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THERMAL SPECIFICATION OF THE DENDROLOGICAL GARDEN IN GLINNA AGAINST THE CONDITIONS OF THE MESOREGION IN THE SZCZECIN COASTAL REGION

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Abstract

The paper is an attempt to assess thermal conditions in the Dendrological Garden in Glinna against the conditions of the mesoregion of the Szczecin Coastal Region, as represented by five stations (Lipnik, Ostoja, Szczecin, Świnoujście, Kołobrzeg) in a study period of two years (May 2014-April 2016), based on measurements of air temperature taken at 200 cm a.g.l. Spatial variation of thermal conditions of the analysed area was found to be very large and was statistically confirmed. Mean air temperature in the analysed period in Glinna was 10.2°C which, in comparison with the other stations, proved to be the highest value. The absolute minimum, i.e. -12.7°C, was recorded in Glinna in January 2016 and the absolute maximum of 35.6°C in August 2015. It was shown that for the purpose of the assessment of thermal conditions in Glinna on the basis of mean air temperature from the 24-hour period, it is justified to refer to multiannual data from IMGW station in Szczecin. On the grounds of minimum temperature, amplitude, time of occurrence of spring and autumn frosts, as well as the number of days with frost and cold days, it was shown that the Dendrological Garden in Glinna has more favourable thermal conditions than the neighbouring areas.

Key words: trees, maximum temperature, minimum temperature, amplitude, frost, cold days, West Pomerania

INTRODUCTION

The Dendrological Garden in Glinna, near Szczecin, is one of the 38 botanical gardens in Poland statutory activity of which includes, among others, attempts to acclimatize the wood plants in particular climatic conditions. The wide range of taxa cultivated in Glinna garden is due to mild climatic and microclimatic conditions, unlike these characteristic for other regions of Poland. According to the map by Heinze and

Schreiber (1984), the arboretum is located in a woody plants frost resistance subzone 7a, where the mean minimum temperature from the multiannual period ranges from -15.0°C to -17.7°C. The bioindicator plants of the sub-zone 7a, i.e. the atlas cedar *Cedrus libanii* subsp. *atlantica*, holly *Ilex aquifolium* and cherry laurel *Prunus laurocerasus*, grow well and do not freeze in such conditions (Kubus 2008, Nowakowska and Baran 2007).

The approximate date of establishing the dendrological garden is 1880, however, as early as in 1823, there were tree nurseries in the area and non-native tree nursery sections were introduced in 1870. In 1938, in Glinna there were 52 species of non-native tress and 3 species of non-native shrubs (Tumiłowicz 2009). Since 1970 the collection of the arboretum, administrated by Gryfino Forest District, has been successfully enriched by its scientific supervisor – Professor Jerzy Tumiłowicz, the head of the arboretum SGGW in Rogów. Currently, the area of the garden is approximately 8 ha, and the collection amounts to 874 taxa of woody plants – species and varieties of trees and shrubs from various regions of the world are predominant (82.6%).

Due to very favourable climatic conditions of the region and favourable microclimatic conditions of the garden, the collection was enriched by species undergoing frequent freezing in the arboretums in the central and eastern Poland, as well as by those not cultivated in Poland. There are 25 plant species which were introduced to Poland for the first time, mainly from natural sites (Tumiłowicz 2002, 2006). The principle by Tumiłowicz (2009) of cultivating mainly the plants obtained from natural sites with minimum share of widely available cultivars (Kubus 2008) is still respected. Under the cultivation conditions, the acclimatization of plants was successful for China-fir *Cunninghamia lanceolata*, giant sequoia *Sequoiadendron giganteum* and for some rarely grown, very early or very late flowering woody plants of seasonal rhythm which does not coincide with phenological seasons in a year (Kubus 2013, Kubus and Nowak 2013, Nowak et al. 2015). Asian species constitute 56% of the collection (including 180 species of taxa from China), the North American species amount to 25% and European 18% (Tumiłowicz 2010). Especially numerous are the species of the following genera: maple (68 taxa) and magnolia (24 taxa).

