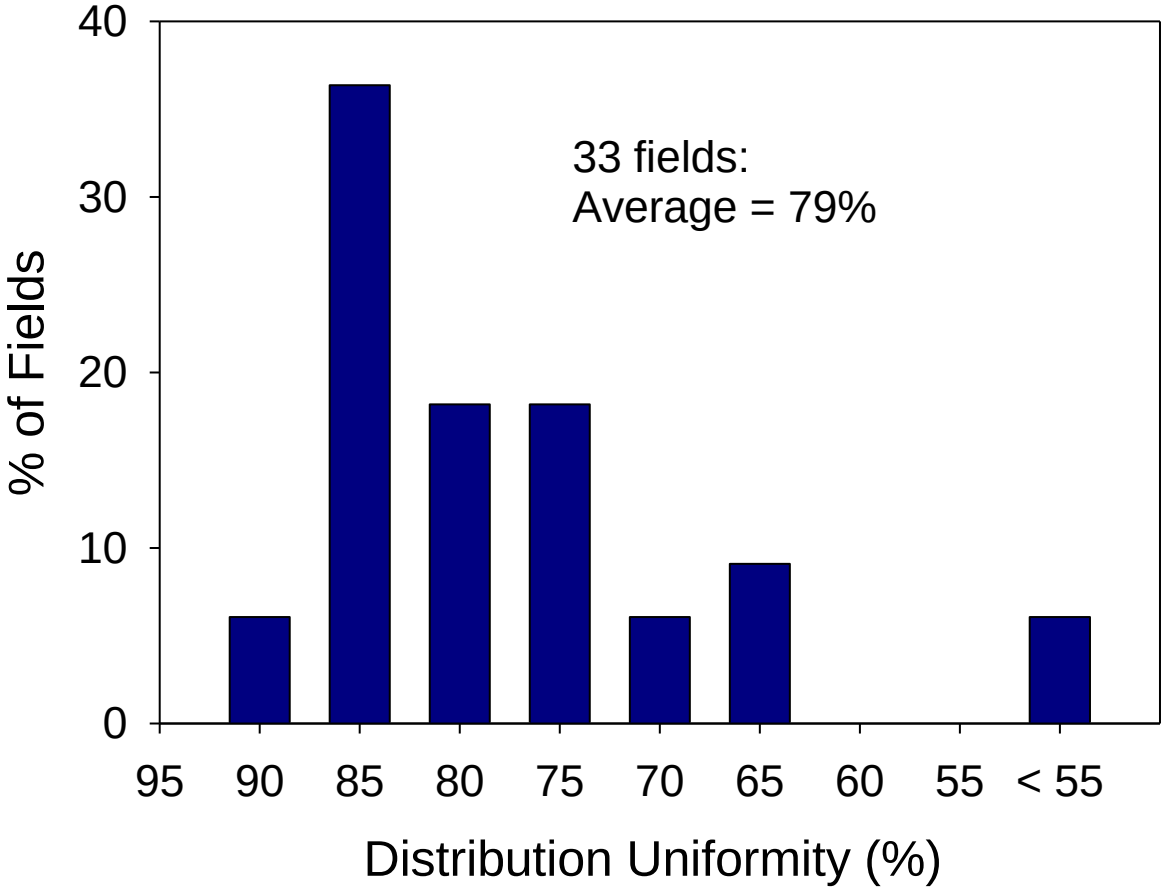
Challenges with drip in strawberries

- Uniform pressure in irrigation blocks
- Application uniformity on slopes
- Fertigation uniformity

Why Achieve Uniformity?



Distribution uniformity of strawberry drip systems (2011-2013)



Achieving high application uniformity with drip

- Properly designed and installed system
- Regular maintenance (fix leaks, flush ends of lines)
- Good operation practices

Uniform pressure is the key to drip

Recommended practice:

1. Check and record pressure during every irrigation

Where?

- ✓ Pump/water source
- ✓ Upstream and downstream of:
  - Filters
  - Valves
  - Pressure regulators
- ✓ Beginning and end of submain
- ✓ Beginning and end of drip lines

2. Use Schrader valves in irrigation blocks

- Use the same gauge for checking pressure at all locations
- Range of gauge should be 0 – 30 psi.
- Periodically check calibration of gauge
- Protect gauge from damage: store properly

3. Use pressure reducing valves to automate pressure regulation

- ✓ **Install at main-submain connections**
- ✓ **Size for flow rate and pressure range**
- ✓ **Need sufficient upsteam pressure (5 psi > downstream psi)**
- ✓ **Add Schrader valves to monitor upstream and downstream pressures**
- ✓ **Maintenance and training needed**

