Sprinkler Irrigation Systems

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I. INTRODUCTION

Sprinkler irrigation is a versatile means of applying water to the surface of any crop or soil. A sprinkler system can apply water to soils at rates equal to, greater than, or less than the infiltration rate; it can be completely automatic or can be manually operated. In general, a sprinkler system can be employed for most soil and topographic conditions and for those areas where surface irrigation may be inefficient and expensive.

The sprinkler is the most important part of a sprinkler system. Most sprinklers consist of one or more nozzles or orifices that spray water under pressure through the air to irrigate some desired area. The wide range in sprinkler and nozzle sizes and types of sprinklers usually permits the designer to select the proper sprinkler and operating pressure to meet specific soil and crop requirements satisfactorily.

The high degree of water control is the outstanding advantage of sprinklers over other methods of irrigation (Fig. 44–1). Water application rates can be as low as 0.25 cm/hour (0.10 inches/hour), thus permitting the irrigation of steep or undulating lands and shallow soils without the hazards of soil erosion or excessive water losses. Sprinkler systems generally utilize smaller rates of water flow more effectively than surface irrigation methods and are of distinct advantage on soils of high permeability or low water-holding capacity. Under some conditions they can be advantageous on dense soils of low permeability. Where labor costs are high for surface irrigation, sprinkler irrigation may be the most economical method for applying water. Sprinkler systems are especially desirable where the required pressure can be developed by gravity.

Sprinkler systems have uses other than those of meeting the water requirements of a crop. Fertilizer application, frost protection, and temperature control (see chapters 52, 53, and 54) are becoming prominent and accepted uses of sprinkler systems all over the world.

Like other economic or physical entities, sprinkler systems also have disadvantages, depending on the conditions involved. Damage to citrus has been observed when poor quality irrigation waters were sprayed on the foliage by sprinklers (Eaton and Harding, 1959). In some cases, poor quality waters will leave undesirable deposits on the leaves or fruit of the crop. Also, in some instances, the influence of free water on crop surfaces as a result of sprinkler irrigation has enhanced the propagation of fungi or foliar bacteria, but the latter