SUITABILITY OF MICRO-IRRIGATION- DRIP IRRIGATION - USED FOR PEPPER GROWTH, IN CONDITIONS OF FIELD CULTIVATION

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Abstract. *Water gives life and maintains the optimum parameters of ecosystems for a normal and efficient growth, likewise the solar irradiation. Because of the climate changes it is necessary to use rational this two energy sources. Micro-irrigation refers to low-pressure irrigation systems that spray, mist, sprinkle or drip. Drip irrigation is an irrigation method which saves water and fertilizer by allowing water drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone. Drip irrigation helps achieve water conservation by reducing evaporation and deep drainage. It can be adapted to almost any cropping situation and climatic zones. Drip irrigation can be installed as either a surface or subsurface water application system. As with all other irrigation methods, drip irrigation is with both positive and negative impacts on irrigation scheduling, efficiency, uniformity, ecology, crop responses and economic. Peppers prefer a sunny location, long growing season, and fertile, well-drained soil for best yields. Mulch around the plant will conserve soil moisture and reduce weed growth. Irregular watering (over or under) can cause flower drop or blossom-end rot, a dark leathery spot on the bottom of the fruit. It is recommended to avoid heavy fertilization of peppers which encourages excessive foliage growth and delays flowering and fruit maturity. Fertilization was made during the irrigation into the soil.*

Keywords: micro-irrigation, drip irrigation, pepper, weed control, water requirements.

INTRODUCTION

Feeding a population of over 6 billions of people, from different climate zones, with all the kinds of soils, is a priority at a large scale, with economical and political implications. Almost all foods are of plant origin. Many plants or plant parts are eaten as food. There are around 2,000 plant species which are cultivated for food, and many have several distinct essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals, and is ingested and assimilated by an organism to produce energy, stimulate growth, and maintain life.

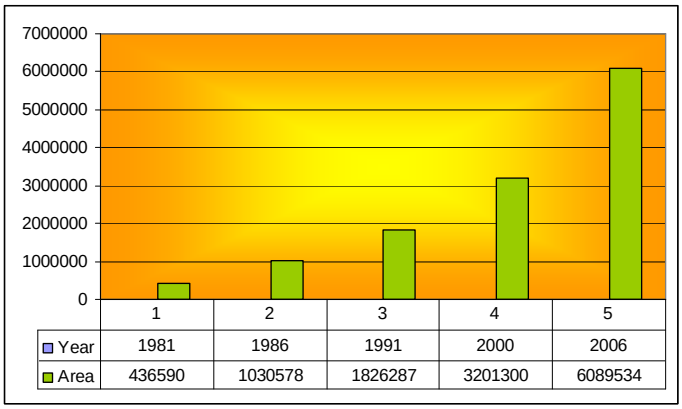
Agriculture was the key development that led to the rise of human civilization. There has been a massive increase in food production in the past few decades, and for the third world the problem was not solved yet. Farming can be made more profitable and healthier if an environmental sustainability would be promote on a large scale. Future crops will be increasingly grown on marginal lands with problems like salinity, water stress and acidity.

Growth of plants is determined by environmental factors, such as temperature, available water (agriculture represents 70% of freshwater use worldwide), available light, and available nutrients in the soil. Any change in the availability of these external conditions will be reflected in the plants growth. Requirements for water are generally higher during vegetation periods, while flowering and fruits and seeds ripening water needs are lower. Lack of ground water reduces production and depreciation of harvest quality.

DISCUSSIONS ABOUT DRIP IRRIGATION

Irrigated agriculture plays a major role in development of farming. Micro-irrigation is an irrigation method that applies water slowly to the roots of plants, by depositing the water either on the soil surface or directly to the root zone, throw a network of valves, pipes, tubing and emitters.

Drip irrigation was used in ancient times by filling buried clay pots with water and allowing the water gradually seep into the soil. Modern drip irrigation began its development in Germany in 1860 when researchers began experimenting with sub irrigation using clay pipe to create combination irrigation and drainage systems, but now a days with the advent of modern plastics major improvements in drip irrigation became possible, plastic micro tubing and various types of emitters began to be used (Reinders, 2007).