Preset pressure reducing valves

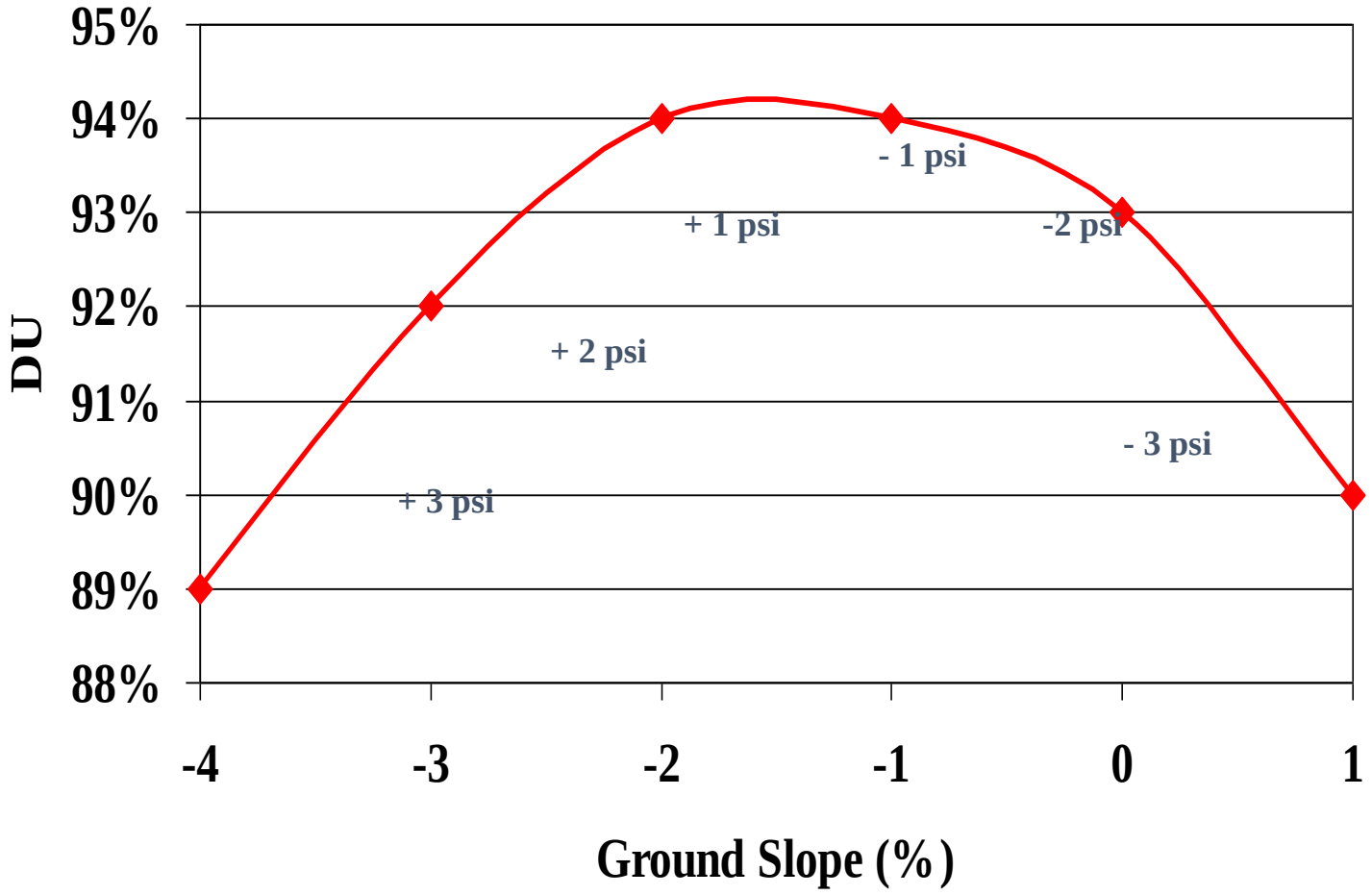
- ✓ Simple to use
- ✓ Low maintenance
- ✓ React quickly to pressure fluctuations
- ✓ Downstream pressure is preset
- ✓ Must be sized for flow rate (up to 100 gpm)

