ISSN 1454 - 8003
Proceedings of 2016 International Conference on Hydraulics and Pneumatics - HERVEX
November 9-11, Baile Govora, Romania

SOLUTIONS TO REDUCE PRESSURE AND WATER USED FOR IRRIGATION

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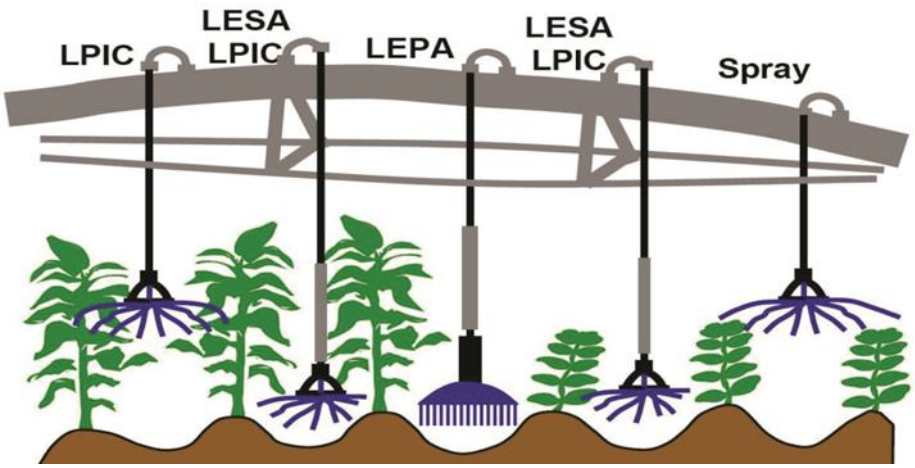
Abstract: *Watering plants with mechanized travel and watering sprinkler watering the move applies to all field crops, with varying rules with low maintenance staff and qualitative indices senior watering. It is further known embodiment of such different systems by way of the distribution and position of the water at the plant. These systems can be equipped sprinkler irrigation pivot or linear and sprinkler irrigation systems and hose reel equipped with ramps and water distribution is done at plants area.*

Keywords*: irrigation; LEPA (Low Energy Precision Application); Lesa (Low Elevation Spray Application); LPIC (Low Pressure In Canopy) and MESA (Mid Elevation Spray Application).*

1. Introduction

Systems of irrigation, low pressure LEPA (Low Energy Precision Application), Lesa (Low Elevation Spray Application), LPIC (Low Pressure In Canopy) and MESA (Mid Elevation Spray Application), can equip plants watering pivot or linear movement. LEPA, LPIC and LESA systems, apply wet in culture between plant rows and MESA applies watering system over the plant.



Slope in this case should not exceed 1% of more than 50% of the land surface. The LEPA is a method of storing water on the soil surface in some furrows broken (divided) or microbasine, where watering is achieved with low power consumption (because it works at reduced pressure) contributes to reducing soil erosion (through the reduction of runoff water) achieved an improvement in the quality indices of watering (uniformity of watering estimated to be 90-95%), reduce the consumption of fertilizers by at least 50% (in the case of fertigation), increase yields agricultural crops and not least increase irrigation efficiency (by reducing operating costs and increased production). The pressure at the nozzle is about 40 kPa and that the necessary energy to the system and thus lower the operating costs are lower.

2. Low pressure irrigations system- LEPA, equipping facilities pivot or linear system

Equipment LEPA (equipment with low power consumption and precise application) applies watering crops sown in rows on the circle when watered facility pivot or straight rows, when watered the plant with displaced Front (linear). There are two systems equipment:
- devices for distribution at the soil surface is wet (watering localized pressure: about 40 kPa) or near ground, valid for LEPA system ;
- with distribution devices for watering 200 - 900 mm surface irrigation (watering by micro sprinkling, pressure: 70-200 kPa), valid for systems LESA, LPIC and MESA.
LEPA system, is used for watering crops sown on the circle when watered facility pivot or straight rows, where they watered the plant displacement front.

3. Low pressure watering system LESA equipping pivot or linear system

LESA system, (equipment which applies by micro sprinkler at low height) consists of water distribution through micro sprinkler near the ground surface at a distance up to 450 mm, on the ground unprocessed and slope in this case should not exceed 3% more than 50% of the land surface. LESA wet nozzle system that distributes water at a low height, and the situation is LPIC systems and MESA, except height distribution and method of distribution.

