Scientific Papers. Series B, Horticulture. Vol. LXVII, No. 2, 2023
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

RESEARCH ON THE DYNAMICS OF METEOROLOGICAL PHENOMENA IN THE SOUTH OF OLTENIA AND THE ESTABLISHMENT OF THE SUITABILITY OF THE SWEET PEPPER CULTURE FOR THE CURRENT CLIMATIC CONDITIONS

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Abstract

In order to highlight the amplitude of climate changes in the southwest of Romania, at Dăbuleni Research - Development Station for Plant Culture on Sands (SCDCPN Dăbuleni), the climatic data from the archives of the own meteorological station were analyzed and processed over a period of 65 years. The dynamics of meteorological phenomena in the period 1956-2020 was analyzed, a sufficiently long period for a meaningful analysis and correct conclusions. Data processing from the 780 months and more than 23,400 data records was the source of our conclusions. Helman`s criterion was used to determine the types of thermal and pluviometric time, and as normal climatic averages the averages of the measurements of the climatic parameters of the 65 years were used, the period being significantly extended. The thermal norm in the Dăbuleni area is much higher than in most of Oltenia with monthly summer averages between 21.6°C in June, 23.6°C in July and 23.0°C in August, and the seasonal average summer of 22.8°C. Summer heat produces staged forcing of the sweet pepper crop and early and massive ripening.

Key words*: climate change, temperature, precipitation, sweet pepper.*

INTRODUCTION

The town of Dăbuleni, an important vegetable basin for the south-western area of Romania and beyond, is located in the vast area of sandy land in the south of Oltenia (>100000 ha) included between the towns: Calafat, Poiana Mare, Sadova, Bechet, Dăbuleni and Danube River, area generically named "Oltenia's Sahara". At the beginning of the 9th century, along with the intensive development of agriculture, a vast action of cutting Romania's forests was triggered in order to create agricultural land. Along with this agricultural development action and the cutting of forests, the specific problems of soil degradation also started. The sandy lands uncovered by vegetation quickly became fragile, and the action of the wind created a huge space with dunes, which in dry years, under the action of wind deflation, became "moving". In the decade 1960-1970, vast works were carried out to improve the agricultural land and build a particularly important irrigation system in this area based on the main source of water, the Danube River. As a result, the once unproductive area was transformed into a fertile land where more than 60 species of plants were cultivated, and the improvements included protective forest curtains that mitigated the force of the wind and stopped the blowing of snow in during blizzards, creating a reserve of water in the soil needed in the spring, at the initiation of vegetative processes in agricultural crops (Diaconu et al., 2019).

The destruction of the irrigation system, protective curtains and other land improvements, which occurred after 1989, quickly restored the situation existing before 1960. The global warming occurred in this area progressively manifested itself, thus the first monthly maximum temperature value ≥40.0°C was recorded on 1985 July 31, 40.8°C, and subsequently the frequency of occurrence of exceptional temperature values increased during the summer, as a result of the increase in the frequency of heat waves and their intensity (Marinică I., 2006).

According to the prevailing landforms, Oltenia is characterized by a great diversity of topoclimates, which develop on the background of climatic floors, in the amphitheater, with

southern exposure. (Bogdan, 2001; Marinică I., 2006).