The aim of the paper is the characteristic of thermal conditions in arboretum in Glinna, based on the two-year long air temperature measurement series taken at 200 cm a.g.l, and subsequent assessment of the conditions in comparison to data obtained from 5 other stations located within, or at the boundary of the Szczecin Coastal Region. It should be noted, however, that the present study is the first research on thermal conditions occurring in the arboretum, based on the actual measurement data.

MATERIALS AND METHODS

The Dendrological Garden in Glinna is located on the south-edge of the Bukowa Forest at the height of 51-68 a.s.l., in the lower part of the so-called Sunny Structural Basin. According to the physico-geographical regionalisation by Kondracki (2013),

the area is located in the mesoregion of the Szczecin Coastal Region, in the microregion of the Bukowe Hills – Fig. 1. Additionally, according to the climatic regionalisation by Koźmiński et al. (2012), the area of Glinna is situated in VI land – Pyrzycko-Goleniowska. Mean annual air temperature for this region ranges from 8 to 8.5°C. The last instance of spring frosts at 200 cm a.g.l. is usually observed before 25-30 of April. The dates of the first occurrence of autumn frosts are between 17 and 25 of October. The vegetation period in this region lasts, on average, 222 to 225 days.

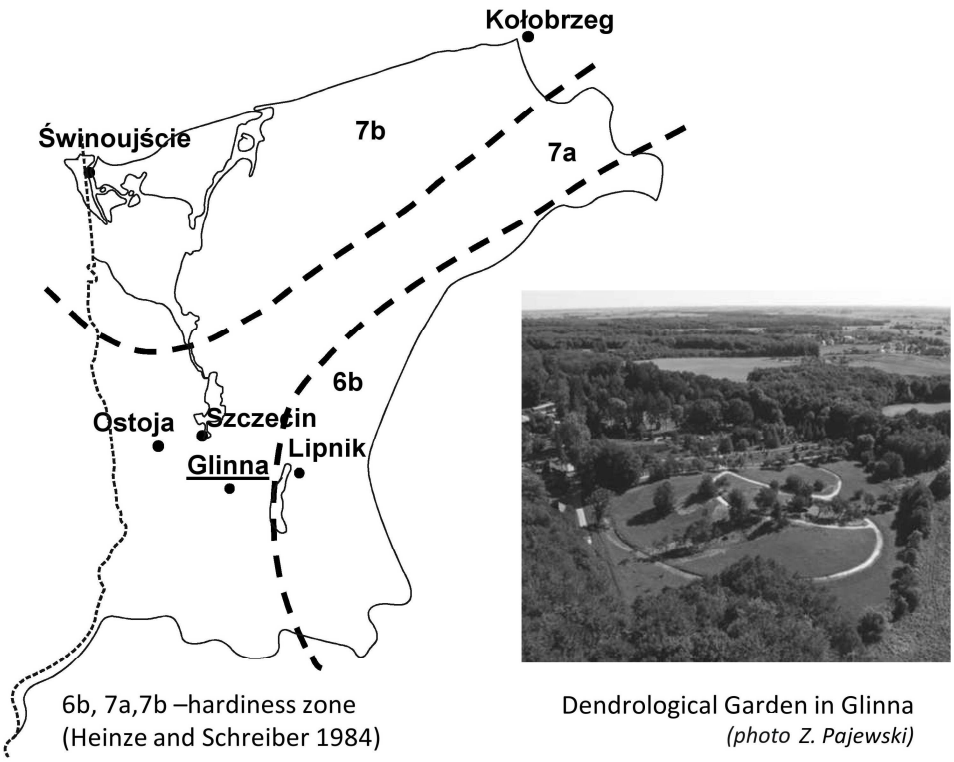

Fig. 1. Localization of Dendrological Garden in Glinna and measuring stations on the Szczecin Coastal Region

The present paper is, most of all, an attempt to compare the thermal conditions of the Dendrological Garden in Glinna with the results from other stations located in the area, or in the close vicinity of the Szczecin Coastal Region (the case of Kołobrzeg station) – Fig. 1. The meteorological stations in Glinna, Lipnik and Ostoja operate within the measurement network of the West Pomeranian University of Technology in Szczecin, and the stations located in Szczecin, Świnoujście and Kołobrzeg are administered by the Institute of Meteorology and Water Management (IMGW).

