



SCIENTIFIC RESULTS OF RESEARCH OF VEGETABLE CROPS DRIP AND IN-SOIL IRRIGATION

A. S. Ovchinnikov, V. S. Bocharnikov, V. V. Borodychev, O. V. Bocharnikova, M. P. Mecheryakov,
 S. D. Fomin and E. S. Vorontsova
 Volgograd State Agrarian University, Volgograd, Russian Federation
 E-Mail: fsd_58@mail.ru

ABSTRACT

Scientific researches with studying of in-soil and drip irrigation systems operation in production conditions on sweet pepper "Belozherka" sort sowings were carried. Experimental production area with surface of 1 ha is located in the Northern part of the Volga-Akhtuba floodplain on the right bank of the river Akhtuba. It has been obtained the maximum yield of sweet pepper crop: in case of in-soil irrigation of 59.1 tons per hectare and in case of drip irrigation - 66.2 tons per hectare in our experiments with irrigation regime 80% of field moisture capacity (FMC). It can be made a conclusion on the basis of performed researches, that the most rational spread of irrigation water and maximum productivity of sweet pepper crop plants ensure by maintaining of pre-irrigation moisture degree at the level of 80% of FMC in case of performing of in-soil watering with 269 m³/ha norm and drip watering with 253 m³/ha norm in Volga-Akhtuba floodplain conditions.

Keywords: sweet pepper, in-soil irrigation, drip irrigation, irrigation rate, productivity, yield.

INTRODUCTION

Trends in the development of irrigated agriculture are directly related to the use of advanced technologies [1, 5, 6, 7, 13]. Irrational use of land changes the quality of the environment, reduces the area of the used territory, the concentration and volume of production in grocery balance sheet.

The main task in the conditions of the lower Volga region is further development and improvement of the use of floodplain lands and first of all Volga-Akhtuba floodplain. The whole history of the agricultural development indicates that constant striving to obtain the maximum yield of cultivated crops and productive land use is the main task. This is one of the paramount issues and the basis for successful solution of the food problem in the country.

Volga-Akhtuba floodplain belongs to the northwestern Caspian Region of Russia within the semi-desert steppe and occupies an area of about 8.5 million hectares. The climate of the region is continental, highly arid and characterized by a pronounced anti-cyclonic weather regime. Soil cover of semi-desert zone mainly consists of light chestnut and brown salty soils in complex with solonchaks. Surface waters represented by the Volga River, floodplain channels system, soft- and salt-water lakes have a significant role in agricultural production, but are not decisive in the agro-climatic conditions formation. In addition, the construction of hydropower plants in the upper Volga basin has radically changed the properties of the drain, the lowering of the river has occurred, the intensity of floods has decreased. The volume of spring floods has decreased in 1.5 times and has fallen from 83 to 53 days.

Nowadays, it is more than half of all irrigated lands are salinized, because sprinkling has been widely developed. Some authors note that there has been a deterioration of in the condition of irrigated lands during

the past decades on the Lower Volga region melioration systems [9, 11, 14]. It occurs the rise of groundwater level and salinization of active soil layer and etc. It is major part of irrigation systems, built 20 or more years ago, have worked out their own resources.

All of the above allows us to conclude that nowadays the most promising irrigation is drip and in-soil irrigation [1, 2, 4, 12, 15]. Water can be supplied by small irrigation norms and watering can be carried out with any frequency in case of these irrigation methods use in comparison with surface irrigation. In this regard, the necessity of moisture reserves recovery from pre-irrigation moisture level to 100% of field moisture capacity (FMC) goes away because there can be maintained a water supply level with variations of 5-10% of FMC [3, 5, 8, 10].

MATERIALS AND METHODS

Experimental production area with surface of 1 ha is located in the Northern part of the Volga-Akhtuba floodplain on the right bank of the river Akhtuba.