Managing Drip on Slopes

Effect of slope along the bed on uniformity

300 ft beds; high flow tape

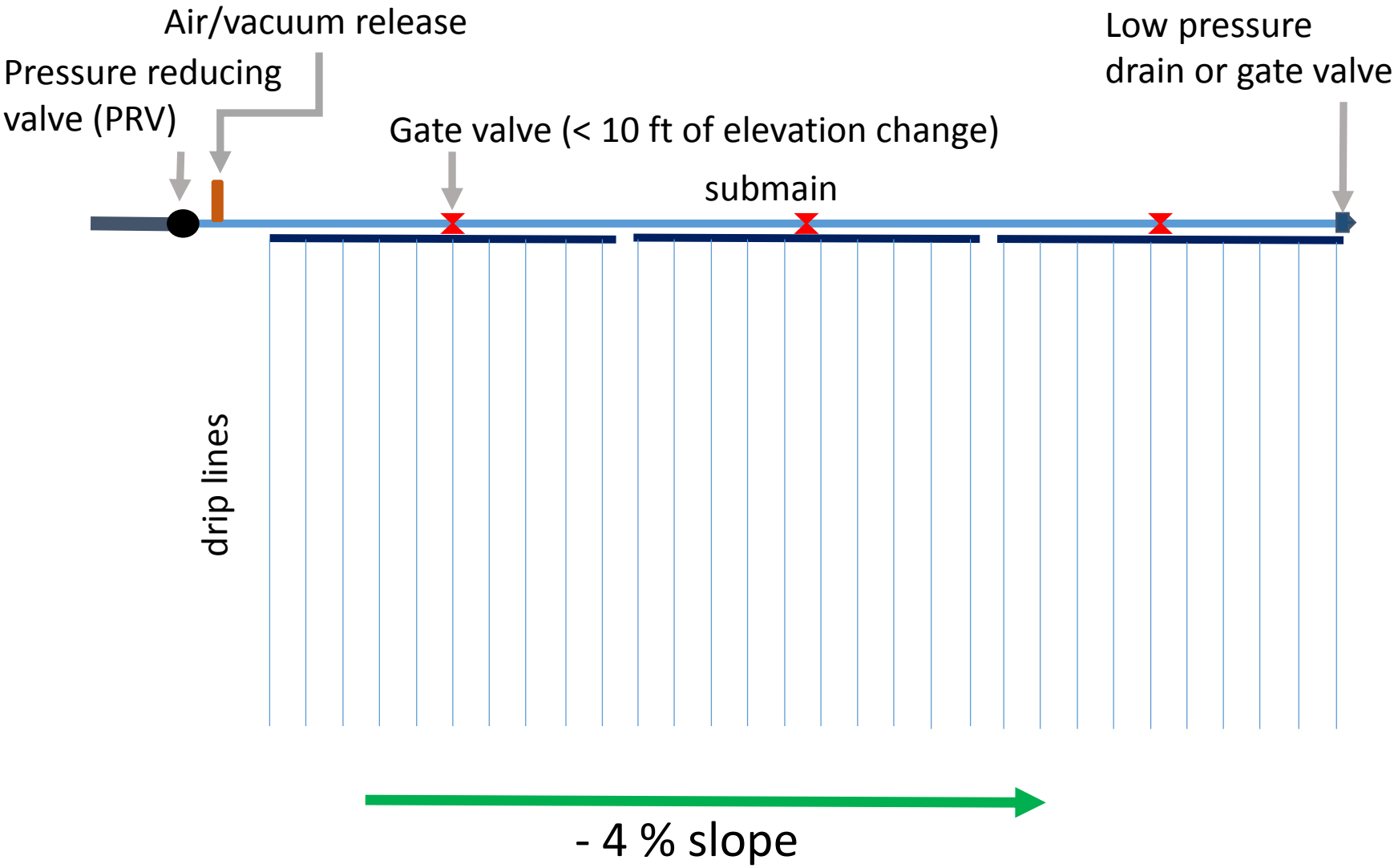
2.3 ft = 1psi



Options for managing slope along the submain

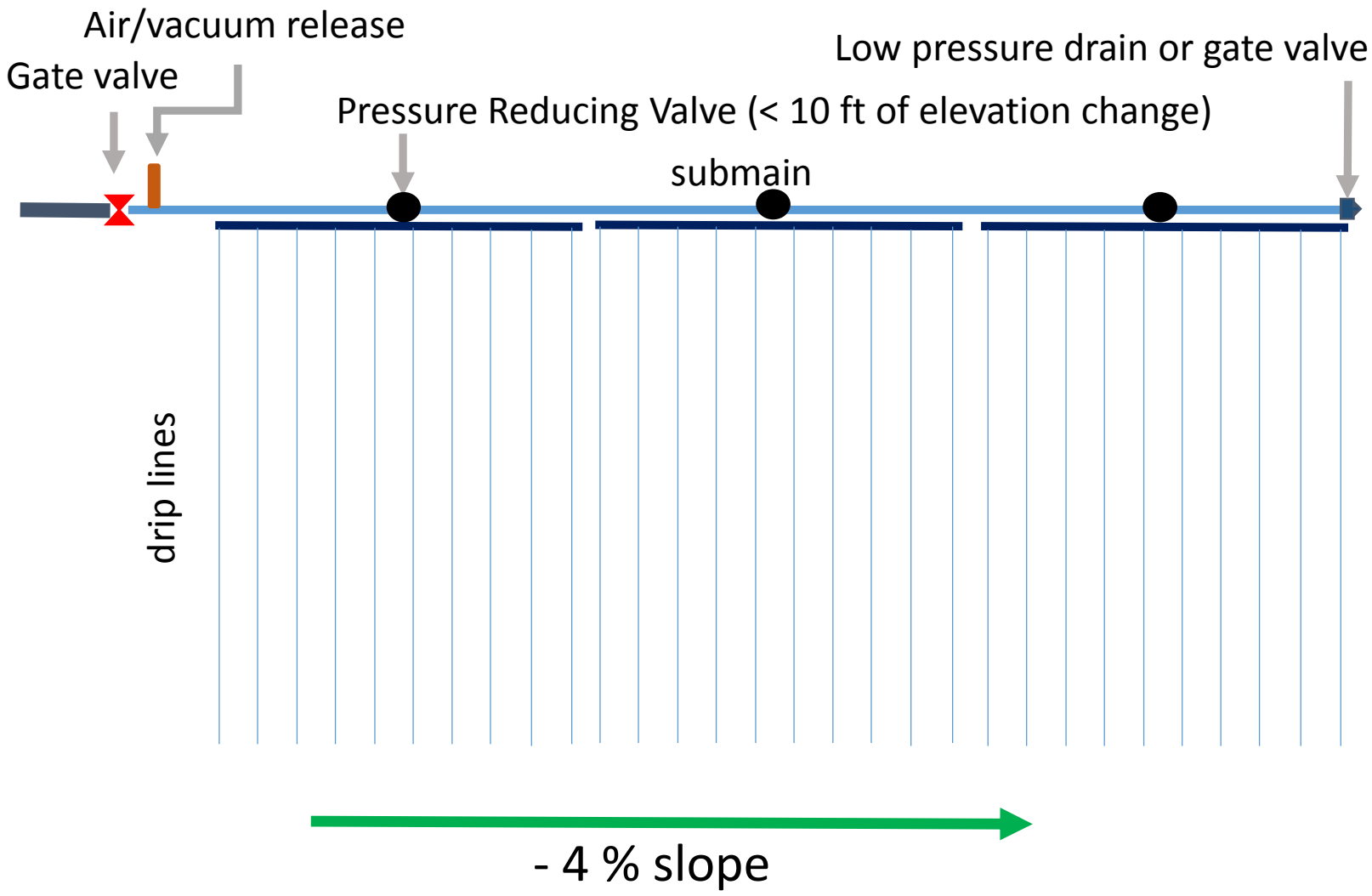
- Run submain (oval hose) downhill and undersize to dissipate pressure (difficult to design)
- Use spaghetti leads of varying lengths and diameters to dissipate pressure (complex design, susceptible to plugging)
- Add manifolds to group beds of similar elevation (preferred)
- Use pressure reducing valves (PRVs) to regulate pressure (better yet)
- Install low pressure drain or gate valve at lowest point to drain submain after irrigating
- Open valves on submain sequentially from top to bottom of slope, and close sequentially from the bottom to top of slope.

