SOP 13 Distribution uniformity evaluation for surface drip

Updated 7/15/2010

Estimated completion time: field: 12 person hours, data analysis: 4 person hours

Materials needed:

1. GPS or measuring wheel
2. Clip board
3. Data sheet
4. Sharpie pen
5. 12 ft tape measure
6. Flags
7. 10-20 0.5 L water collection cups (flat bottom)
8. 2 of each: 100 ml , 250 ml , and 500 ml graduated cylinders
9. 2 funnels
10. Hose pieces to isolate emitters
11. 15 Schrader valves on T's with connectors for 7/8" tape
12. 15 Schrader valves on T's with connectors for 5/8" tape
13. 10 Schrader valves on for end of drip tape lines with connectors for 7/8" tape
14. 10 Schrader valves on for end of drip tape lines with connectors for 5/8" tape
15. 10 couplers for 7/8" tape
16. 10 couplers for 5/8" tape
17. Stop watch
18. Calibrated pressure gauge with Schrader adapter

Procedures:

Preparations before irrigating (recommend completing the day before irrigating)

Description of field and drip tape (Skip if also doing SOP 20):

1. Measure longest and shortest row.
2. Determine width of field
3. Determine area of field
4. Determine bed width
5. Determine in row spacing of plants
6. Determine emitter spacing on tape
7. Determine tape diameter and wall thickness
8. Determine tape flow rate (emitter discharge rate) and if pressure compensating
9. Map block to be evaluated and location of measurements

Emitter and pressure evaluation (before irrigating):

1. Determine 6 areas to measure pressure and emitter flow rates (areas should represent different elevations and distances from water source [pump o r mainline] such as the head, middle, and lower end of irrigation block, as well as the middle and sides of the field). Identify each evaluation area on map by codes A,B,C, etc. Estimate distances between the areas and a reference point (submain and bed number) Install a T with a Schrader valve and locate a flag near the valve.
2. Install a T with a Schrader valve at each of the 6 evaluation areas, and locate a flag near the valve.
3. Install Schrader T valves at 5 locations along the submain for the block; record the distance of Schrader valves from a reference point on the map (bed number). Place a flag where each valve is located (NOTE: skip this step if also doing SOP 20).
4. Install Schrader end valves at 5 locations at the lower end of the block; record the distance of Schrader valves from a reference point on the map (bed number) (NOTE: skip this step if also doing SOP 20).
5. Record initial flow meter reading and time irrigation begins.

After irrigation begins:

6. Do the following at 10 or more locations within each evaluation area (A-F) after the irrigation system is operating and fully pressurized:
    a. Record starting pressure with calibrated pressure gauge
    b. Place hose rings on both sides of emitters
    c. Place 1st collection cup below emitter and start stop watch.
    d. Check that water is dripping into cup
    e. After 30 seconds place next cup below an emitter.
    f. Repeat steps “b ” - “d” until 10 cups are positioned.
    g. Remove the first cup after 10 minutes (Note: adjust time if cups overfill or insufficient volume is collected).
    h. Remove the other cups @ 30 second intervals.
    i. Record ending pressure with calibrated gauge.
    j. Measure volume of water in each collection cup and record cup number by area (A, B, C) and cup number.
7. Record pressure along submain and tail of field after the irrigation system is operating and fully pressurized.

8. After irrigation system is turned off or after all areas are evaluated:
    a. Remove Schrader valves and reconnect cut tape using couplers
    b. Remove hose pieces and cups
    c. Remove all flags

9. Record end flow meter reading and time.

Calculations: Enter data into **DU drip row crop spreadsheet**

1. Calculate overall emitter application rate (gal/minute/emitter)
2. Calculate overall tape discharge rate (gal/minute/100 feet of tape)

3. Calculate regional tape discharge rate (each area or groups of areas)
4. Calculate field application rate (overall and regional) (inches/hour)
5. Evaluate pressure vs tape discharge rate if pressure varies significantly within irrigation block
6. Calculate overall DU lowest quarter for the irrigation block
7. Calculate regional DU lowest quarter (group of at least 20 cups)
8. Calculate overall 10% scheduling coefficient for the irrigation block
9. Calculate regional 10% scheduling coefficient (group of at least 20 cups)
10. Calculate applied water and field application rate (in/hr) from flow meter data

Comments

1. Use 15 sec intervals between cups to speed up DU evaluation
2. Use GPS to determine elevation of collection area on hilly blocks.

Notes:

Grower _____ Date _____

Ranch _____ Block _____

crop and field dimensions

crop	
plant rows per bed	
between row spacing (feet)	
In row plant spacing (feet)	
bed width or spacing (feet)	
shortest bed length (feet)	
longest bed length (feet)	
field width (feet)	
field area (acres)	
slope of field (%)	

drip tape characteristics

Tape diameter (inches)	
Tape wall thickness	
Tape discharge rate (gpm/100ft)	
Emitter spacing (inches)	
number of tape lines per bed	

Field Map

Grower _____ Date _____

Ranch _____ Block _____

Area A		**Area B**		**Area C**	
time (min)		**time (min)**		**time (min)**	
start pressure (psi)		start pressure (psi)		start pressure (psi)	
	----------	collection volume (ml)			----------
cup A1		cup B1		cup C1	
cup A2		cup B2		cup C2	
cup A3		cup B3		cup C3	
cup A4		cup B4		cup C4	
cup A5		cup B5		cup C5	
cup A6		cup B6		cup C6	
cup A7		cup B7		cup C7	
cup A8		cup B8		cup C8	
cup A9		cup B9		cup C9	
cup A10		cup B10		cup C10	
cup A11		cup B11		cup C11	
cup A12		cup B12		cup C12	
end pressure (psi)		end pressure (psi)		end pressure (psi)	

Area D		**Area E**		**Area F**	
time (min)		**time (min)**		**time (min)**	
start pressure (psi)		start pressure (psi)		start pressure (psi)	
	----------	collection volume (ml)			----------
cup D1		cup E1		cup F1	
cup D2		cup E2		cup F2	
cup D3		cup E3		cup F3	
cup D4		cup E4		cup F4	
cup D5		cup E5		cup F5	
cup D6		cup E6		cup F6	
cup D7		cup E7		cup F7	
cup D8		cup E8		cup F8	
cup D9		cup E9		cup F9	
cup D10		cup E10		cup F10	
cup D11		cup E11		cup F11	
cup D12		cup E12		cup F12	
end pressure (psi)		end pressure (psi)		end pressure (psi)	

Grower _____ Date _____

Ranch _____ Block _____

Location	Description	Time 1	Pressure (psi)	Time 2	Pressure (psi)	Time 3	Pressure (psi)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							