The automatic meteorological station in the Glinna garden was installed in the second half of 2014. The starting date was the determinant of the period in which the

analysis was conducted, that is the period of two years – from May 2014 to April 2016.

To achieve its objectives, the study uses the hourly values of air temperature taken at 2 m a.g.l. in the aforementioned stations. The obtained results are presented using the basic statistical characteristics. Statistical significance of the difference between the thermal conditions in Glinna and the remaining stations was evaluated with the T-Student test at $\alpha = 0.05$. Taking into consideration the potential threat to the plants, the dates of the beginning, ending as well as intensity of frosts were established together with the number of days with frost and cold days. There are various definitions of frost in the literature on the subject, yet the present paper adopts the definition as given by the meteorological dictionary (Słownik meteorologiczny 2003) which identifies day with frost as the day with a minimum temperature below 0.0°C and a maximum temperature above 0.0°C ($t_{min} < 0.0$°C, $t_{max} > 0.0$°C). The cold day is defined as the day with a maximum temperature between 0.0°C to -10°C ($t_{max} <$ 0.0°C to -10°C) – Kossowska-Cezak (2014).

RESULTS AND DISCUSSIONS

In the period from May 2014 to April 2016, the mean air temperature in Glinna amounted to 10.2°C and was higher by 0.1°C-1.3°C than that recorded in the other stations under analysis – Fig. 2. In turn, the mean maximum air temperature in a 24-hour period in Glinna was 14.1°C, and was lower by 0.5°C only in comparison with Szczecin and higher for all other stations – Lipnik and Kołobrzeg by as much as 1.1°C. The mean minimum air temperature in a 24-hour period in Glinna (6.5°C) was markedly higher than that recorded in the stations located in the closest vicinity (Lipnik, Ostoja, Szczecin), and comparable with the coastal stations. It is worth noting that the minimum temperature, as compared with the maximum temperature, was characterised by a significantly greater variability from one 24-hour period to another, yet in Glinna the variability was relatively small and similar to Świnoujście and Kołobrzeg.

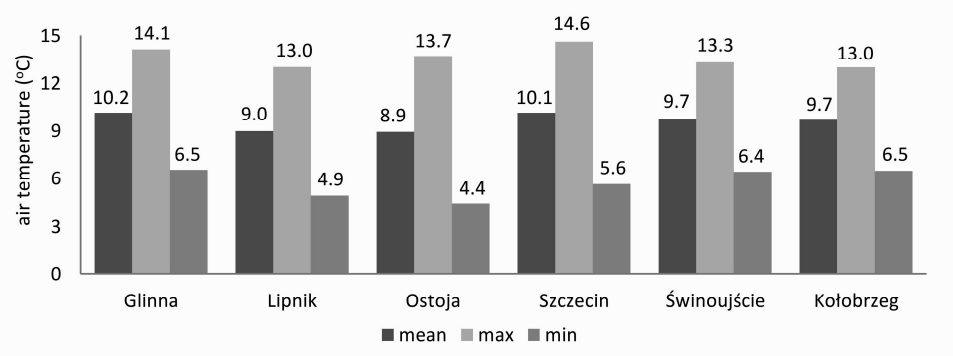

Fig. 2. Average, maximum and minimum air temperature (200 cm a.g.l.) in the period from May 2014 to April 2016

The important parameter in the characteristics of thermal conditions of a given area is the 24-hour air temperature amplitude, defined as the difference between the lowest and the highest air temperature recorded during the 24-hour period. Various factors affect its value, predominantly: latitude, total cloudiness, the season in a year, vicinity of water reservoirs and the area's orography. In Poland, the lowest amplitudes are characteristic for the coastal zone and show an increasing tendency further inland and reach its peak value in the eastern part of Poland.

