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DEVELOP A TOMATO IRRIGATION SCHEDULE

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ABSTRACT
Under greenhouse conditions, tomato plants were irrigated using drippers based on FAO's CropWAT program[1]. The effect of soil salinity, dug and un-dug indicator, seedling placement scheme, light duration and temperature on the productivity and water consumption of tomato plants was studied.
KEYWORDS: *Irrigation schedule, excavated greenhouse, soil salinity, density of seedlings.*

INTRODUCTION

One of the important issues in the steady growth of the population of the Republic of Uzbekistan, ensuring food security and increasing the country's export potential is the development of greenhouses[2,3]. The role of greenhouses in meeting the demand for vegetable products in rural areas, even in the cold winter days, and in the production of quality tomato plants for consumption, which are low in heavy metals, nitrates and other harmful substances is a comparison.

MATERIALS AND METHODS

The studies were conducted in a greenhouse and laboratory setting. In particular, the Uzbek Institute for Vegetable, Melon and Potato Research (ITI), Irrigation and Water Problems (ITI), statistical analysis was performed using MathCAD and Microsoft Yexsel programs to study the impact of greenhouse indicators on productivity. Irrigation regime for greenhouse conditions was developed using CropWAT 7.0 program[1,6,8].

RESULTS AND DISCUSSION

With a soil salinity of 4 ds / m, the plant was required to provide more water. As a result of irrigation water, the salts in the soil gradually fell to the lower layers. In greenhouses under excavated conditions, less evaporation was observed than in non-excavated conditions, which in turn reflects the plant's demand for water. Irrigation water supplied to the tomato plant under excavated conditions was used 180-220 m3 less than under non-excavated conditions.

Country: Location 19 — Station: ANDIZAN
Altitude: 477 m. — Latitude: 40.73 °N — Longitude: 72.33 °E

Month	Min Temp	Max Temp	Humidity	Wind	Sun	Rad	ETo
	°C	°C	%	km/day	hours	MJ/m²/day	mm/day
January	13.0	16.2	75	61	2.8	5.9	0.86
February	13.0	16.6	74	78	3.6	8.4	1.30
March	15.0	18.7	70	104	4.9	12.4	2.13
April	19.0	23.5	60	138	6.9	17.6	3.63
May	23.0	31.1	56	147	8.9	22.3	5.27
June	26.0	36.7	50	147	11.1	26.1	6.73
July	28.0	41.0	52	112	11.5	26.2	6.97
August	26.0	36.4	58	104	10.9	23.7	5.90
September	22.0	28.7	65	95	9.7	19.0	4.13
October	13.0	16.6	75	78	7.0	12.5	1.85
November	13.0	16.4	76	69	4.7	7.8	1.00
December	13.0	15.6	77	61	2.5	5.1	0.73
Average	**18.7**	**24.8**	**66**	**99**	**7.0**	**15.6**	**3.38**

Figure 3.1.1. Climate Index (CropWAT)

	Rain	Eff rain
	mm	mm
January	0.0	0.0
February	0.0	0.0
March	0.0	0.0
April	0.0	0.0
May	0.0	0.0
June	0.0	0.0
July	0.0	0.0
August	0.0	0.0
September	0.0	0.0
October	0.0	0.0
November	0.0	0.0
December	0.0	0.0
Total	**0.0**	**0.0**

Figure 3.1.2. precipitation (CropWAT)

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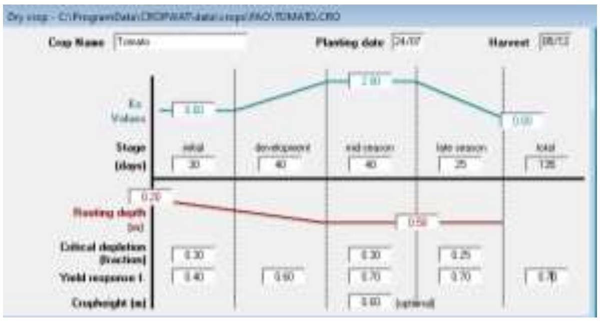
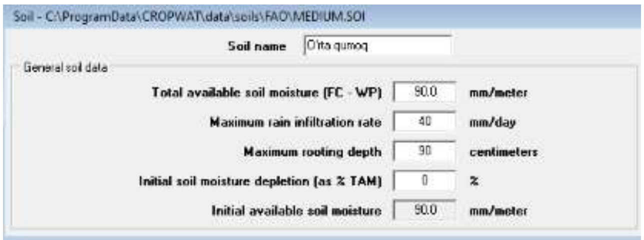