4. Low pressure watering system MESA equipping pivot or linear system

MESA system, (equipment which applies by micro sprinkler at the average height) consists of water distribution through micro sprinkler over the plants at a distance as close to plants. This system allows the distribution of chemicals in the ground unprocessed crops and uniformity coefficient is about 90%.

5. Low pressure watering system LPIC equipping pivot or travel system

LPIC system, (equipment who operating at low pressures in culture) is the distribution of water in the vicinity of plant foliage by the micro sprinkler at a distance of 300-900 mm. This distribution allows of fertilizers to crops on soil unprocessed slope in this case should not exceed 3% more than 50% of the land surface and the coefficient of uniformity is about 90%.

6. Low pressure system that equips watering installations with hose reel and drum

Sprinkler irrigation installations with hose reel and can be equipped with ramps and water distribution is achieved with nozzles or hoses. If the wetting is performed with spray devices with fixed deflector, this is positioned on the line of the ramp as shown in figure 6 and 7, or in the vicinity of the culture hose. If desired application or administration to the soil watering liquid fertilizers, the ramp will be provided with the wet ground hose-like LEPA system.

7. Characteristics of the most common types of sprinklers used for watering pivot system

Sprinkler type	Pressure (kPa)	Height to the ground (m)	Benefits	Disadvantages
Shock Wide Angle	170-300	1.8-4.5	The watering reduced	High energy; effects of exposure to winds.
Shock Small Angle	170-250	1.8-4.5	The watering reduce	High energy; effects of exposure to winds.

360^0 spray, rotary (mini sprinkler), rotating the circle; installation height	70-200	1.8-4.5	Requires less power; smaller distance between sprinklers.	The watering is big. Applying chemicals only above that crop foliage.
360^0 spraying device; small installation height, for LESA or LPIC	70-200	0.3 -1.8	Requires less power; reduced exposure to wind effect; small distance between sprinklers; some adapters have dragged hoses type LEPA; chemicals management is under crops foliage .	The warering is big.
Multiplace spray devices with small deviation	70-200	Variable height to the trusses of LPIC-supply pipes.	It requires less energy; low drift and low exposure to wind effect; several alternative configurations; many adapters have dragged hoses type LEPA and plates for managing chemicals.	The warering is big.
Rotary	100-300	The variable height of the trusses supply pipes LPIC.	Diameter greater watered and the watering less. Good resistance to the effects of winds.	Potential for greater energy required. Application of chemical substances in the crop foliage.
Tip spin	70-150	Variable; See the rotary type	Low power required; Raindrops are applied with less force / pressure.	Application of chemical substances in the crop foliage.
Oscillating spray plates / rotary	70-150	0.9-1.8	Low power required; rain droplets; reduced watering rules applied with less force / pressure.	Application of chemical substances in the crop foliage
LEPA Bubble-' (Enforcement watering system with low power consumption, devices positioned at 3-4.5 m above the ground, which irrigates the form of a "bubble")	40-70	0.3-0.9	Low power required; usually alternate furrows are wet and evaporate less water; have multiple uses (can be converted from the bubble and spray, sock 'dragged); excellent options for managing chemicals at levels that crop foliage.	Watering extremely high standards. Furrows require watering or other means compartmentalized water accumulation on the surface of the land (15-50 mm water volume).
LEPA Drag Sock	40-70	0 (0)	See LEPA Buble; less erosion furrows watering the compartmentalized.	See LEPA Buble.

8. Conclusions

All systems help to improve the environment, reduce water losses through evaporation, reduce energy costs, achieved superior qualitative indices of watering works at low pressures and can equip facilities pivot or linear system.

Water losses associated with different components. Sprinkler watering packages

	Sprinkler watering package			
Component water loss	With over watering	MESA type or spray	Type LESA or LPIC	Type LEPA
Evaporation rain drop	YES	YES	YES	NO
Divert rain drop	YES	YES	NO	NO
Evaporation in the crop foliage	YES	YES	YES (but not significantly)	NO (Only when applying chemicals)
Stored water evaporation	NO	YES	YES	YES (significant)
Evaporation of the ground level-irrigated	YES	YES	YES	YES (limited)
Surface water movement	NO (but possible)	YES (insignificant)	YES	YES (insignificant)
Surface drainage	NO (but possible)	YES	YES	YES (insignificant, unless measures are applied to the surface of the water storage)
Percolation	NO	NO	NO	NO

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