Designing a submain along a slope



Managing slope along the submain: Use small pressure regulators

Designing a submain along a slope



Managing slope along the length of the bed

- Install beds parallel to contours (along the hillside)
- No more than +1% elevation gain or -3% drop along the bed length
- Maintain pressure near maximum for tape (10 psi for most 4 mil tapes)
- Use thicker walled tape (6-8 mil)-allows pressures up to 12 to 14 psi
- Use pressure compensating tape

Uniform fertigation applications

Prerequisites:

- High distribution uniformity
- Backflow prevention

Distribution Uniformity of Water and Fertilizer

Field #	Lettuce Type	Bed width	Irrigation DU[1]	Fertilizer Uniformity	Pressure Uniformity
		inches	---------- % ----------		
1	Romaine	40	58	54	82
2	Romaine	80	75	82	87
3	Romaine	80	81	73	62
4	Iceberg	40	80	75	89
5	Romaine	40	83	74	91
6	Romaine	80	46	66	79
7	Romaine	80	86	78	77
8	Iceberg	40	88	46	89
9	Romaine	80	38	32	43
10	Iceberg	80	81	80	86
11	Romaine	40	87	74	99
Average			73	67	80

[1.] Distribution Uniformity of the lowest quarter

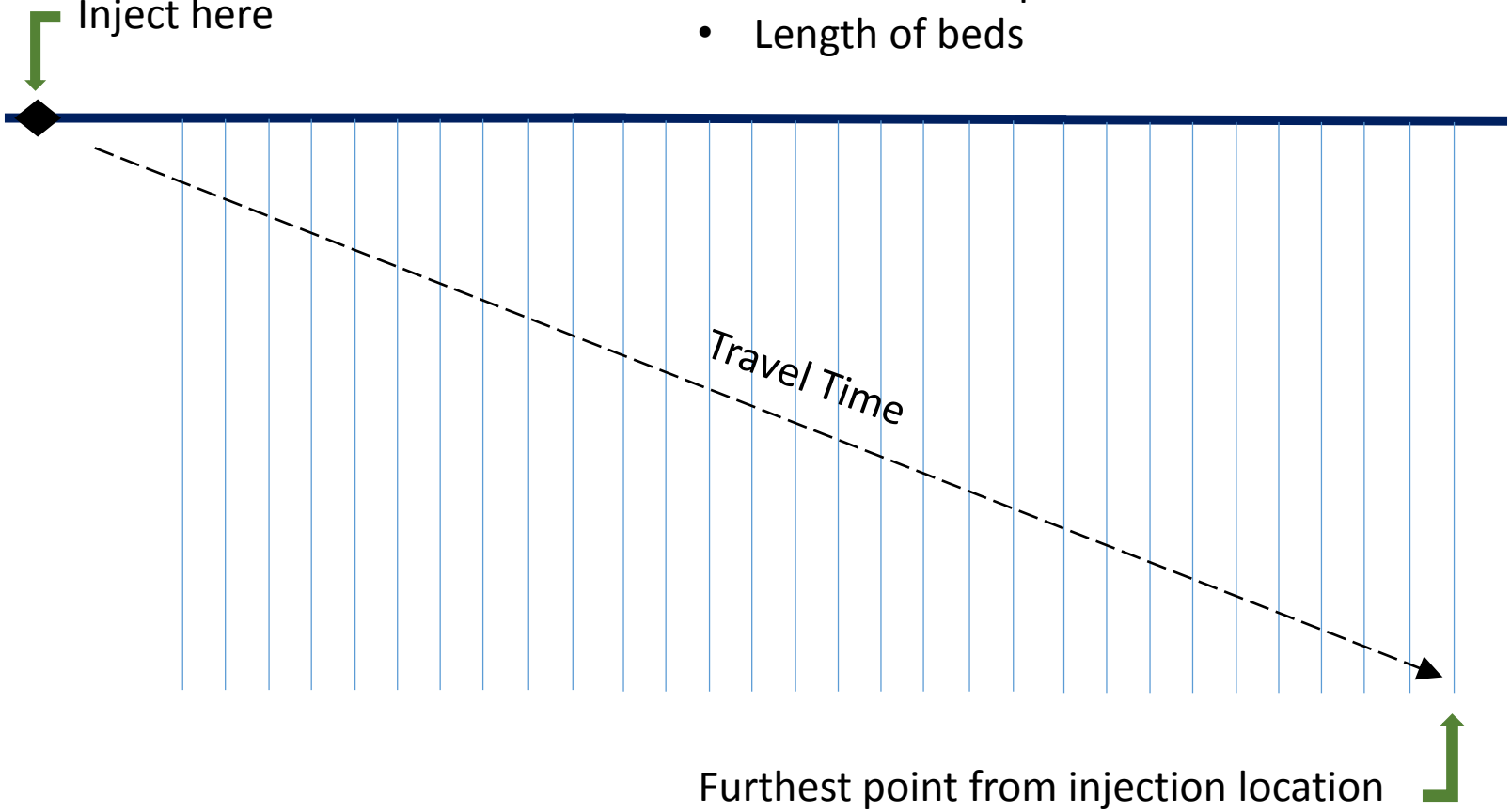
Uniform fertigation applications: Words of wisdom