The Dăbuleni vegetable basin is included in the plain topoclimate, with the elementary topoclimates of valleys, meadows, fields, sand dunes and with specific topoclimatic phenomena: temperature inversions, minimum temperatures below -30°C and maximums above 35-40°C, precipitation in the form of showers and maximum amounts in 24 hours of more than 300 l/m², with dry and hot winds in summer and dry and drought phenomena (Bogdan, 1996; Popa et al., 2015). The areas with sandy soil in Oltenia contributed to the creation of the warm topoclimate of this area through the properties and way of interaction with solar radiation of this type of soil. The sandy surface heats up quickly and strongly under the influence of solar radiation, and from it the air heats up strongly and quickly. The albedo of sand is 0.40, a very high value compared to that of other types of soil (Marinică & Marinică, 2016). The thermal conductivity properties of the sand, which has interstitial spaces in its structure, cause its strong heating in a superficial layer, and in depth the temperature remains favorable for agricultural crops. The intense heat, on hot days, causes a strong and rapid evaporation of water from the superficial layers, reducing the water reserve available from the soil and an intense transpiration of the plants, thus producing their wilting (the reduced water reserve specific to the wilting coefficient is reached). Thus, the soil water reserve is conditioned by the rapid drainage of water from the soil due to its structure (Sandu et al., 2010; Bogdan et al., 2020). Due to the geological conditions, in the depth of the soil, an impermeable rock layer is present, as an extension of the foundation of the Pre-Balkan Plateau in northern Bulgaria, under the Danube in the Oltenia Plain. As a result, in the underground of this area there are water phreatic layers that can provide sufficiently high flows for irrigation, and the continuous water supply of these layers is produced by the rich flow of the Danube, but also by other phreatic layers that come from under the Hills Oltenia, fed in turn by the precipitation, which falls all year round in the area of Oltenia. As a result, the Dăbuleni area can be favorable for agricultural crops of all types. Under irrigated conditions, cereals, technical plants, sugar beet and a wide range of vegetable plants, plants of very high food value, can be grown successfully.

MATERIALS AND METHODS

The SCDCPN Dăbuleni, since its foundation, has been equipped with a weather station, the first in this area, established 4 years before the one in Bechet, which is part of the modern national network of weather stations of Romania. As a result, the climatic data from the data archive of the meteorological station of the SCDCPN Dăbuleni were analyzed and processed (coordinates 43°48′04″N, 24°05′31″E). Correlations were made with the data from the meteorological station in Bechet, which belongs to the National Meteorological Administration (coordinates 43°47`N, 23°57`E) located at 11.4 km (according to GPS). Climate data from 1956-2020 was analyzed, so a period of 65 years, long enough for meaningful analysis and correct conclusions. The processing of data from the 780 months and more than 23,400 data records contributed to the conclusions of this paper.

The methodological bases of the processing of these data were focused on the climatic criteria presented in the following tables:

Table 1. Types of weather according to the deviation (ΔT°C) of daily air temperature averages from normal values (N) (Hellmann-type criterion)

Δ*T°C*	Weather feature	Abbreviation
>10°C	Too hot	**EC**
7.0…10.0°C	Wery warm	**FC**
4.0…6.9°C	Hot	**C**
2.1…3.9°C	Slightly warmer	**UC**
-2.0…+2°C	Thermally normal	**N**
-3.9…-2.1°C	Slightly cooler	**UR**
-6.9…-4.0°C	Cold	**R**
-10.0…-7°C	Very cold	**FR**
<-10°C	Too cold	**ER**

(Source: MARINICĂ and MARINICĂ, 2016).

Table 2. Hellmann's criterion for mean monthly temperatures

Deviation of temperature monthly averages compared to normal (°C)	Characterization	Abbreviation	Coloring
≥ 10°C	Too hot	**EC**	**EC**
5°C…9.9°C	Wery warm	**FC**	**FC**
2.0°C…4.9°C	Hot	**C**	**C**
1.0°C …1.9°C	Slightly warmer	**Cl**	**Cl**
-0.9°C…+0.9°C	Thermally normal	**N**	**N**
-1.9°C …-1.0°C	Slightly cooler	**RC**	**RC**
-4.9°C…-2.0°C	Cold	**R**	**R**
-9.9°C…-5°C	Very cold	**FR**	**FR**
≤-10°C	Too cold	**ER**	**ER**

