SOP 12 Distribution uniformity evaluation for subsurface (buried) drip

Updated 7/15/10

Estimated completion time: field: 16 person hours, data analysis: 4 person hours

Materials needed:

1. GPS or measuring wheel
2. Clip board
3. 12 ft tape measure
4. 10-20 0.5 L water collection cups (flat bottom)
5. 2 of each: 100 ml , 250 ml , and 500 ml graduated cylinders
6. 2 funnels
7. Hose pieces to isolate emitters
8. 15 Schrader valves on T's with connectors for 7/8" tape
9. 15 Schrader valves on T's with connectors for 5/8" tape
10. 10 Schrader valves on for end of drip tape lines with connectors for 7/8" tape
11. 10 Schrader valves on for end of drip tape lines with connectors for 5/8" tape
12. 15 couplers for 7/8" tape
13. 15 couplers for 5/8" tape
14. 2 Shovels
15. Garden trowel
16. Data sheet
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 conduct measure pressure and emitter flow rates (areas should represent different elevations and distances from water source [pump] such as the head, middle, tail, and lower end of irrigation block). Identify each evaluation area on map by codes A,B,C, etc. Estimate distances from reference point (submain and bed number)

2. 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).
3. 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).
4. Do the following at each evaluation area before irrigating:
    a. At 5 locations within the evaluation area dig down to drip tape using a shovel and trowel to expose at least a 1.5 foot length of tape.
    b. Install a T with a Schrader valve at 1 of the 5 locations.
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 15 cups)
8. Calculate overall 10% scheduling coefficient for the irrigation block
9. Calculate regional 10% scheduling coefficient (group of at least 15 cups)
10. Calculate applied water and field application rate (in/hr) from flow meter data

Comments

1. Use 10 or 15 sec intervals between cups to speed up DU evaluation

2. Use GPS to determine elevation of collection area on hilly blocks.
3. Add 1 or 2 more DU evaluation areas if there is sufficient time.

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 _____

Grower _____ Date _____

Ranch _____ Block _____

Flowmeter 1		Flowmeter 2	
Time	Reading (gal/acre-ft)	Time	Reading (gal/acre-ft)

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 _____
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 _____
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							