	1	2	3	4	5
Year	1981	1986	1991	2000	2006
Area	436590	1030578	1826287	3201300	6089534

Source: Reinders, 2007.

Fig. 1. Area under micro-irrigation in the world

The large-scale use of drip irrigation systems started in 1970s in Australia, Israel, Mexico, New Zealand, South Africa and USA (fig. 1) to irrigate orchards and vegetables.

The actual application of water in a micro-irrigation system is through an emitter. These emitters dissipate water pressure through the use of long path, small orifices or diaphragms. In drip mode, water is applied as droplets or trickles. Depending on how the emitters are placed in the plastic polyethylene distribution line, the drip mode can be further delineated as a line source or a point source (Hla, 2003).

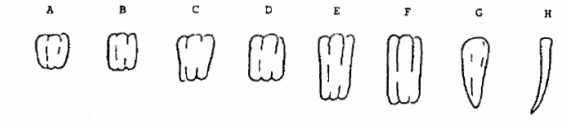
The drip irrigation has advantages and disadvantages. Environmentally friendly, by reduced leaching and run-off of water, giving the possibility of application of small amounts of water more frequent, which increase the crop yields and economical profits, allowing a better weed and fertilizer control – this are some advantages. The disadvantages of drip irrigation are about the expensive costs and needs a good management.

ESTABLISH PEPPER FEATURS IN DRIP IRRIGATION CULTURE

Tabel 1

The description of sweet peppers cultivars (Amati *et al.*, 2002)

Cultivar	Maturity	Plant		Fruit characteristics					
		height (cm)	type	length (cm)	Ø (cm)	Shape *	No. cells	wall (mm)	Color
SWEET PEPPER									
Golden Cal. wonder	mid-early	50-60	rather compact	9	9	A	3-4	5-6	green-yellow
California wonder	mid-early	60-70	rather compact	10	9	A	3-4	5-6	green-red
Yolo wonder B	mid-early	50-60	rather compact	10	8	A	3-4	5-6	green-red
Hungarian yellow sweet wax	early	50-60	compact	14	4	G	-	4-5	light-yellow-orange-red
Marconi	mid-early	70-90	vigorous, leafy	20-22	4-5	G	-	4	green-red
Resistant giant	mid-late	65-75	compact, sturdy	8	10	B	3-4	5-6	green-red
HOT PEPPER									
Cayenne long slim	mid-early	65-75	vigorous, leafy	12-15	2	H	-	2-3	green-red
Anaheim chili (tmr)	mid-late	70-85	vigorous, leafy	17-20	4	H	2	2-3	green-red
Anaheim chili	mid-late	70-85	vigorous, leafy	17-20	4	H	2	2-3	green-red
Hungarian yellow wax hot	mid-early	65-70	upright	13-15	4	G	-	2-3	light-yellow-orange-red