As is presented in Fig. 3, depending on the station, the seasonal variability is markedly pronounced in the course of the amplitudes. The highest daily amplitudes of air temperature, and at the same time the greatest variations between the amplitudes recorded in different stations, occurred in the warm half year. In turn, the lowest daily amplitudes were found in the period November-January. In the Szczecin Coastal Region, by far lowest fluctuations in air temperature in a day were observed in the coastal stations. Markedly lower, both mean and maximum, amplitudes of air temperature in Glinna as compared to Szczecin, Ostoja and Lipnik, certainly result from the location of the garden on the edge of the Bukowa Forest – the vegetation of that area has a mitigating effect on the daily extremes in air temperature.

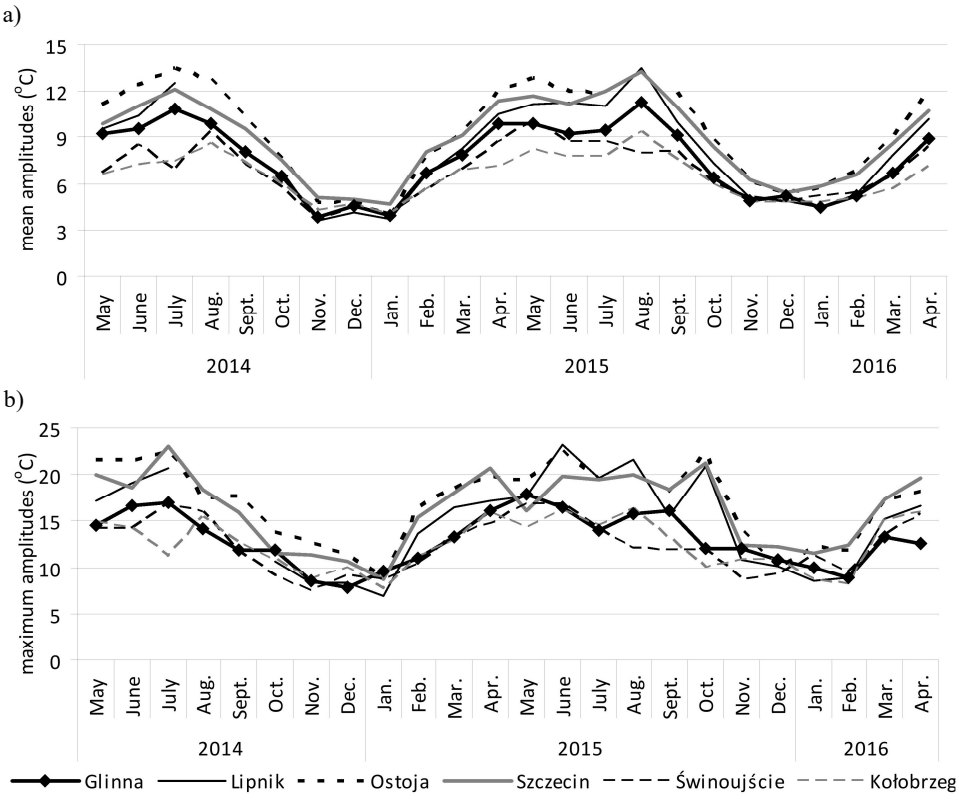

Fig. 3. Average (a) and maximum (b) amplitude of air temperature in particular months from May 2014 to April 2016

Table 1

Average and absolutely maximum and minimum air temperature (200 cm a.g.l.) in particular months from May to April 2016-2014