Figure 3.1.3. Development (CropWAT) Figure



3.1.4. Soil structure (CropWAT)

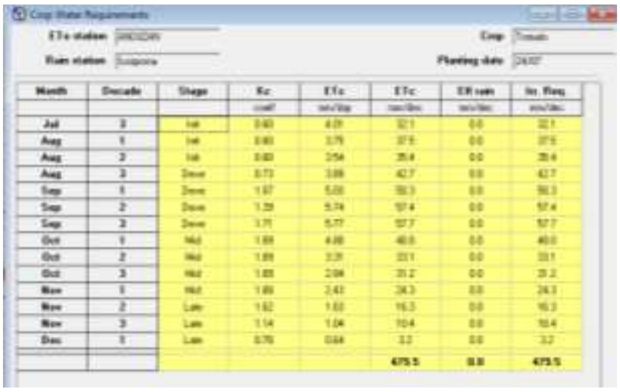


Figure 3.1.5. Water Demand (CropWAT)

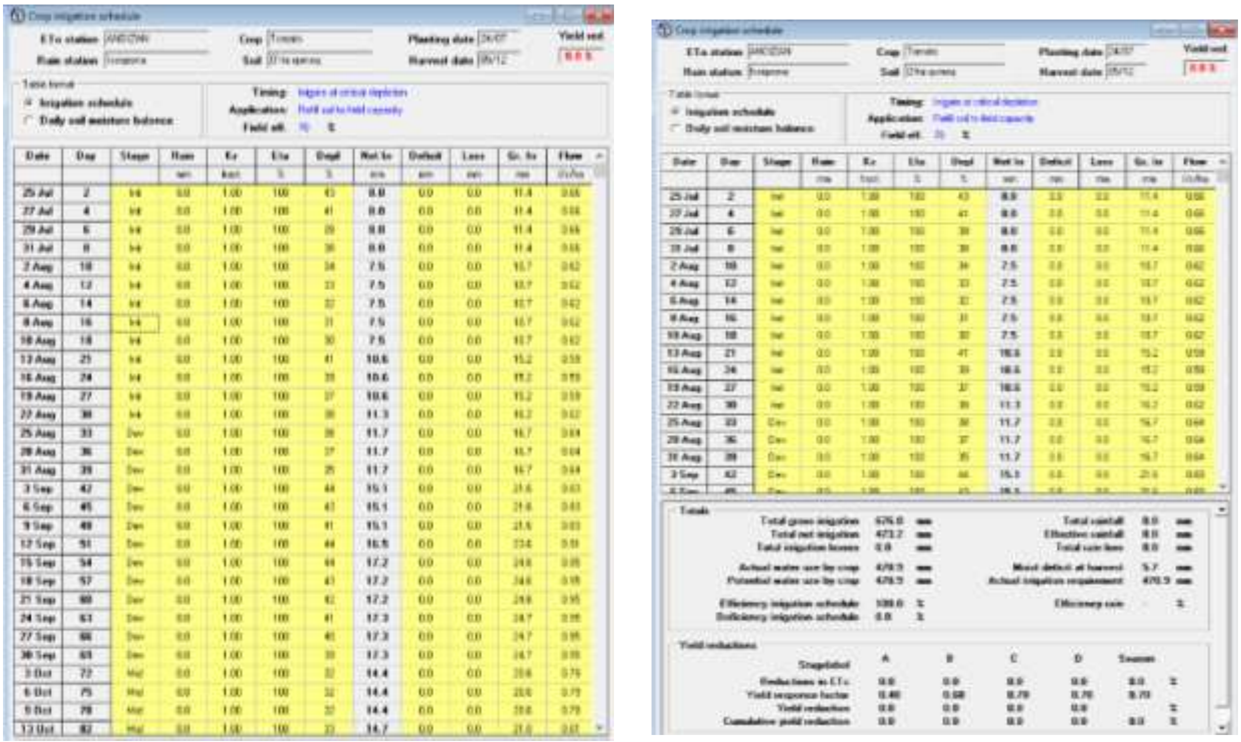


Figure 3.1.7. Crop irrigation schedule CropWAT

Irrigation of tomato plants in the initial (pre-flowering), development (flowering period), middle (harvesting), and late (ripening) phases was carried out in accordance with the CropWAT program. In the initial (pre-flowering) period, the topsoil was kept moist for 25 days. During the development (flowering) period, moisture in the 0.40 m layer was provided by watering every 3-5 days for 35 days. Irrigated for 35 days during the medium (harvest) period. During the last (harvest) period, 0.4-0.5 m of soil layer was