Table 3. Hellmann's criterion for average seasonal and annual temperatures

Average seasonal or annual temperature deviation relative to normal (°C)	Characterization	Abbreviation	Coloring
≥ 5°C	Too hot	**EC**	**EC**
2.6°C…4.9°C	Wery warm	**FC**	**FC**
1.1°C…2.5°C	Hot	**C**	**C**
0.6°C …1.0°C	Slightly warmer	**Cl**	**Cl**
-0.5°C…+0.5°C	Thermally normal	**N**	**N**
-1.0°C …-0.6°C	Slightly cooler	**RC**	**RC**
-2.5°C…-1.1°C	Cold	**R**	**R**
-4.9°C…-2.6°C	Very cold	**FR**	**FR**
≤-5°C	Too cold	**ER**	**ER**

Table 4. Rainfall weather types according to Hellmann's criterion

Applied to monthly rainfall amounts			Applied to annual rainfall amounts		
Types of time	Deviation (%)	Abbreviation	Types of time	Deviation (%)	Abbreviation
Excessively Rainy	>50	**EP**	Excessively Rainy	>20	**EP**
Very Rainy	30.1…50.0	**FP**	Very Rainy	15.1…20.0	**FP**
Rainy	20.1…30.0	**P**	Rainy	10.1…15.0	**P**
A little rainy	10.1…20.0	**PP**	A little rainy	5.1…10.0	**PP**
Normal	-10.0…+10.0	**N**	Normal	-5.0…+ 5.0	**N**
A little dry	-20.0…-10.1	**PS**	A little dry	-10.0…-5.1	**PS**
Dry	-30.0…-20.1	**S**	Dry	-15.0…-10.1	**S**
Very Dry	-50.0…-30.1	**FS**	Very Dry	-20.0…-15.1	**FS**
Excessively Dry	>-50.0	**ES**	Excessively Dry	>-20.0	**ES**

Helman's criterion was used to determine the types of thermal and pluviometric time, and as normal climatic averages the averages of the measurements of the climatic parameters of the 65 years were used, the period being significantly extended.

RESULTS AND DISCUSSIONS

Air temperature regime in the Dăbuleni area

The Dăbuleni area is placed in an area with a strong influence of the sub-Mediterranean climate, with frequent warm air advections in the cold and warm seasons and with frequent higher temperatures than in most of Oltenia. Winters are generally warm, springs are early with summer days and tropical in some years starting from the end of March, summers excessively hot, and autumns long and mild with monthly averages of 18.0°C in September, 11.7°C in October and 5.6°C in November and positive minimums, which also extends into December. This warm area of Oltenia is characterized by the fact that only in January the multiannual monthly average is negative, and in the other months it is positive or slightly negative (≥-0.1°C).

Average monthly temperature values (normal) in the analyzed interval (1956-2020) were between -1.4°C in January and 23.6°C in July, the warmest month of year, and the annual average of 11.7°C (Table 5).

Table 5. Characteristic values of air temperature (°C) for the interval 1956-2020 from the meteorological station of SCDCPN Dăbuleni