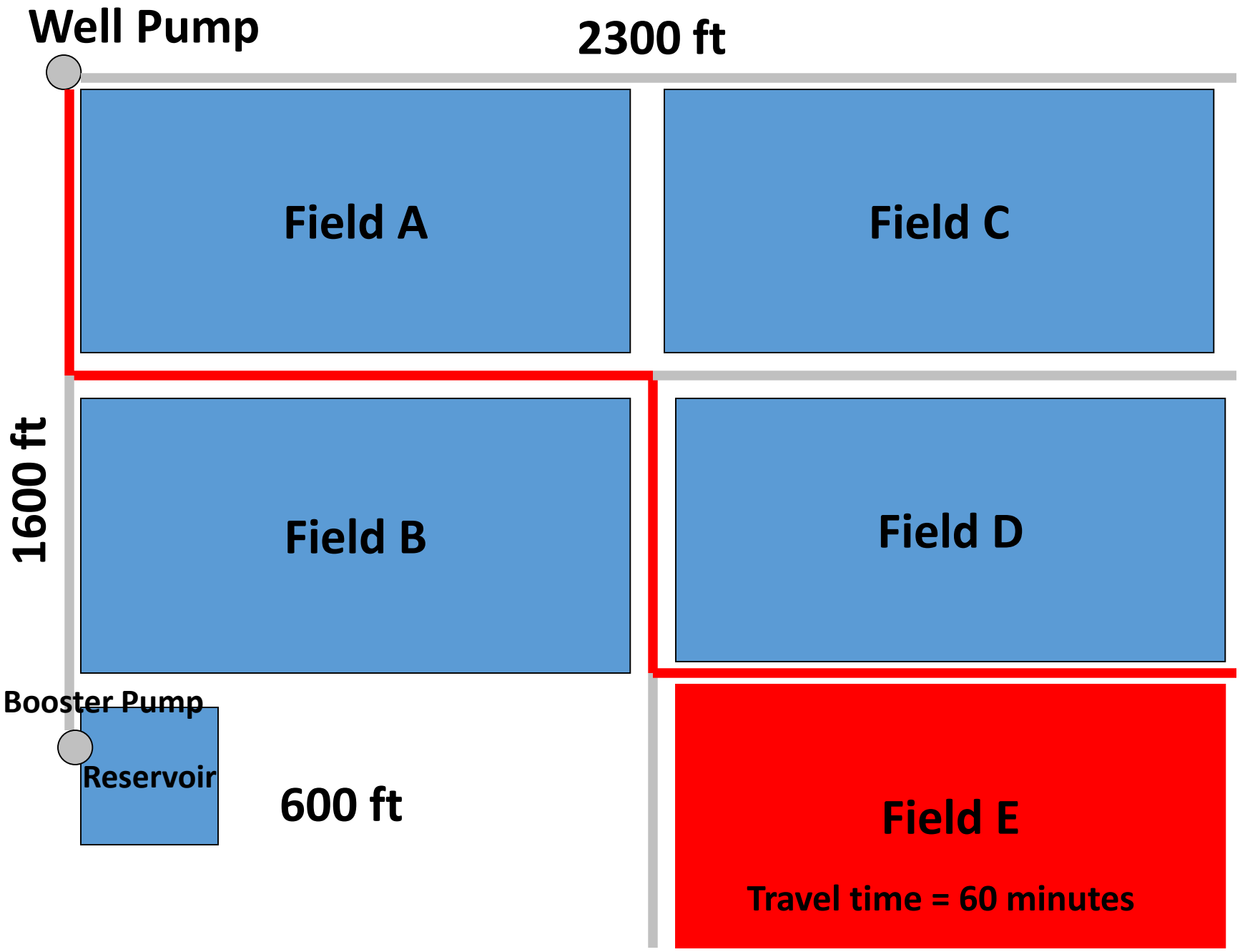
1. **Start injection after drip system is fully pressurized and leaks are fixed**
2. **Inject upstream of a filter to prevent clogging of drip emitters**
3. **Injecting slowly as possible provides a more uniform distribution**
4. **After injection, irrigate a sufficient time with clean water to flush out all of the injected fertilizer from the drip system**
5. **Avoid over-irrigating in subsequent irrigations to prevent leaching losses of nitrate**

