## SPRINKLER IRRIGATION METHOD

The applications of surface irrigation (flood irrigation) methods are not productive in the fields whose surface is not smooth; having more slope and infiltration (water intake) speed is high. The surface irrigation (flood irrigation) is not economical due to the decrease of the flow length also in the lands where the water intake speed is high. In this sort of soils, the ideal irrigation is the sprinkler irrigation. Taking some of these cases into consideration, sprinkler irrigation method has found a wide application fields especially in developed countries due to many advantages it provides.

## WHAT IS SPRINKLER IRRIGATION METHOD?

The system which is composed of pipes with the nozzles or heads which spray water on the surface of land under a certain pressure in fine drops of rain forms is called "Sprinkler Irrigation Method." In the Sprinkler Irrigation method, the irrigation water which is sprinkled in the air under pressure through the sprinklers which are fitted at certain distances on the field, falls on the surface of the ground and stored in the root zone of the plant penetrating into the soil through infiltration. This irrigation method is named sprinkler irrigation method as it looks like a natural rain. In order to give water under pressure through the heads, it is necessary to have a pressured pipe system and the operational pressure should be given either through a pump unit or through gravity by placing the water supply in a higher place. At least 2.5 atm pressure is needed to enable the sprinkle irrigation system operates productively. So in order to apply the method, water conveying system consisting of main and lateral lines and a system to provide the pressure are required. The pressure is mainly provided from a pumping unit. The sprinklers complete the system.

## THE ELEMENTS OF SPRINKLER SYSTEM

**a) Water source :** All sorts of water sources can be used in this method. So, it could be any of the running water, lake, caisson wells, deep well, pond, dam, irrigation canal, etc. The water is needed to be suitable for irrigation in terms of quality and not containing much amount of sediment and floating matters; otherwise, these matters will cause blockages in the pipe lines and sprinklers.
**b) Pump unit:** The necessary operational pressure is usually provided through pump unit in the sprinkler irrigation systems. On the conditions where the static suction height is not too much, centrifuge type; deep well pumps with vertical shafts or submersible pumps are used in the deep wells. The pumps are operated either using liquid fuel or electricity. The electrical motor pumps are preferred because of the ease of operational facility, establishment cost and the economy it provides in the energy inputs.
**c) Pipe Lines:** The main pipe line conveys water which is taken from the source to the lateral pipe lines. The lateral pipe lines are the ones where the sprinklers exist on. They convey the water they get from the main pipe line to the sprinklers.
**d) Sprinklers:** These parts take place on the lateral pipe lines. The connection between the lateral pipe lines and sprinklers are provided with the riser pipes which are selected according to the plant height.

## WHAT ARE THE APPLICATION CONDITIONS OF SPRINKLER IRRIGATION METHOD?

If the sprinkler irrigation systems are operated in a proper way, the needs of the irrigation water will become significantly less in comparison to surface irrigation. Particularly, it results successful outcomes with the irrigation of shoal rooted plants in the lands whose surface is not smooth, high-sloped, and the straining speed is high. In the sprinkler irrigation method, a certain initial investment and energy costs are required in the beginning. If these costs can be covered by agricultural product increase implementing the method, the sprinkler irrigation systems can be developed. As the sprinkler irrigation methods require less workmanship, it has found a wide application field in the places where the labor costs are high or it is hard to find labors.

**1.** The usable water holding capacity of the soils: The plants can benefit from the water available between the field capacity in the soil and constant fading point. This moist amount is called the "Usable water holding capacity" or the "efficient capacity" of the soil. This is changeable according to the structure of the soil.

**2.** The Effective Root depths of the plants: The root depth where the plants get water they need in 80% for their normal growth is called "Effective Root Depth". This value indicates the soil depth to be watered during the irrigation and it generally changes between 30 – 180 centimeters according to the plant type.

| Soil Structure | Usable water keeping capacity (mm/1m) | |
|---|---|---|
| | Limits | Average |
| Rough sand | 33-62 | 40 |
| Rough sand and thin sand | 60-80 | 70 |
| Rough sand and thin sandy soil | 85-125 | 105 |
| Average type very thin sandy soil | 125-190 | 160 |
| Thin type very thin sandy soil and silt clay | 145-210 | 175 |
| Thin type sandy clay, silt clay and clay | 135-210 | 170 |

| Plant Species | Effective Root Depth (cm) | Plant Species | Effective Root Depth (cm) | Plant Species | Effective Root Depth (cm) |
|---|---|---|---|---|---|
| Grapevine | 90-180 | Spinach | 60 | Potato (Sweet) | 90 |
| Pea | 75 | Marrow | 45-60 | Aubergine | 30-50 |
| Pepper | 30-60 | Melon | 75-90 | Onion | 90 |
| Strawbery | 30-45 | Cabbage | 45-60 | Sorgum | 45 |
| Tomato | 30-60 | Lettuce | 30 | Soybean | 75 |
| Artichoke | 120 | Pasture | 45 | Sugar Beet | 60-90 |
| Beans | 60 | Fruit Trees | 90-150 | Citrus Fruits | 50-150 |
| Carrot | 45-60 | Corn | 75 | Tobacco | 75 |
| Cucumber | 45-60 | Cotton | 120 | Pistachio | 45 |
| Cereals | 60-70 | Potato | 60 | Clover | 90-180 |