Year	Month	GLINNA			OSTOJA			SZCZECIN			LIPNIK			ŚWINOUJŚCIE			KOŁOBRZEG		
		$\bar{x}$	*max*	*min*	$\bar{x}$	*max*	*min*	$\bar{x}$	*max*	*min*	$\bar{x}$	*max*	*min*	$\bar{x}$	*max*	*min*	$\bar{x}$	*max*	*min*
2014	**May**	13.3	29.1	2.9	12.7	29.2	-0.3	13.3	28.7	2.4	12.7	28.9	-0.5	12.8	29.5	3.5	12.6	30.3	10.1
	June	16.2	30.4	7.7	15.7	31.4	5.0	16.2	30.2	4.4	15.6	30.8	4.9	15.7	24.3	7.8	15.5	25	12.5
	July	21.2	32.4	9.9	21.0	34.1	8.5	21.2	31.7	7.9	21.0	32.7	9.4	19.6	28.6	10.2	19.3	31	17.2
	Aug.	17.3	31.7	7.4	16.9	32.5	4.8	17.3	31.9	4.6	-	-	-	17.2	32.1	6.9	17.4	34.1	17.5
	Sept.	15.5	25.6	5.3	15.1	27.6	4.1	15.4	25.8	2.8	-	-	-	15.3	24.4	5	15.0	24.4	12.9
	Oct.	11.6	20.8	1.1	11.2	21.8	1.4	11.8	20.9	1.5	11.1	19.6	0.5	11.7	20	3.2	11.5	19.5	5.6
	Nov.	6.5	16.4	-4.5	5.9	17.0	-5.0	6.5	16.9	-4.7	5.9	15.2	-4.4	6.6	15.7	-3.6	6.4	15.9	0.1
	Dec.	2.6	11.9	-7.6	1.3	11.0	-9.4	2.5	12.1	-9.6	1.8	11.3	-8.7	2.4	11.2	-6.6	2.2	11.5	-2.5
2015	**Jan.**	2.7	12.5	-3.2	1.8	10.8	-4.8	2.8	12.1	-5.8	2.0	11.5	-4.7	2.6	10.9	-3.2	2.7	11.1	0.9
	Feb.	1.5	10.8	-7.6	0.5	10.8	-10.8	1.4	11.6	-8.8	0.9	9.9	-9.3	1.5	9.6	-6.6	1.6	10.5	-1.7
	Mar.	5.8	16.3	-3.1	5.1	16.3	-5.0	5.7	17.5	-5.3	5.0	16.3	-5.0	5.3	16.5	-1.2	5.2	17.1	3.4
	Apr.	8.8	22.2	-1.3	7.9	22.1	-3.2	8.7	22.6	-2	7.9	21.3	-2.9	8.1	22	-0.1	7.9	22.6	5.9
	May	12.4	25.3	2.7	11.9	25.4	0.1	12.5	25.7	1.9	11.9	24.0	0.3	11.6	25.6	2.3	11.8	24.8	11.1
	June	15.4	29.2	5.3	15.1	30.3	2.8	15.5	29.2	3.9	15.0	29.5	2.3	14.8	27.7	6.3	14.6	28.9	14.2
	July	18.4	33.2	7.1	18.3	35.4	8.3	18.5	33.7	7.1	18.4	34.1	8.3	17.7	34	9.4	17.6	32.2	14.4
	Aug.	21.2	35.6	10.2	-	-	-	21.0	36.3	4.4	21.0	37.1	5.9	19.4	33.3	7.3	18.9	32.4	18.1
	Sept.	14.1	28.9	4.8	13.4	26.7	2.5	14.1	28.9	2.5	13.9	29.2	2.3	14.4	27.1	5.9	14.8	26.8	14.8
	Oct.	8.9	20.6	-0.1	8.1	22.3	-2.1	8.5	20.7	-3.9	8.5	20.9	-2.0	9.0	19.7	1.1	8.7	17.1	5.5
	Nov.	7.0	16.2	-2.5	6.1	16.3	-3.2	7.1	16.4	-2.2	6.3	15.3	-1.7	7.0	15.2	-1.8	7.0	15.3	2.5
	Dec.	6.3	14.5	-4.2	5.7	13.4	-5.2	6.7	14.8	-4.1	5.7	13.8	-5.3	6.2	13.4	-3	6.2	13	0.7
2016	**Jan.**	-0.7	10.9	-12.7	-1.9	10.1	-13.9	-0.9	11	-16.1	-1.7	9.9	-13.9	-1.1	10.3	-14.6	-1.1	10.1	-8.3
	Feb.	3.6	12.9	-2.7	2.7	13.2	-5.4	3.7	14	-6.7	3.1	11.1	-4.1	3.2	10.8	-4.3	3.4	12.6	2.3
	Mar.	4.5	17.2	-2.7	3.7	16.5	-5.4	4.3	17.8	-5.7	3.7	16.3	-4.6	4.1	16.4	-2.8	4.0	17.1	3.3
	Apr.	8.7	22.1	0.4	7.9	23.0	-2.6	8.7	23.1	-3.6	8.1	22.0	-1.7	7.8	19.1	-0.6	7.9	18.6	7.2
May 2014-April 2016		**10.2**	**35.6**	**-12.7**	**8.9**	**35.4**	**-13.9**	**10.1**	**36.3**	**-16.1**	**8.9**	**37.1**	**-13.9**	**9.7**	**34.0**	**-14.6**	**9.7**	**34.1**	**-8.3**