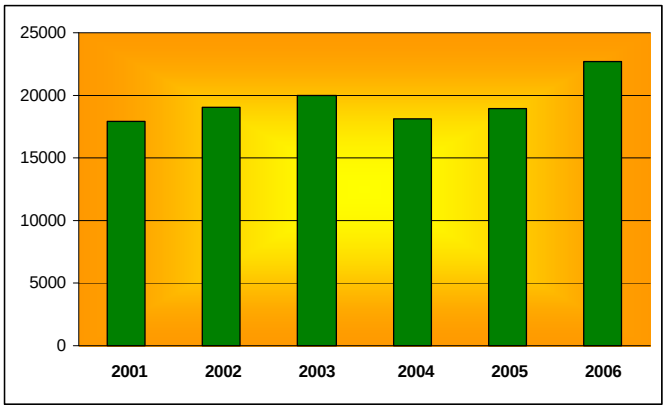


* Fruit shape

Pepper (*Capsicum annum* L.) (Tabel 1) is a nutritional plant because of its economical and cultural importance, and it is consumed on a large scale in the world. This issue consists of the remarkable value of pepper fruits, which is given by the chemical composition, containing from 7.2 to 9% solids which comprises: 5 to 6.4% carbohydrate (glucose 7.33% sp, 1.99% sp fructose, 0.33% sp sucrose, 1.78 su to 4.40% starch, 14, 83% w su in green fruits and 13.50% g su in dried fruit (pulp), 1-1.5% and 1% fat protidic. Sweet pepper has a high content of vitamin C (150-300 mg/100g) and carotenoids (1.8 to 4.5 mg/100g), in particular but vitamin B1 (0.05 mg% w sp), vitamin B2 (0.05 mg% w sp), vitamin E (0.65 mg% w sp), vitamin A (0.75 to 6.00 mg% w sp), vitamin P (Citrine, 75-300 g sp) etc. In hot peppers is found in large quantities capsicina, an irritant substance. Mineral content (Ca, P, Mg, Fe) is lower than other vegetables.

Pepper fruits may be consumed fresh, which has great importance because vitamins are fully used by the body. Green pepper is rich in vitamin C, while the yellow and red are rich in beta carotene. 200 grams of sweet cover daily requirement of vitamin C. The fruits of pepper are used in the preparation of a wide range of dishes, suitable for processing or canning industry to prepare pot of pepper. Some species and varieties of ornamental peppers have a great value in landscape design and are suitable in decoration indoor for growing in pots.

A growing amount of global production of sweet peppers reaches the international market. Thus, international trade in 2008 included 2.1 million tonnes (8% of global production), which is 34% more than in 2003. According to FAO data, in fig. 2, are the areas planted with peppers in Romania during 2001-2006. Adjusting to the ability of country to produce for own consumption the needs of peppers these areas have no relevance.



Source: FAO, 2008.

Fig. 2. The surface cultivated with pepper in Romania (ha)

Vegetable plants are characterized by very high water content - 85-90% of plant weight, representing 10-15% of organic substances and minerals only 0.5-1% (Luca and Nagy, 1999).

Because pepper has a shallow root system with high water requirements, soil moisture levels are optimal for the top 60-65% of Active Humidity Range and between 70-75% of Active Humidity Range during fructification period. The pepper crop requires irrigation during the growing season in order to obtain large fruit, turgid, characteristic for the variety. Soil drought causes poor growth, flowers, fruit small and deformed, which implicitly leads to lower production (Popescu and Horgoş, 2003). Peppers do not support atmospheric drought, which causes abortion of flowers (Hoza, 2003). The optimum level of humidity is 70-80%, especially during flowering and fruit binding (Popescu and Horgoş, 2003).

Establish culture is through planting peppers. Planting seedlings is only after the soil temperature reaches 14-15^{O}C, as the climatic conditions of our country coincides with the first decade of May in warmer areas and second or third decade in the cold (Popescu and Horgoş, 2003). Maintenance of irrigation starting to catch planting (200 m^3/ha) followed several days of filling the gaps. It is recommended that 3-4 weeks after planting is not wet, to allow deep rooting, and then work watering run regularly every 10-15 days, depending on rainfall, with each 300-400 m^3/ha . Irrigation norm can reach 4200 m^3 in the driest areas and 2 100-2 400 m^3 in the wettest (Popescu and Horgoş, 2003).

Plastic and organic mulches effectively control weeds. Higher density plant spacing will also smother weeds. Shallow cultivation will help avoid root damage especially around young plants.

CONCLUSIONS

To have results for long term to protect the environment the agriculture has to bring updates in all the fields and has to improve its technology. Genetic engineers may someday develop transgenic plants which would allow for irrigation, drainage, conservation, sanitary engineering, and maintaining or increasing yields while requiring fewer economic expenses derived inputs than conventional crops. Knowledge and direct relationship between soil and ground water will provide protection against damage, but will not always achieve the greatest economic and production. To obtain high yields and economic use of water as the plants needs, it is a must to know how soil and water affect plant growth and development, the interaction between ground-water and plant.

Requirements for water are generally lower resting stage, at flowering and ripening of fruits and seeds. Lack of ground water quality reduces production and depreciation. Thus due to excessive development of mechanical tissues, accumulate large quantities of essential oils and alkaloids.

Micro-irrigation could be the solution in rational management of growing vegetable on a large scale, by increasing the outgoings to obtain highest benefits.

Middle while, in the developed world the range usually extends between sustainable agriculture and intensive farming.

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