**3.** Irrigation water needs for the products:

| Crops | Water amount to be given once | | Sulama | |
|---|---|---|---|---|
| | (Ha/mm³) | (Ha/mm³) | Irrigation Repetition | Intervals (Day) |
| Cereals | 100-150 | 1000-1500 | 2-3 | 20-30 |
| Vegetables | 20-70 | 200-700 | 12-20 | 5-10 |
| Fruit Trees | 70-100 | 700-1000 | 4-5 | 20-25 |
| Nursery | 50-80 | 500-800 | 8-10 | 10-15 |
| Clover | 100-125 | 1000-1250 | 4-8 | 20-30 |

**4. Water intake (Infiltration) speeds of the soils:** Knowing the water intake speed of the soils is very important in irrigation. The causes such as the structure and texture of soil, the amount of the organic matter in the soil, the amount of the moist, flora, the slope in the field, the congestion and cracking of the soil, the type and amount of the salts available in the soil and water affect the water intake speed of the soil.

## WHAT ARE THE BENEFITS OF SPRINKLER IRRIGATION METHOD ?

The advantages of the sprinkler irrigation method in comparison to the surface irrigation method are as follows:
• Water use efficiency is high. In the places where the irrigation water is less, this water can be utilized maximally.
• Irrigation can be performed in the sloping and the field shapes (topography) are bad without causing any erosion.
• It removes the condition of the plant's not coming out of the ground due to the fact that the soil forms cream at the time the seed is about to germinate.
• A saving is provided from the operation costs and workmanship.
• It is the most convenient irrigation system for the soils whose depth is less and shallow, and permeable.
• Dust, harmful insects and salt particles which is moved by the wind especially on the fields near sea side can be washed away by the sprinkler irrigation.
• As there is a controlled water deliverance possibility with the sprinkler irrigation, it becomes the most convenient irrigation method in the places where the ground water is high and having drainage problems.
• As there is no need for the field drains, the plantation area is getting increased and the agricultural operations are easily carried out
• The dissoluble artificial fertilizers can be given to the plants together with the irrigation water without needing any workmanship.
• Vegetables, citrus fruits, vineyard and other orchards can be protected from frost and heat.
• As the water is given to the soil in fine particles just like in the rain, it provides at the rate of 25 – 50 % production increase in respect of the irrigation forms.
• It saves time.
• An equal water distribution to the per sqm is provided.
• There is no need for leveling the agricultural fields even if they are not smooth.
• A controlled irrigation is performed without increasing the ground water level.

## THINGS TO BE CARED IN INSTALLING THE SPRINKLER IRRIGATION METHOD ?

• The main pipe line should be placed in a parallel direction with the dominant slope direction.
• The lateral lines should be at upright position to the dominant slope and the direction parallel to leveling curves as much as possible.
• In the places where the wind speed is more, the laterals should be placed to be at upright position towards the dominant wind direction.
• Using too long lateral lines should be avoided. The laterals' being short decreases the workmanship and provides equal water distribution.
• The movement of the laterals on the main line should be arranged in the way to require the minimum workforce.
• The system should be arranged in square or rectangular shape as much as possible to provide an easy lateral movement and to make as less replacement as possible with the sprinklers operating together.
• The pipe sizes and arrangement of the system should be at the formation to decrease the annual costs to minimum.
• In case the possibilities allow, the pumping unit should be placed in the middle of the field as it will enable the selection of suitable and economical pipe diameters.

## WHAT ARE THE ISSUES TO BE CARED DURING THE OPERATION AND MAINTENANCE OF SPRINKLER IRRIGATION METHOD?

ERHAS Sprinkler Irrigation Pipes in order to be much resistant against the cold, sun light and heat, they are manufactured in the most suitable color not absorbing the rays but to reflect, will be in your service for many years under proper usage conditions. Therefore, it will be beneficial to follow up the following recommendations on operation and maintenance.
• Before fitting the gaskets of the pipes, clean the gasket grooves.
• Initially, the system is started at the smaller flow and the lateral and main pipes should be filled with water and the pipe line should be cleaned by unmounting the end cap for a very short time.
• A filter should be fitted to the pump suction pipe so that the foreign matters do not enter and the sprinkling nozzles are not blocked.
• The time for changing the place of the laterals should certainly be determined.
• The position of the laterals should be well-arranged according to the wind condition in order to make the irrigation distribution properly.
• If the system supplied with the fertilizer, all of the system should be cleaned properly.
• When the irrigation process is over, the gaskets should be kept in a box after drying them all.
• The joining parts and gaskets should be wiped using a soapy cloth so as to enable the pipes easily take apart and fit again while mounting pipes to each other.