We carried out researches with studying of in-soil and drip irrigation systems operation in production conditions on sweet pepper "Belozherka" sort sowings. The layout of plants location in case of in-soil irrigation is 50 × 25 (70.4 thousand pieces per 1 ha), and in case of drip irrigation is 90 + 15 + 15 × 25 cm (70.4 thousand pieces per 1 ha).

The length of each pipeline is 100 m.

Researches of the soil water regime in case of in-soil and drip sweet pepper crop irrigation have been carried out with maintaining of pre-irrigation soil moisture degree at the level of 70%, 80% and 90% of FMC.

In case of drip irrigation, watering norms which have been taken to research, was 114 m³/ha, 253 m³/ha и 343 m³/ha with maintaining of pre-irrigation moisture degree at the level of 90% of FMC, 80% of FMC и 70% of FMC respectively and in case of in-soil watering was 121,



269 и 363 м³/ha, corresponding to analogous pre-irrigation moisture levels.

RESULTS AND DISCUSSIONS

It can be made the conclusion that irrigative water spreads by the best way in case of in-soil watering with 269 м³/ha norm and maintaining of pre-irrigation moisture not less than 80% of FMC and in case of drip watering with 253 м³/ha and maintaining of pre-irrigation moisture at the level of 80% of FMC on the basis of comparison of different irrigation norms spread in soil structure (Figures 1, 2). It has been defined in the result of performed researches that hydrological soil regime has a significant impact to the weight of fruit. The average weight of one fruit changes from 0.117 kg to 0.133 kg in case of in-soil irrigation and from 0.124 kg to 0.140 kg in case of drip irrigation respectively in case of changing the level of

moisture from 70% of FMC to 90% of FMC, that naturally impacts to plants productivity increasing per unit of land area. It has been obtained the maximum number of fruits per plant in case of optimum irrigation regime of 80% of FMC. The growth and development of plants and their specific organs reduces to water absorption eventually. Water takes a direct influence at processes, performing in plants: photosynthesis, breathing, metabolism and finally at yield formation. The parameter of specific culture water consumption have a relative permanence in comparison with number and norms of watering.

The analysis of findings has demonstrated that total water consumption of sweet pepper crop in case of in-soil irrigation increases with increasing of irrigation regime, changes by years of research in the limits of 4604...5413 м³/ha in case of drip irrigation and from 4849 м³/ha to 5647 м³/ha in case of in-soil irrigation.