Month	I	II	III	IV	V	VI	VII
Average	-1.4	1	6	12.5	17.6	21.7	23.6
CMMavg	5.7	7.4	10.0	17.8	22.4	24.8	27.7
DCMMavg	2007	1958	2017	2018	1958	2002	2002
Cmmavg	-9	-7.8	0.9	8.3	9.3	18.6	21.1
DCmmavg	1963	1956	1957	1997	1985	1976	1979
TminAbs	-30.5	-27	-16.9	-3.7	1	5.8	8.5
DataTminAbs	1963;25	2012;1	2018;1	2012;2	2000;5	1962;9	1987;28
CMMmin	-1.9	-1.6	-1.2	4	10.6	16.1	22
DataCMMmin	1988;18	2013;5	2014;11	2004;4	2003;17	2003;22	2020;9
Avgmin	-14.1	-12.2	-6.1	0.2	6	10.2	12
TMAXAbs	19.6	24.3	28.9	34.7	37.5	43.3	43.5
DataTMAXAbs	2007;21	2016;22	1983;26	1998;6	1993;28	2007;26	2007;24
cmmTMax	3.2	4.0	12.1	17.6	26.7	28.4	32.5
DatacmmTMax	1996;3	2003;21	1996;30	2002;30	1957;x	2011;24	1969;5
Avgmax	11.3	15.0	22.6	27.2	31.6	34.9	36.7
Month	VIII	IX	X	XI	XII	Year	
Average	23	18	11.7	5.6	1	11.7	
CMMavg	26.3	21.4	18.8	9.7	9.4	13.5	
DCMMavg	2003	1994	1962	2019	1960	2019	
Cmmavg	18.4	14.3	8.6	-0.7	-6.3	9.2	
DCmmavg	1976	2006	1972	1993	1962	1985	
TminAbs	6	-2.2	-6.7	-20	-22	-30.5	
DataTminAbs	1981;30	1977;30	1988;28	1993;26	1997;18	1963;25	
CMMmin	16.1	13.0	5.9	0.6	-0.7	-9.4	
DataCMMmin	2016;14	1999;7	1999;18	2002;7	1987;11	2020;8.I	
Avgmin	10.9	5.4	-1.1	-5.7	-10.5	-17.5	
TMAXAbs	42.6	38.0	34.8	28.8	20.5	43.5	
DataTMAXAbs	2012;24;26	2007;28	1991;1	1989;1	1957;x	2007;24:VII	
cmmTMax	23.4	25.0	20.1	2.6	4.5	33.6	
DatacmmTMax	2009;4	2002;8	2010;2	1998;5	1963;6	2002;16.VII	
Avgmax	36.2	32.7	27.3	19.1	13.5	37.8	

(Average = monthly temperature average (or annual for annual column); CMMavg = highest monthly temperature average; DCMMavg = record year of highest monthly temperature average; Cmmavg = lowest monthly temperature average; DCmmavg = year of record of lowest monthly average temperature; TMinAbs = absolute minimum temperature; DataTminAbs = record date of absolute minimum monthly temperature (year;day); CMMmin = highest monthly minimum temperature; DataCMMmin = date of record of highest minimum temperature (year;day); Avgmin = average of monthly minimums; TMAXAbs = absolute maximum monthly temperature; DataTMAXAbs = record date of absolute maximum monthly temperature (year;day); cmmTMax = lowest maximum temperature monthly; DatacmmTMax = record date of the lowest monthly maximum temperature (year; day); Avgmax= average of monthly maximums; x= missing data).

The lowest monthly temperature averages ranged from -9.0°C recorded in January 1963 (the year when one of the coldest winters was recorded on the European continent) to 21.1°C recorded in July 1979 (Table 5).

The highest monthly temperature averages were between 5.7°C in January 2007 (the winter of 2006-2007 was the warmest winter on the European continent and holds the climatic record of the warmest winter for Romania as well) and 27.7°C in July 2002.

According to the average monthly temperature values, the warmest months were: January 2007 with an average of 5.7°C, February 1958 with an average of 7.4°C, March 2017 with an average of 10.0°C, April 2018 with average 17.8°C, May 1958 average 22.4°C, June 2002 average 27.7°C, August 2003 average 26.3°C, September 1994 average 21.4°C, October 1962 average of 18.8°C, November 2019 with an average of 9.7°C and December 1960 with an average of 9.4°C. With the exception of 5 months (February 1958, May 1958, September 1994, October 1962 and December 1960), the warmest months have been recorded since 2000, thus confirming the increase in climate warming after 2000. Since 2000, the criteria for evaluating the types of thermal weather have changed in accordance with the new climatic developments due to the increase in the

frequency of long hot periods. Among the spring months, April 2018 holds the climate record of the highest temperature averages in the entire history of climate observations, not only in Romania but in a good part of the northern hemisphere. The highest average and maximum temperatures in the entire history of climate observations were recorded in July 2007.

