

Drought proofing your farm check list

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General strategies

- Fallow least productive fields if water supply is not sufficient for the optimizing production on all fields
- Optimize soil fertility to maximize production from available water
- Use reduced/conservation tillage to improve soil structure and to reduce pre-season water needed to facilitate tillage operations

Use winter precipitation and irrigation run-off

- Capture storm run-off in ponds/reservoirs
- Plant fall/winter cover crops to minimize storm run-off from fields
- Vegetate permanent ditches to slow storm run-off and maximize ground water recharge
- Furrow dike to slow storm run-off from fields
- Capture irrigation tail water in basin and reuse for irrigations (food safety)

Reduce evaporation/transpiration losses

- Irrigate during the evening, morning or night to minimize evaporative losses
- Control weeds
- Use plastic mulches and organic residue (cover crop residue) mulches
- Convert to irrigation systems that wet less soil surface (furrow to drip, or sprinkler to micro-sprinkler)
- Increase interval between sprinkler irrigations to reduce evaporative losses
- Use short season and early season cultivars
- Incorporate or kill cover crops between rows of permanent crops (trees and vines) before the cropping season
- Time incorporation or killing of winter cover crops to conserve soil moisture for subsequent crop
- Avoid the use of anti-transpirants

Improve infiltration and water holding capacity of soil

- Incorporate organic amendments to increase water holding capacity and macropore structure
- Apply gypsum to minimize crusting of soil surface
- Rotate with cereal crops (rye, barley, wheat) and/or deep rooted agronomic crops (corn, safflower, sunflower)
- Correct drainage problems (install tile drainage, break impeding layers)

Optimize irrigation system design and operation

General practices

- Evaluate distribution uniformity of irrigation system
- Audit operation and maintenance of irrigation system
- Consult with an irrigation system designer
- Check that irrigation system is operating at recommended pressure
- Invest in more efficient irrigation system (eg. change from sprinkler to micro-sprinklers in orchard)
- Train irrigators and irrigation foremen on maintenance and operation
- Grade field to improve the uniformity of slope
- Minimize or eliminate irrigation run-off
- Fix leaks in main and sub main lines

Practices specific to micro-irrigation

- Install pressure gauges or Schrader valves for monitoring pressure at water source, filter, submain connections, and lateral lines (drip hoses, drip tape).
- Use pressure regulators at main-submain connections
- Conduct regular maintenance to prevent clogging of emitters
- Use the appropriate filter for water source and drip system
- Repair leaks
- Replace worn tape/ drip emitters/ micro-sprinklers
- Limit elevation change along rows to less than 15 feet
- Consider using pressure compensating tape/drip emitters/micro-sprinklers
- Make sure main and submain line diameters are appropriate for flow rates

Practices specific to sprinkler irrigation

- Use appropriate nozzle size for spacing of sprinkler heads
- Check that the same sprinkler heads and nozzle sizes are used through out the field
- Irrigate at low wind speeds (< 10 mph)
- Space lateral lines and sprinkler heads to optimize distribution uniformity
- Replace worn nozzles
- Replace worn gaskets
- Replace sprinkler heads that leak or do not turn
- Consider replacing impact sprinkler heads with rotator heads

Practices specific to furrow irrigation

- Surge or pulse irrigate
- Use torpedo to smooth furrows
- Shorten length of furrow runs
- Irrigate alternate furrows
- Start with high application (intake) rates
- Improve uniformity of slope
- Cut-off water when flow reaches tail end of field
- Re-circulate tail water to head of field

Improving irrigation scheduling

Practices that can reduce water use

- Apply appropriate amount of water for pre-plant and early season irrigations
- Apply appropriate amount of water for germination and transplant establishment
- Apply appropriate amount of water for salinity management
- Record volume of water applied (flow meter)
- Use a timer to automatically shut off pump
- Consider using regulated deficit irrigation for tree and vine crops

Information to improve irrigation scheduling

- Know crop water needs (daily evapotranspiration requirement)
- Know the application rate of irrigation system (inches per hour, gallons per hour)
- Know the rooting depth of the crop
- Identify soil type and texture
- Know water holding capacity of soil
- Test salinity of irrigation water and soil
- Understand water stress effects on crop growth, yield and product quality
- Monitor soil moisture
- Use tools for monitoring plant water stress (pressure bomb)
- Use CIMIS or other weather stations for determining daily crop evapotranspiration requirements
- Use irrigation scheduling software or spreadsheets to aid irrigation decisions