- lack of data

The analysis of monthly values presented in Table 1 shows that in the Szczecin Coastal Region, the warmest months were July 2014 and August 2015. In both months in Glinna, the mean temperature was 21.2°C with the absolute maximum in August 2015 (35.6°C). In turn, the coldest month was January 2016. Mean air temperature in Glinna recorded in this month was -0.7°C, with the absolute minimum -12.7°C and, in comparison with the remaining area, it was higher both in terms of average and minimum values. The absolute minimum of January 2016, i.e. -16.1°C, was recorded in the Szczecin station.

The value of minimum temperature is an important element which affects the possibility of cultivating particular species of plants. The information on the range of the lowest tolerable temperatures for plants, as well as on the frost resistance zones in which the plants could be cultivated, allows the optimum planning in terms of cultivation of particular species. For this reason, Heinze and Schreiber (1984) established the frost resistance zones for trees using the values of minimum temperatures. The analysed area belongs to three (6b, 7a, 7b) of the sub-zones determined for Poland, and its boundaries are presented in Fig. 1. It should be noted that in the analysed period, threshold values of minimum temperature for a given sub-zone were not exceeded in any of the stations. The decrease in minimum temperature below the critical values almost always resulted in freezing and therefore loss of shrubs and trees. For example, the decrease in minimum temperature in January 2006 in Glinna to -26°C (as recorded in the station in Szczecin) resulted in freeze damage in 96 taxa – Nowakowska and Baran (2007).

For the sake of better highlighting the thermal specificity of Glinna against the remaining stations, Fig. 4 shows the differences between the values recorded in a 24-hour period: mean, maximum and minimum values of air temperature per individual months. Almost each month of the analysed two-year long period, a positive deviation of temperature was observed – on average 0.5°C, which points to thermal favouring of Glinna. The greatest average spatial variations in temperature were recorded between Glinna and Ostoja (0.7°C), and comparison with Szczecin shows no such variations (0.01°C). As is presented in Fig. 4a, in terms of particular months, the highest deviation was found in the warmest months – July 2014 and August 2015, between Glinna and the coastal stations: Świnoujście (1.7°C, 1.8°C) and Kołobrzeg (2.0°C, 2.3°C). Substantial negative differences were found in September 2015 as compared with Kołobrzeg. The T-Student test confirmed the statistical significance of the obtained variations for all combinations of stations, with an exception of the comparison between Glinna and Szczecin.