The main vegetation period of the sweet pepper is from May 10-15 to October 1, with a maximum development in the months of July-August-September, when the peak of production is expected. The sweet pepper seedlings are obtained in the greenhouse, and the sowing date is between March 10-20, depending on the type of spring, and the latter depends on the type of winter (warm, cold, etc.). The germination time of sweet pepper seeds (duration in days from sowing to emergence) is long compared to other plants, about 3 weeks. Planting in the field is carried out depending on the climatic conditions, between May 10-15. In the Dăbuleni area, springs are usually early and warm, which makes the development of crops have optimal climatic conditions. The absolute climatic record of the earliest spring was recorded in the spring of 2016 with the absolute spring index of 583.1 (calculated according to the temperature values from the weather station in Bechet. Summers are particularly hot with intense heat waves, with a large number of tropical days and nights, autumns are long and dry, and the summer heat extends into September and heat waves also occur in the first 15-20 days of September. In winter, particularly cold air advections can occur from the Pre-Balkan Plateau (during cold waves) or from the mountainous area of northern Oltenia. The phenomenon of thermal inversion is frequent, especially in the cold season, but it also occurs in the warm season. Only the month of January has the multiannual average of negative temperature (-1.4°C), and the other months have positive averages. According to the annual temperature averages, the warmest year was 2019 with an average of 13.5°C, the year in which air temperature records were achieved at many meteorological stations in Romania, and in Dăbuleni the maximum temperature was 38.4°C.

The warmest years by mean annual temperature values ≥12.0°C have been recorded, with only four exceptions, since 2000, with annual means of: 1960 with annual mean of 12.5°C, 1966 with annual mean of 12.1°C, 1994 with annual average of 12.6°C, 1999 with annual average of 12.2°C, 2000 with annual average of 13.0°C, 2001 with annual average of 12.6°C, 2002 with annual average of 12.8°C, 2003 with annual average of 12.2°C, 2004 with annual average of 12.3°C, 2005 with annual average of 12.2°C, 2007 with annual average of 13.32°C, 2008 with annual average of 12.2°C, 2009 with annual average of 12.1°C, 2012 with annual average of 12.6°C, 2013 with annual average of 12.7°C, 2014 with annual average of 12.29°C, 2015 annual average of 12.9°C, 2016 annual average of 12.8°C, 2017 annual average of 12.9°C, 2018 with annual average of 13.1°C, 2019 with annual average of 13.5°C and 2020 with annual average of 13.3°C. It should be noted that since 2018, the averages have been ≥ 13.0°C. The increase in climate warming has been particularly rapid since 2000. Since 1990, most of the old climate records have been broken, and climate warming has accelerated since 2000, a process that continues today. The coldest years by annual average temperature with means ≤11.0°C were: 1963 with annual average of 10.7°C, 1969 with annual average of 10.3°C, 1973 with annual average of 10.8°C, 1976 with annual average of 10.4°C, 1980 with annual average of 10.6°C, 1982 with annual average of 10.9°C, 1983 with annual average of 10.9°C, 1985 with annual average of 9.2°C (the coldest year in the entire data set), 1986 with an annual average of 10.6°C, 1993 with an annual average of 10.9°C, 1997 with an annual average of 10.8°C, and 2011 with an average of 10.98°C. After 2011, such values were no longer recorded. For the entire analyzed period (1956-2020) the alternation of the percentage weights of thermal time during the vegetation period of the sweet pepper is shown in the Table 6 and graph in Figure 1.

Table 6. Matrix of types of thermal weather at Dăbuleni in the growing season (May-September) and adjacent months (April, October) of sweet pepper for the interval 1956-2020, calculated using Hellmann's criterion (TC = warm time = Cl+C+FC+EC; TR = cool time = RC+R+FR+ER, TN = normal thermal time)