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provided with moisture and irrigated for 8-12 days to cook and harvest the entire crop [4,5].

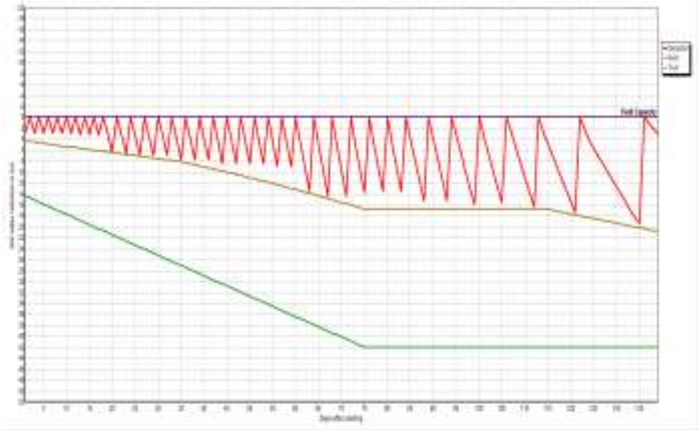

Figure 3.1.8. Irrigation regime of tomato plants in uncultivated conditions (2018-2019 yy.)

Under excavated conditions, in the initial phase, the top 0-0.2 m layer of soil is provided with moisture every 3-5 days for 25 days, while in the development phase, the 0.4 m layer is provided with moisture for 35 days. irrigated. In the middle (harvest) phase, it was watered every 4-5 days to provide 0.4 m of moisture. In the final (ripening) phase, the crop was irrigated for 6-8 days to cook and harvest everything. The FAO method was used to develop the irrigation scheme [7].

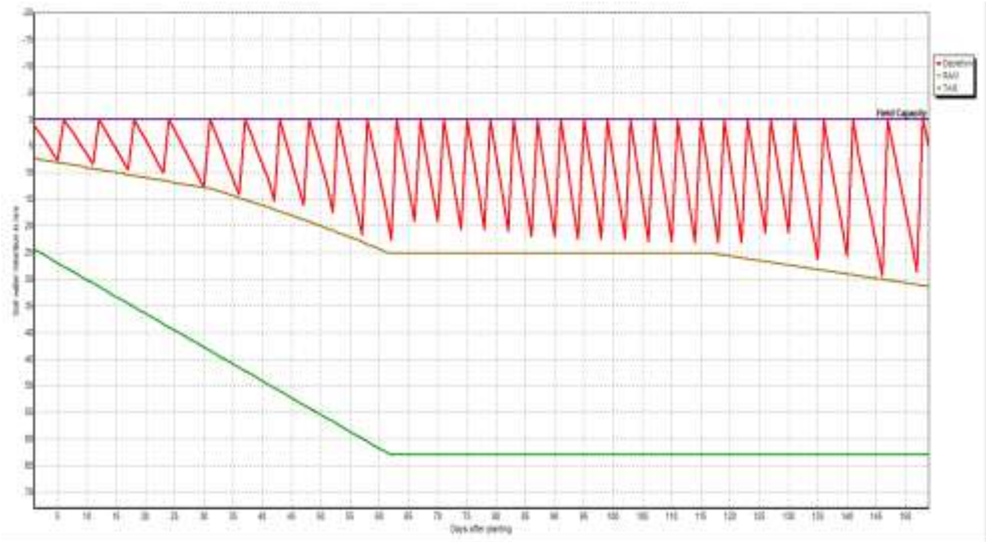

Figure 3.1.9. Irrigation regime of tomato plants under excavated conditions (2018-2019 yy.)