The situation was slightly different in terms of differences between the maximum temperatures, as the analysis showed higher number of months with negative deviations, mainly for the pairs Glinna–Ostoja and Glinna–Szczecin (Fig. 4b). The negative differences did not exceed 1.1°C, and on average were 0.5°C. In comparison with the negative differences, the positive differences were, on average, higher (0.8°C) and were predominantly more common in the warm part of a year – particularly in comparison of Glinna with the coastal stations (G-Ś, G-K). However, it is worth noting that the greatest differences (3.4°C-3.8°C) were found in the warmest months of the analysed period, similarly to mean 24-hour period differences. As for

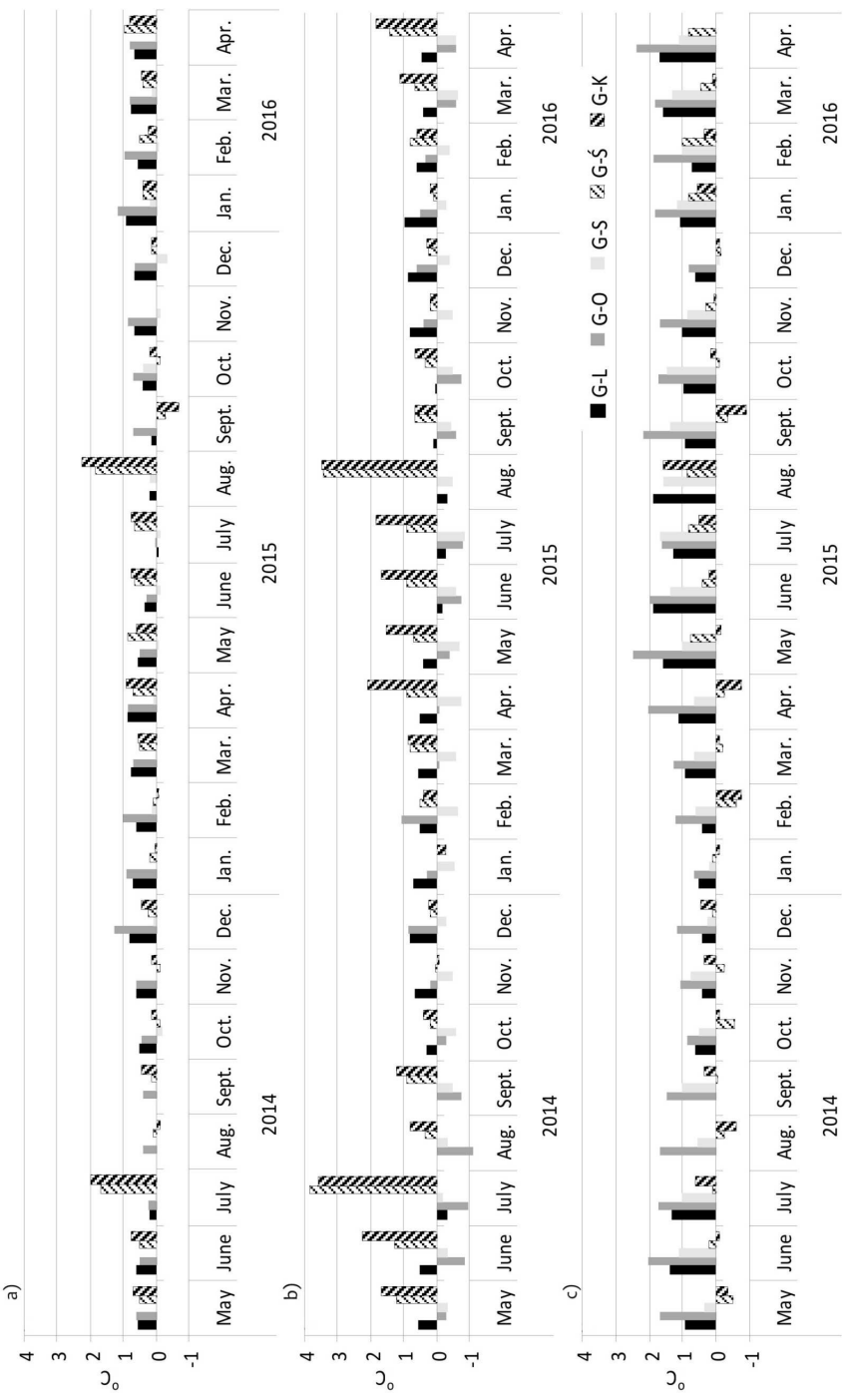

Fig. 4. The differences between the daily averages (a), maximum (b), minimum (c) values of the air temperature in Glinna and Lipnik (G-L) Glinna and Ostoja (G-O), Glinna and Szczecin (G-S), Glinna and Świnoujście (G-Ś) and Glinna and Kołobrzeg (G-K) in particular months from May 2014 to April 2016

the aforementioned differences in maximum temperatures, the values of T-Student test show statistical significance for all pairs of stations.
In turn, the analysis of data presented in Fig. 4c shows that the average highest positive variations (1.0°C) were found for the minimum air temperature values. Importantly, the greatest thermal contrasts occurred each month of the analysed period between Glinna and Ostoja. The smallest differences in minimum temperature were found for the pairs Glinna – the coastal stations, and only for such pairs the negative difference was observed in some months. The values of T-Student test confirmed the significance of the obtained deviations, only with the exception of the pair Glinna–Kołobrzeg.