Year	IV	V	VI	VII	VIII	IX	X
1956	CL	N	N	N	C	CL	N
1957	N	RC	C	CL	N	CL	N
1958	N	C	CL	C	C	CL	CL
1959	CL	N	N	C	N	RC	RC
1960	N	N	N	N	CL	RC	C
1961	CL	RC	N	RC	RC	N	N
1962	N	CL	RC	N	CL	N	FC
1963	N	N	N	N	CL	CL	N
1964	N	RC	N	N	RC	RC	CL
1965	R	N	N	N	R	CL	RC
1966	CL	N	R	N	N	N	C
1967	N	N	R	N	N	N	N
1968	C	C	N	N	R	N	RC
1969	RC	C	RC	R	N	N	RC
1970	N	RC	N	RC	RC	N	RC
1971	N	N	RC	R	RC	RC	RC
1972	C	N	CL	N	RC	R	R
1973	N	N	N	N	RC	N	N
1974	R	RC	RC	N	N	CL	N
1975	N	CL	N	RC	R	CL	N
1976	N	N	R	RC	R	RC	RC
1977	RC	N	RC	N	RC	R	R
1978	RC	RC	RC	RC	R	R	N
1979	RC	N	N	R	R	N	R
1980	RC	R	N	N	R	RC	CL
1981	RC	RC	N	RC	RC	N	CL
1982	R	N	N	RC	RC	CL	N
1983	CL	FR	R	N	RC	N	R
1984	R	N	R	N	R	N	C
1985	N	FR	RC	RC	N	RC	R
1986	N	N	RC	RC	RC	N	RC
1987	RC	RC	N	N	RC	C	RC
1988	R	N	N	CL	N	N	R
1989	C	RC	R	RC	N	RC	N
1990	N	N	N	N	RC	RC	N
1991	RC	R	N	N	R	N	N
1992	N	N	N	RC	C	RC	N
1993	RC	N	CL	N	N	N	CL
1994	CL	N	N	N	N	C	N
1995	N	N	N	N	N	N	N
1996	RC	C	CL	N	N	R	N
1997	R	CL	N	N	RC	RC	R
1998	CL	N	CL	CL	CL	RC	N
1999	CL	N	CL	CL	N	CL	N
2000	C	C	C	CL	C	N	N
2001	N	N	RC	CL	C	N	CL
2002	R	C	C	C	N	N	N
2003	RC		C	N	C	N	RC
2004	N	N	N	CL	N	CL	CL
2005	RC	N	N	N	RC	N	C
2006	CL	N	CL	N	C	R	N
2007	C	C	C	C	N	RC	N
2008	CL	N	N	RC	C	N	N
2009	N	N	N	N	N	N	N
2010	N	N	N	N	CL	N	R
2011	N	RC	N	N	N	C	RC
2012	CL	N	CL	C	CL	CL	C
2013	CL	C	N	N	CL	N	N
2014	N	RC	RC	N	N	N	N
2015	N	CL	RC	CL	CL	C	N
2016	C	N	CL	CL	N	C	N
2017	N	N	C	CL	CL	C	CL
2018	FC	C	N	N	C	CL	CL
2019	N	N	CL	N	C	C	CL
2020	N	N	N	N	CL	C	CL
TC%	29,2	20	24,6	21,5	30,8	30,8	26,2
TN%	41,6	58,1	49,2	52,3	32,3	41,5	44,6
TR%	29,2	21,9	26,2	26,2	-36,9	27,7	29,2

The predominance of normal thermal time (TN) is observed in the vegetation season, the normal here meaning much warmer than in other agricultural areas in Oltenia, which actually means exceptionally favorable climatic conditions from a thermal point of view for the culture of sweet pepper.

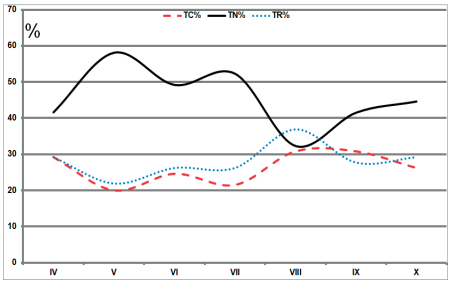

Figure 1. The alternation of the weight of thermal time types (TC%, TN%, TR%) in the Dăbuleni area during the sweet pepper vegetation period. (Source: Data processed from the data archive of the meteorological station of SCDCPN Dăbuleni)

The analysis of the amounts of precipitation recorded in the growing season of the sweet pepper in the interval 1956-2020, shows that the multiannual average (normal) is 270.3 l/m² (normal for vegetation season - SV). The lowest value was 79.8 l/m² (the climate record for the lowest amount of precipitation for the growing season) recorded in the dry year 1958, and the highest 541.0 l/m² (the climate record for the most large amounts of precipitation in the growing season) in the rainy year 1957 (Figure 2).