The dynamics of moisture change during the improvement process were determined based on the formulas described in Section 3.1. The dynamics of root development of tomato plants was determined in accordance with Chapter 3[5].

Soil moisture was determined using the following formulas:

3 points (0.2h, 0.6h and 0.8h):

$$W_{\breve{y}P} = \frac{W_{0,2h} + 2W_{0,6h} + W_{0,8h}}{3}; \qquad (3.1.1)$$

5 points (0,07*h*, 0,2*h*, 0,6*h*, 0,8*h* va 0,93*h*):

$$W_{\breve{y}P} = \frac{W_{0,07h} + 3W_{0,2h} + 3W_{0,6h} + 2W_{0,8h} + W_{0,93h}}{5}; \qquad (3.1.2)$$

In this case; W_i – Wi is the moisture in the layer.

Conclusion: Based on the CropWAT program of FAO, the production capacity is 0.75-1 m. Seasonal irrigation does not decrease from 4500-5000 m3/ha to 3500-4000 m3/ha. 4510-5012 m3/ha of water was consumed in the traditional method, while 3510-4015 m3/ha of water was consumed as a result of fractional production. Irrigation water was saved by 20-22%.

BIBLIOGRAPHY

1. *https://www.fao.org/sdg-progress-report/2020/en/*
2. *Ubaydillayev A.N., Kholmuratova G.M., Umarov S.R., Muradov R.A., Durmanov A.S.(2020). Heat and Energy -EconomıcAnalysıs for Greenhouses of the Republic of Uzbekıstan. International Journal of Advanced Science and Technology 29 (8), pp.3285 – 3298*
3. *Khojiyev A. Muradov R. Khaydarov T. Rajabov N ., Utepov B. (2019) Some results of moisture and salt transfer in the initial period of plant development. International Journal of Engineering and Advanced Technology (IJEAT) Volume-9, pp. 6907-6911*
4. *Khojiyev A. Muradov R. (2019) Some results of moisture and salt transfer in the initial period of plant development. International Journal of Engineering and Designing Innovation (IJEDI), 1 (1), pp.*
5. *Ubaydillayev A.N. "Production of water- and resource-saving technology of growing tomato plants in greenhouse conditions" PhD dissertation Uzbekistan 2022.*
6. *Ubaydillayev A.N. Muradov R.A. Creating a lighting environment in artificial lighting technologies epra International Journal of Research and Development (IJRD) issue 5. pp 324-331.*
7. *Muradov, R., & Ubaydillayev, A. (2022). Tomatoes Cultivation Under Conditions of a Managed Farming Systems. Bulletin of Science and Practice, 8(7), 122-126. (in Russian). https://doi.org/10.33619/2414-2948/80/15*
8. *Durmanov, A., Kalinin, N., Stoyka, A., Yanishevska, K., & Shapovalova, I. (2020). Features of application of innovative development strategies in international enterprise. International Journal of Entrepreneurship, 24(1 Special Issue), 1–9.*
9. *Tkachenko, S., Berezovska, L., Protas, O., Parashchenko, L., & Durmanov, A. (2019). Social partnership of services sector professionals in the entrepreneurship education. Journal of Entrepreneurship Education, 22(4).*
10. *Durmanov, A. S., Tillaev, A. X., Ismayilova, S. S., Djamalova, X. S., & Murodov, S. M. ogli. (2019). Economic-mathematical modeling of optimal level costs in the greenhouse vegetables in Uzbekistan. Espacios, 40(10).*
11. *Shulga, O., Nechyporuk, L., Slatvitskaya, I., Khasanov, B., & Bakhova, A. (2021). Methodological aspects of crisis management in entrepreneurial activities. Academy of Entrepreneurship Journal, 27(SpecialIssue 4), 1–7.*
12. *Durmanov, A., Bartosova, V., Drobyazko, S., Melnyk, O., & Fillipov, V. (2019). Mechanism to ensure sustainable development of enterprises in the information space. Entrepreneurship and Sustainability Issues, 7(2), 1377–1386. https://doi.org/10.9770/jesi.2019.7.2(40)*
