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 throughout 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