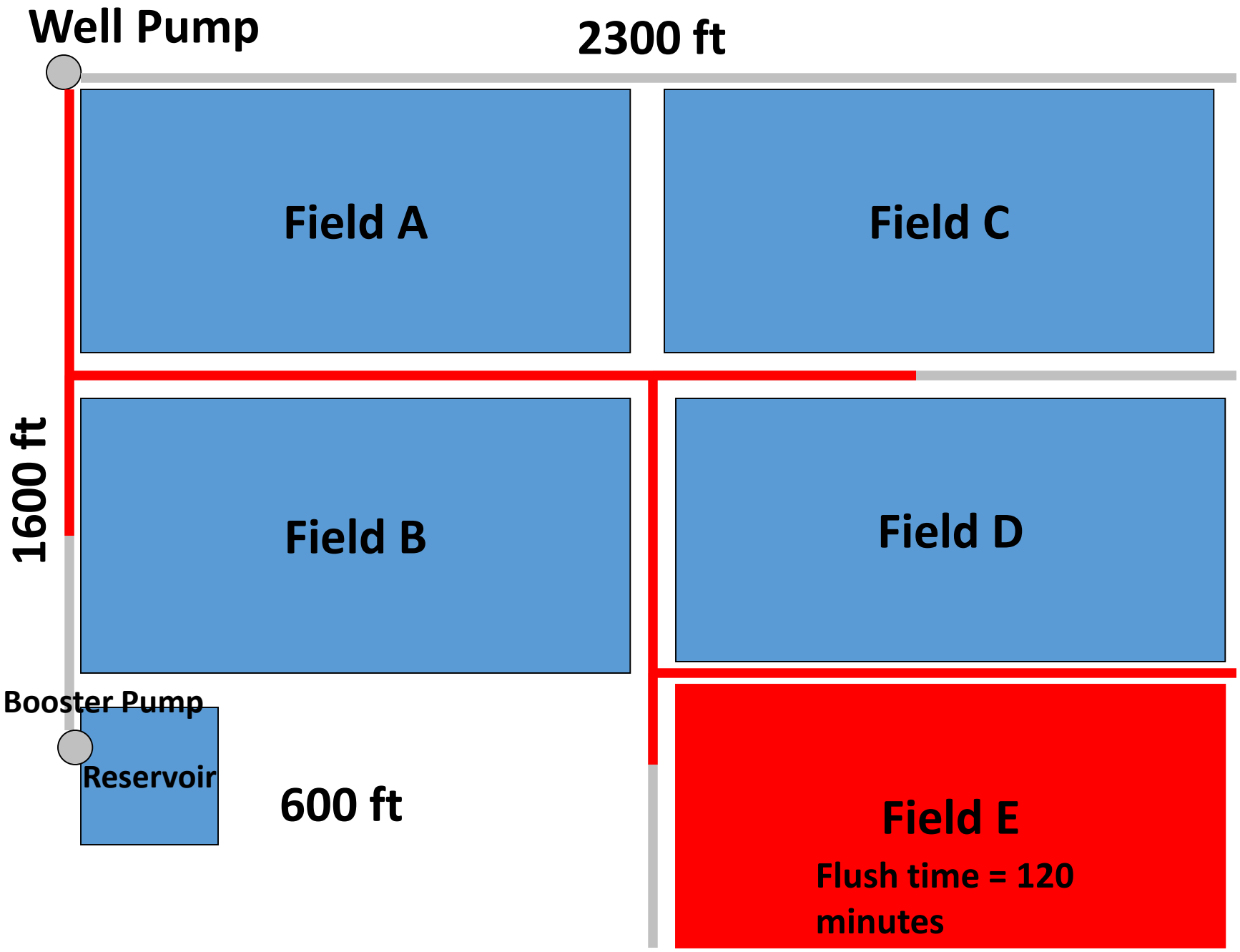
Travel time: how long does the fertilizer need to distribute evenly?

Travel time depends mostly on:

