



Irrigation of Liquid Manures with Solid Set Systems

F 257

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This fact sheet emphasizing how to check a solid set liquid manure system for appropriate application rates is part of a fact sheet series. If you have not read, or are not familiar with, fact sheet F 254 *Irrigation of Liquid Manures: Basic Principles and Procedures*, please read it before trying to use the information in this fact sheet.

Solid Set Irrigation System

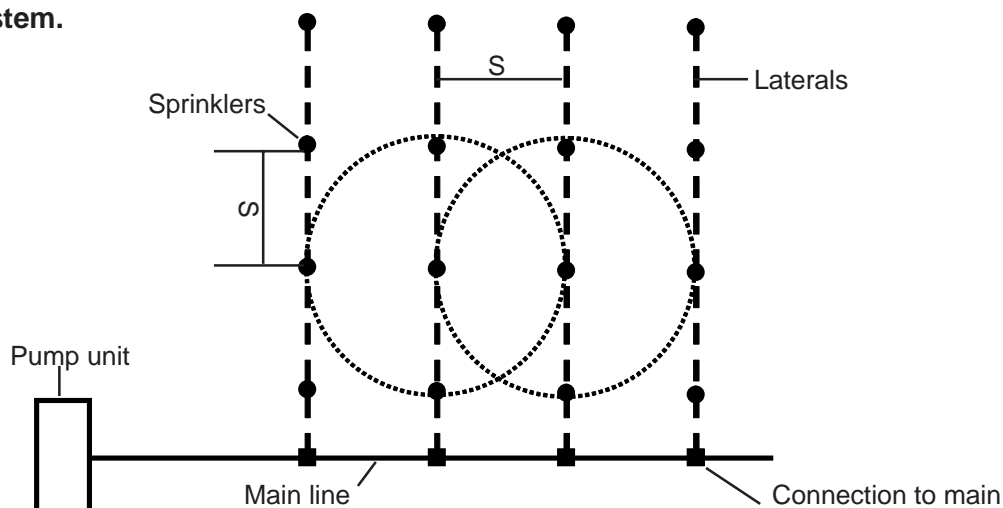
Solid set irrigation is a system of irrigation sprinklers and piping placed in a field. The piping is usually spaced a distance of one sprinkler radius apart on each lateral, see Figure 1. This creates a square spacing of sprinklers within the field. The piping may either be buried PVC or steel to create a permanent system or it may be aluminum and very portable (can be easily moved from one location to another). Solid set irrigation systems are rarely used to apply liquid manure. The sprinklers are generally small with nozzles that are too small to freely pass the manure solids. If the manure to be applied has a very low solids content and the solids are small, it may be possible to use a solid set system. The application rates are very uniform and often quite low, both advantages to good manure application. On the other

hand, solid set systems are usually not moved often enough and excessive depths of manure are applied leading to runoff and/or over application of nutrients.

Application Rate. Solid set irrigation systems consist of multiple sprinklers (usually smaller sprinklers than are used on travellers) located on pipelines called laterals with the sprinklers spaced about a wetted radius (one-half the wetted diameter) apart. When sprinklers are placed in square stationary positions with uniform overlap as in a solid set irrigation system, the average application rate, A_r experienced at any point in the field can be computed as

$$A_r = \frac{96.3Q}{S^2} \quad (1)$$

Figure 1. Solid Set Irrigation System.



where A_r = application rate in inches per hour
 Q = sprinkler discharge (gpm)
 S = distance between sprinklers in a square spacing (feet)
96.3 = unit conversion factor

Example 1. Sprinklers with 200-foot wetted diameters are used to apply liquid manure in a field of hay with silt loam soil. These sprinklers are placed on a 100- by 100-foot square spacing ($S = 100$ feet). Each sprinkler discharges 50 gpm. Compute the application rates.

Solution: The application rate for a 100- by 100-foot square spacing of sprinklers can be computed as

$$A_r = \frac{96.3(50 \text{ gpm})}{100^2} = 0.48 \text{ in/hr}$$

Evaluating a Solid Set Liquid Manure Irrigation System

Assessment Data. To be able to fully assess the suitability of a liquid manure application system using a travelling gun or traveller, the following information should be provided:

1. Sprinkler Discharge (Q) = _____ gpm
2. Sprinkler Wetted Diameter (W_d) = _____ feet
3. Sprinkler Pressure = _____ psi
4. Traveller Speed (S_p) = _____ ft/min
5. Spacing between traveller paths (S) = _____ feet
6. A sketch of the field where the traveller will be used along with indications of where the traveller will track through the field. Indicate slopes and changes in elevation along these paths.
7. A sketch of the field and all environmentally sensitive features within 1,000 feet of the field including streams, waterways, ponds, lakes, wells, springs, sinkholes, rock outcrops, homes, roads, subdivisions, steep slopes etc. Also show slope direction.

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