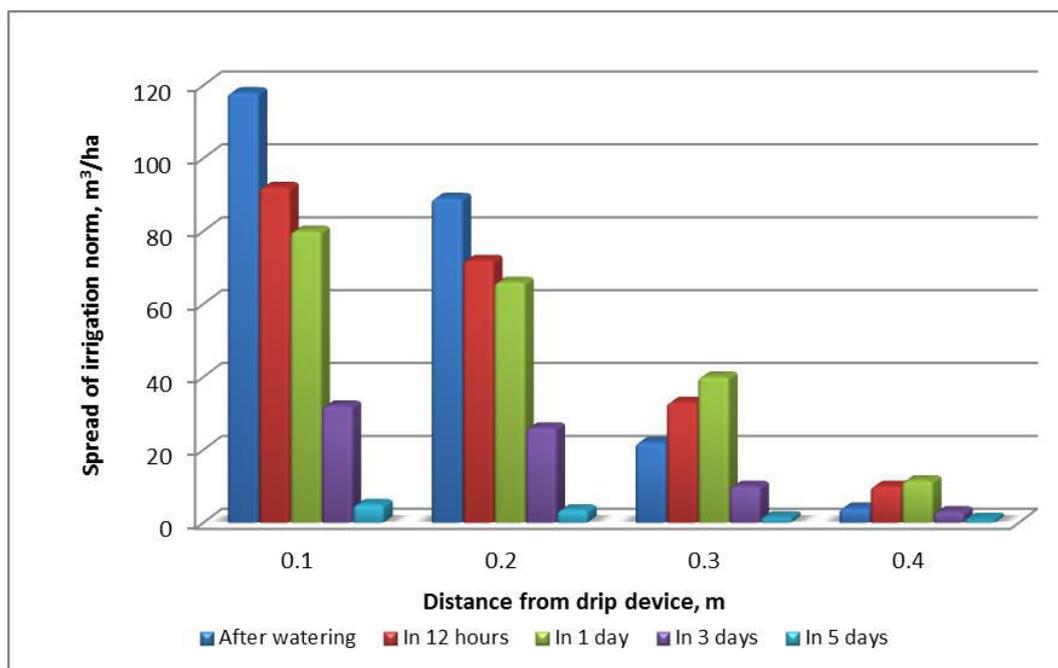


Figure-1. Spread of irrigation norm 252 м³/ha after performing of drip watering.

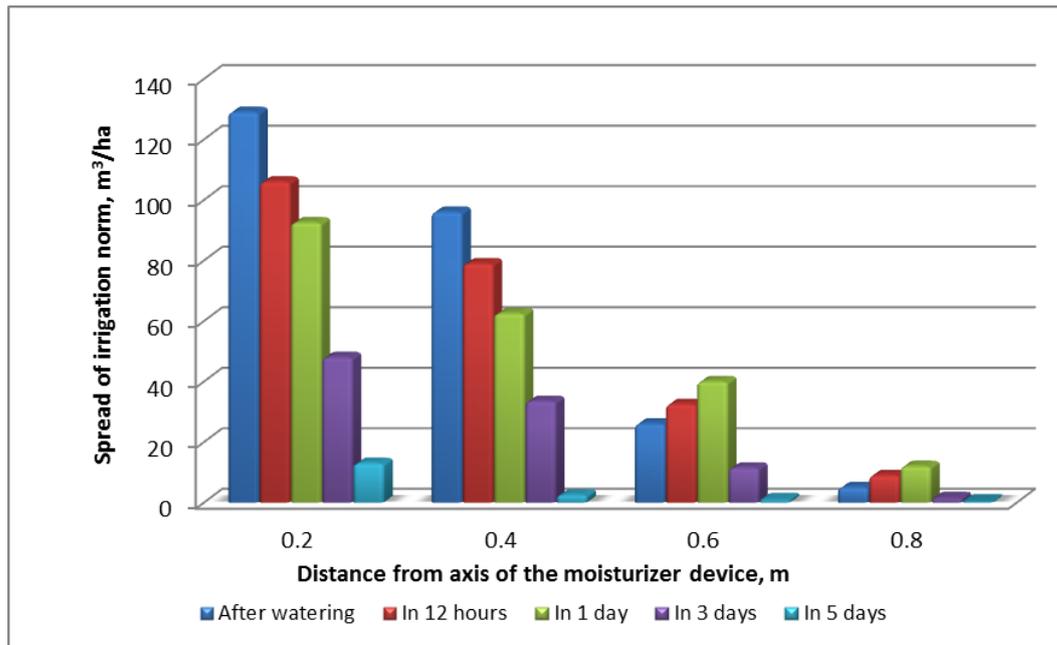


Figure-2. Spread of irrigation norm 269 m³/ha after performing in-soil watering.

CONCLUSIONS

It has been obtained the maximum yield of sweet pepper crop: in case of in-soil irrigation of 59.1 tons per hectare and in case of drip irrigation - 66.2 tons per hectare in our experiments with irrigation regime 80% of FMC.

Thus, it can be made a conclusion on the basis of performed researches, that the most rational spread of irrigation water and maximum productivity of sweet pepper crop plants ensure by maintaining of pre-irrigation moisture degree at the level of 80% of FMC in case of performing of in-soil watering with 269 m³/ha norm and drip watering with 253 m³/ha norm in Volga-Akhtuba floodplain conditions.

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