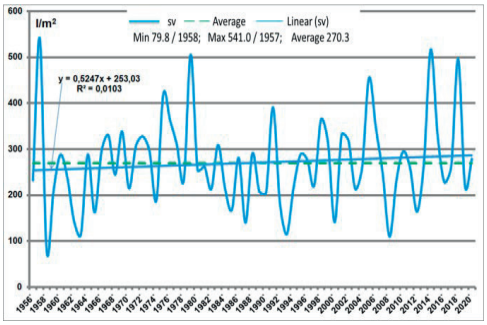

Figure 2. The variation of the annual amounts of precipitation (l/m²) in Dăbuleni in the interval 1956-2020

The rainiest growing seasons (with precipitation values ≥350 l/m²) were in the years: 1957 with 541.0 l/m², 1975 with 419.1 l/m², 1976 with 362.7 l/m², 1979 with 505.6 l/m², 1991 with 390.9 l/m², 1998 with 364.9 l/m², 2005 with 455.0 l/m², 2014 with 516.9 l/m² and 2018 with 495.9 l/m². The driest growing seasons (with precipitation values ≤ 150 l/m²) were in the years: 1958 with 79.8 l/m², 1962 with 143.5 l/m², 1963 with 114.8 l/m², 1987 with 140.0 l/m², 2000 with 141.4 l/m² and 2008 with 110.0 l/m².

CONCLUSIONS

It can be concluded that in the interval of 5 months from May to September, the sweet pepper crop completes its vegetative cycle almost entirely, except for the stage before being put in the field and what can still take place as a result of the extension of the warm weather in October. The aridification of the climate of the area is progressive and excessively hot summers lead to the need to irrigate the culture of sweet peppers, and the water reserves in the basement will be sufficient as long as the Danube flows and as long as the Oltenia Hills exist, the topoclimate here being the product of several factors that interconditions. In situations with prolonged and intense heat, shading nets are useful, which reduce the intensity of solar radiation and allow enough light to reach the plants for photosynthesis processes. The variability of the climate is particularly high, with rapid transitions in the spring from rainy and cool weather to hot and dry weather, and in the first month of autumn or at the end of August, rainy periods settle in some years. The thermal norm in the Dăbuleni area is much higher than in most of Oltenia with monthly summer averages between 21.6°C in June, 23.6°C in July and 23.0°C in August, and the seasonal average summer of 22.8°C. Summer heat produces stadial forcing of the sweet pepper crop and early and massive ripening. September's average of 18.0°C is 4 tenths of a degree higher than May, thus extending the warm weather and favorable conditions into September as well. The increasing trend of air temperature parameters (maximum, minimum, average) determines the translation of the summer season to autumn and the extension of favorable conditions in the first month of autumn. Climate warming also manifests itself in the Dăbuleni area in all months of the year. Deficient rainfall time prevails throughout the growing period of the sweet pepper, and for the entire vegetation period the percentage of deficient rainfall time is 46.2%, of normal 20.0%, and of excess rainfall 33.8%.

ACKNOWLEDGEMENTS

This research work was carried out with the support of with the support of Mr. Marinică Ion, specialist in meteorology within the Oltenia Regional Meteorological Center, and is an integral part of the doctoral university studies contract no. 522/B/A3/23 dated 05.10.2018, concluded between the University of Craiova, the Doctoral School of Animal and Plant Resources and the doctoral student Alina-Nicoleta Ciucă (Paraschiv).

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