How to determine furrow length

fact sheet

Why is furrow length important?

- Furrow length affects **irrigation efficiency**.
- Irrigation efficiency indicates how much of the water applied to the field is stored in the **root zone,** where plants can reach it (Figure 1).
- **Deep percolation** refers to water that moves below the root zone. This happens more at the beginning of the furrow than at the end (Figure 1).
- **Run-off** is water that runs off the end of the furrow instead of infiltrating into the field (Figure 1).
- The longer the furrow, the longer the **irrigation duration** (amount of time it takes water to flow over the entire field). Long irrigation duration reduces irrigation efficiency because a large percentage of the applied water is lost as **deep percolation** and/or as **run-off** from the field (Figure 1).

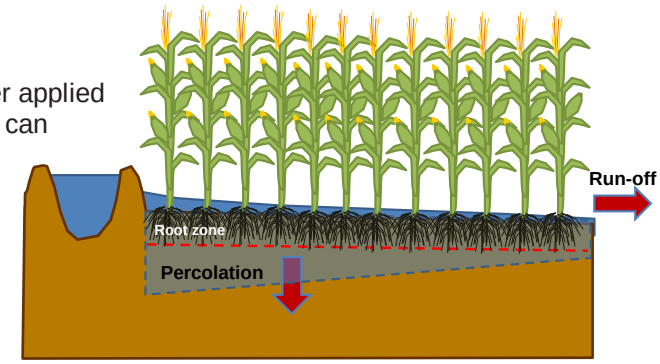

Figure 1. For efficient furrow irrigation, waster losses –run off and percolation- should be minimized.

Choosing furrow length

a. **Soil texture** affects **water infiltration** (the rate at which water enters the soil). Water infiltrates more quickly in coarse textured (sandy) soils than in fine textured (clayey) soils. As a general rule, the sandier the soil, the shorter the furrow should be to reduce losses related to deep percolation (Figure 2). See Table 1 for recommended furrow lengths based on soil texture.

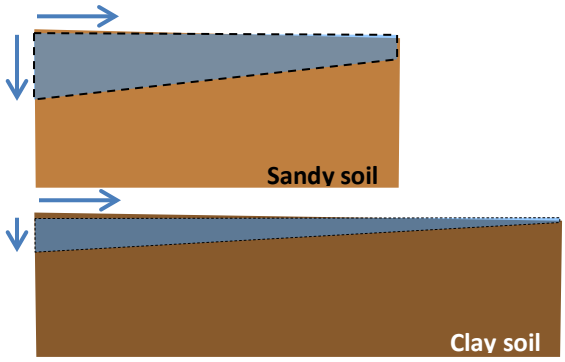

Figure 2. Shorter furrows are better for sandy soils to reduce losses due to deep percolation. Longer furrows are more efficient for clayey soils *(Source: IPO UC Davis).*

b. **Slope** reduces irrigation duration by helping move water through the furrow quickly. However, if it moves too fast, the soil may erode. Slope should not exceed 3% (a height difference of 3m for every 100m of furrow length), and should be as uniform as possible across the field.

c. **Flow rate.** Higher flow rates get water to the end of the furrow more quickly but may erode soil. The ideal flow rate is as high as possible without carrying away significant amounts of soil.

d. **Field layout.** Longer furrows facilitate field operations and maximize use of field space. Make furrows as long as possible while still ensuring that irrigation duration is not too long and soil erosion is minimized.

Table 1. Recommended furrow lengths depending on soil texture *(Adapted from UC Drought management and Tips on Irrigating Vegetables, UC Small Farm Program).*

Soil texture	Recommended furrow length
Clay	250 - 400 m
Loam, silt loam, Clay, clay loam, silty clay loam	180 - 250 m
Sandy, clay, sandy clay loam	150 - 180 m

General recommendations

It is recommended to shorten the furrows to reduce deep percolation, in combination with reduced irrigation duration. This will eventually improve irrigation efficiency.

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