13. *Khaustova, Y., Durmanov, A., Dubinina, M., Yurchenko, O., & Cherkesova, E. (2020). Quality of strategic business management in the aspect of growing the role of intellectual capital. Academy of Strategic Management Journal, 19(5), 1–7.*
14. *Durmanov, A., Umarov, S., Rakhimova, K., Khodjimukhamedova, S., Akhmedov, A., & Mirzayev, S. (2021). Development of the organizational and economic mechanisms of greenhouse industry in the Republic of Uzbekistan. Journal of Environmental Management and Tourism, 12(2), 331–340. https://doi.org/10.14505//jemt.v12.2(50).03*
15. *Umarov, S. R., Durmanov, A. S., Kilicheva, F. B., Murodov, S. M. O., & Sattorov, O. B. (2019). Greenhouse vegetable market development based on the supply chain strategy in the Republic of Uzbekistan. International Journal of Supply Chain Management, 8(5), 864–874.*
16. *Nurimbetov, T., Umarov, S., Khafizova, Z., Bayjanov, S., Nazarbaev, O., Mirkurbanova, R., & Durmanov, A. (2021). Optimization of the main arameters of the support-lump-breaking coil. Eastern-European Journal of Enterprise Technologies, 2(1–110), 27–36. https://doi.org/10.15587/1729-4061.2021.229184*
17. *Durmanov, A., Bayjanov, S., Khodjimukhamedova, S., Nurimbetov, T., Eshev, A., & Shanasirova, N. (2020). Issues of accounting for organizational and economic mechanisms in greenhouse activities. Journal of Advanced Research in Dynamical and Control Systems, 12(7 Special Issue), 114–126. https://doi.org/10.5373/JARDCS/V12SP7/20202089*
18. *Durmanov, A., Li, M., Khafizov, O., Maksumkhanova, A., Kilicheva, F., & Jahongir, R. (2019). Simulation modeling, analysis and performance assessment. In International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2019. Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/ICISCT47635.2019.9011977*
19. *Durmanov, A., Tulaboev, A., Li, M., Maksumkhanova, A., Saidmurodzoda, M., & Khafizov, O. (2019). Game theory and its application in agriculture (greenhouse complexes). In International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2019. Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/ICISCT47635.2019.9011995*
20. *Akmal Durmanov et al 2022 IOP Conf. Ser.: Earth Environ. Sci. 1043 012022*
21. *Rashid Khakimov et al 2022 IOP Conf. Ser.: Earth Environ. Sci. 1043 012043*
22. *Ravshan Nurimbetov et al 2022 IOP Conf. Ser.: Earth Environ. Sci. 1043 012006*
23. *Fatima Nazarova (2023). Cultural cooperation of the countries of the region in the format of regular and systemic relations and development of the historical and cultural potential of central asia in modern conditions. International Journal of Asian Economic Light (JAEL), 11 (2), 1-8*
24. *Krutov, A., Azimov, A., Ruziev, S., & Dumanov, A. (2019). Modelling of turbidity distribution along channels. In E3S Web of Conferences (Vol. 97). EDP Sciences. https://doi.org/10.1051/e3sconf/20199705046*
25. *Menglikulov, B., Umarov, S., Safarov, A., Zhyemuratov, T., Alieva, N., & Dumanov, A. (2023). Ways to increase the efficiency of transport logistics - communication services in Uzbekistan. In E3S Web of Conferences (Vol. 389). https://doi.org/10.1051/e3sconf/202338905036*
26. *Durmanov, A., Madumarov, T., Abdulkhayeva, G., Shermukhamedov A., & Baltashov S. (2023). Environmental aspects and microclimate in greenhouses in the republic of Uzbekistan. In E3S Web of Conferences (Vol. 389). https://doi.org/10.1051/e3sconf/202338904002*