- Injection location
- Flow rate of tape
- Length of beds

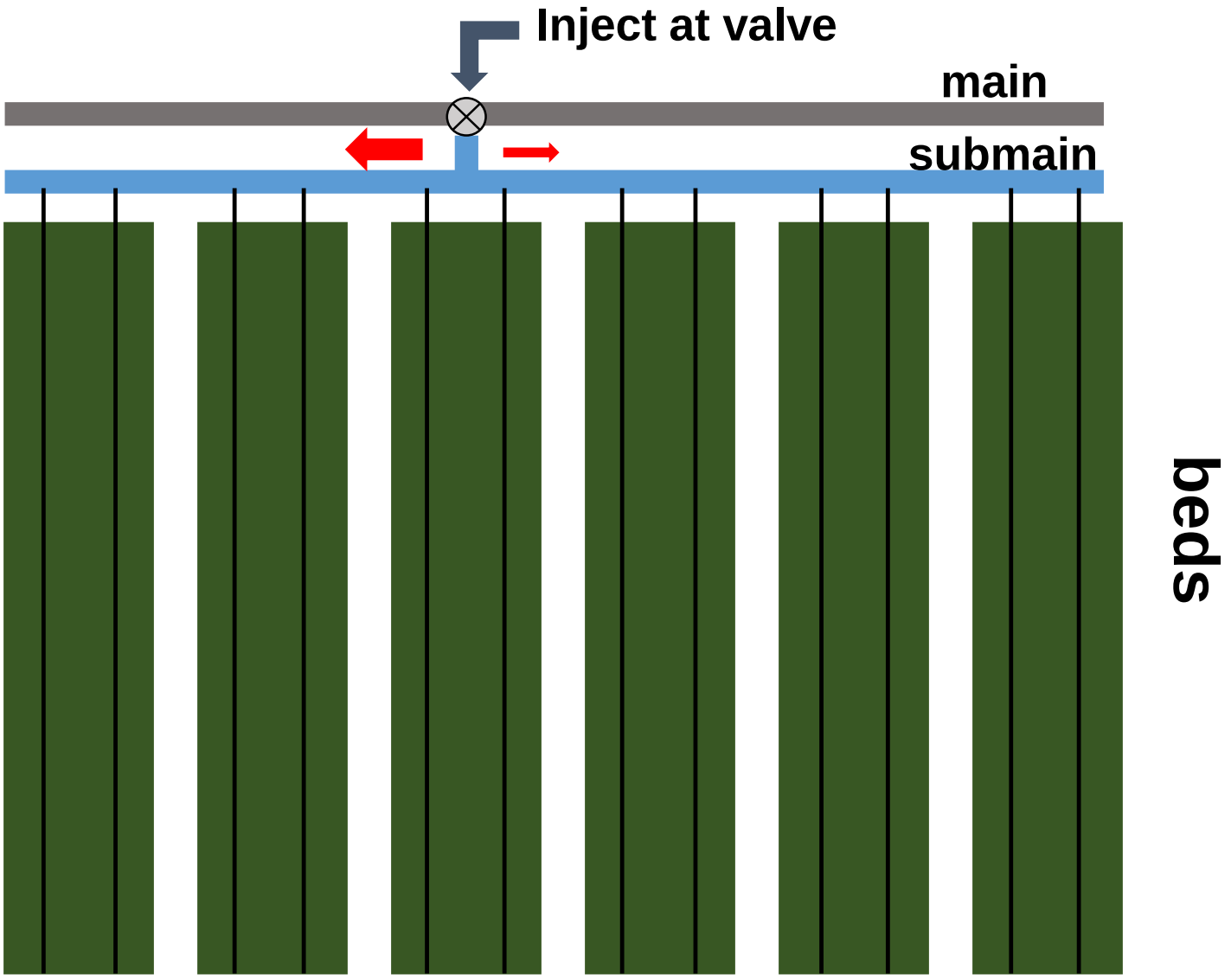


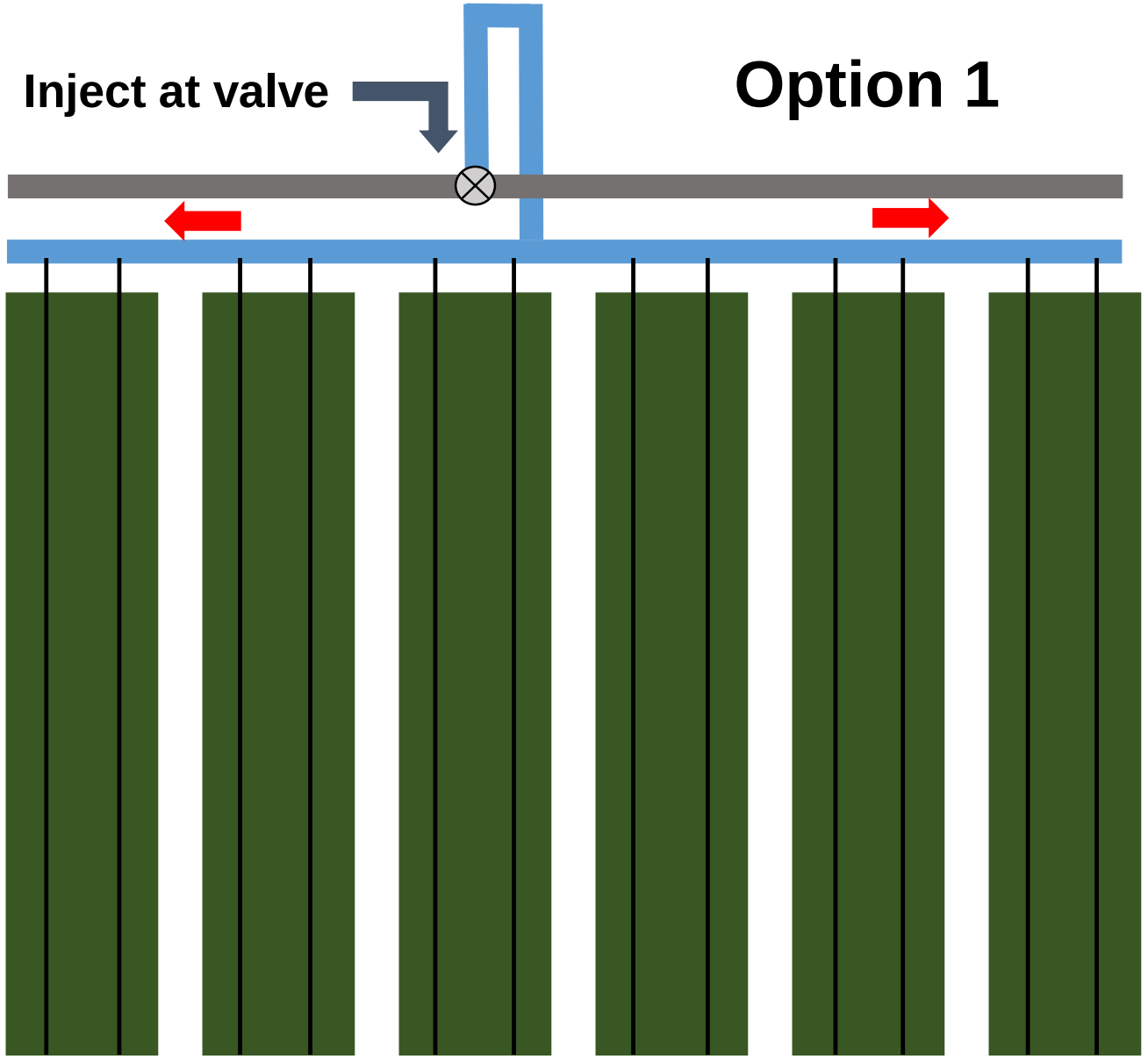

Well Pump
2300 ft
Field A
Field C
1600 ft
Field B
Field D
Booster Pump
Reservoir
600 ft
Field E
Travel time = 60 minutes


Well Pump
2300 ft
Field A
Field C
1600 ft
Field B
Field D
Booster Pump
Reservoir
600 ft
Field E
Flush time = 120 minutes

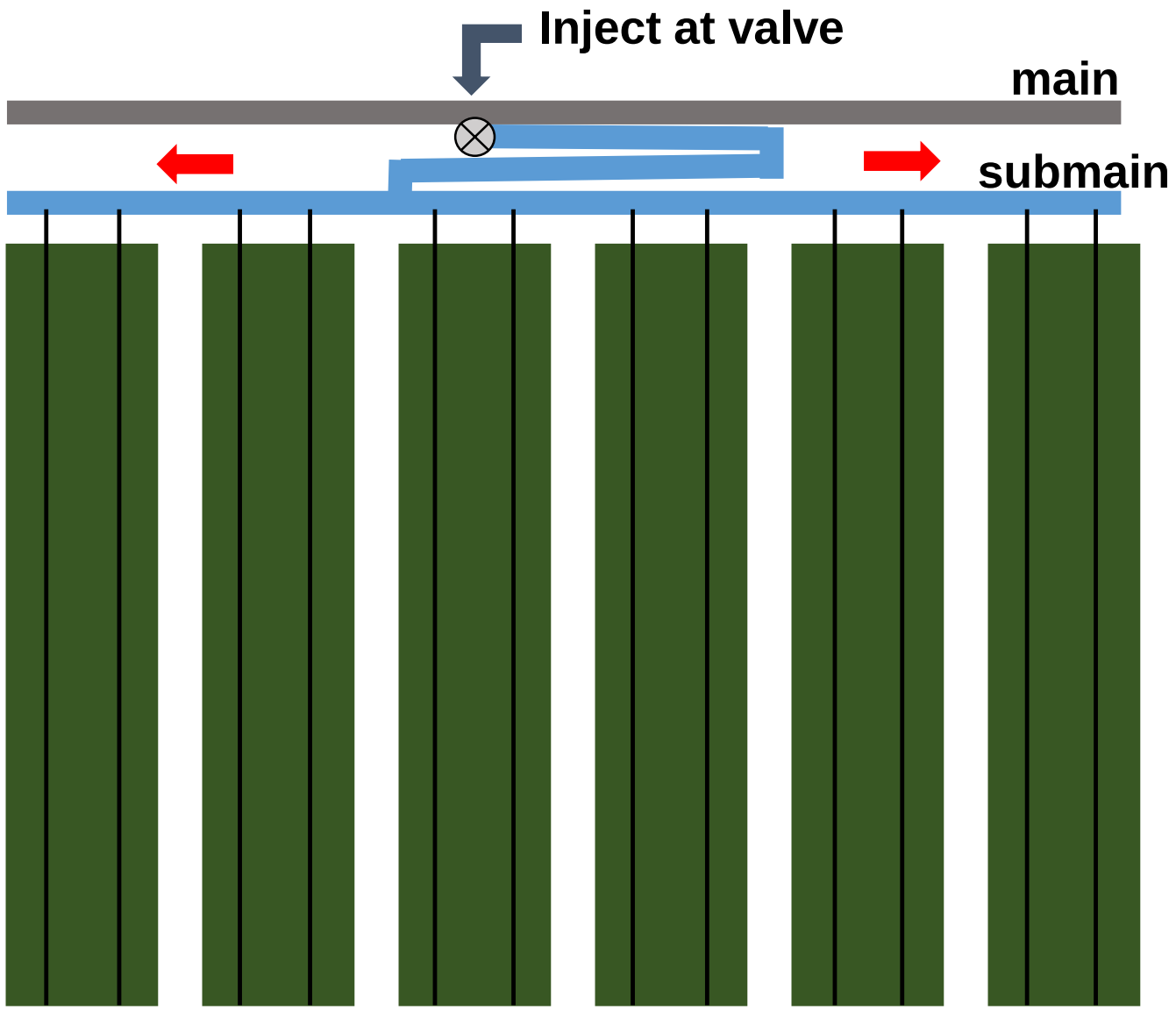
Fertigation: Is there sufficient distance for mixing?

Standard Design




Inject at valve
Option 1

Option 2



Static Mixers

- ✓ Option for short mixing distances
- ✓ Install between injection point and submain
- ✓ Pressure loss of 5 to 10 psi depending on flow rate and size of static mixer

Injection Quills

- ✓ Size to deliver fertilizer to the center of the pipe
- ✓ Optimizes mixing of fertilizer with water stream

Main Points

- Uniform pressure is necessary to have a high distribution uniformity with drip.
- Check and record pressure during every irrigation.
- Use pressure reducing valves (PRV) to maintain consistent pressure in irrigation blocks.
- Pressure reducing valves can be used to increase distribution uniformity on sloped fields.
- Attaining uniform fertilizer applications using chemigation requires that the drip system has a high distribution uniformity and that the correct practices for injecting fertilizers are followed.


Thank you!
Muchas Gracias!