Another important feature of thermal characterisation of a given area, particularly in terms of constituting a threat to plants, is frost. The multiannual data show that the number of spring frosts (April-August) in Zachodniopomorskie Voivodeship is approximately two or three times higher than the number of autumn frosts (August-October) – Koźmiński et al. 2012. In 2014, in the Szczecin Coastal Region, the earliest autumn frosts (at 200 cm a.g.l.) were recorded in Ostoja – 9 November. In the remaining stations, the earliest autumn frosts occurred almost 3 weeks later – between 26 and 28 November depending on the station. However, in 2015, in comparison with the previous autumn season, frosts occurred considerably earlier – in four stations as early as in the first part of October (3 October in Lipnik, Ostoja and Szczecin; 12 October in Kołobrzeg), and a month later in Glinna (3 November) with greater intensity (-1.6°C) – Table 2. On a multiannual basis (1971-2000), the earliest autumn frosts recorded in the analysed area occurred between 15 October and 5 November (Koźmiński et al. 2012) which means that in 2014 the frosts occurred later, and in 2015 earlier than usual.
The data presented in Table 2 show that spring frosts of 2015 ended the earliest in the coastal zone – 23 March in Kołobrzeg, and in Świnoujście and Glinna 5, 6 April respectively. The frost period ended the latest in Lipnik – 19 April. In the subsequent season, spring frosts ended the earliest in Glinna – as early as 16 March, and in the

Tabela 2
Dates of earliest and latest frosts and their intensity in the period from May 2014 to April 2016

Locality	Date of the first frost of autumn 2014	Intensity (°C)	Date of the last frost of spring 2015	Intensity (°C)	Date of the first frost of autumn 2015	Intensity (°C)	Date of the last frost of spring 2016	Intensity (°C)
Glinna	28 Nov.	-1.1	6 Apr.	-0.8	3 Nov.	-1.6	16 Mar.	-0.8
Lipnik	28 Nov.	-1.8	19 Apr.	-0.3	3 Oct.	-0.1	25 Apr.	-0.9
Ostoja	9 Nov.	-0.6	18 Apr.	-0.8	3 Oct.	-0.6	29 Apr.	-1.2
Szczecin	27 Nov.	-0.2	10 Apr.	-0.6	3 Oct.	-0.5	15 Apr.	-0.1
Świnoujście	28 Nov.	-1.7	5 Apr.	-0.1	23 Nov.	-1.8	25 Apr.	-0.1
Kołobrzeg	26 Nov.	-0.4	23 Mar.	-0.2	12 Oct.	-0.6	2 Apr.	-0.8

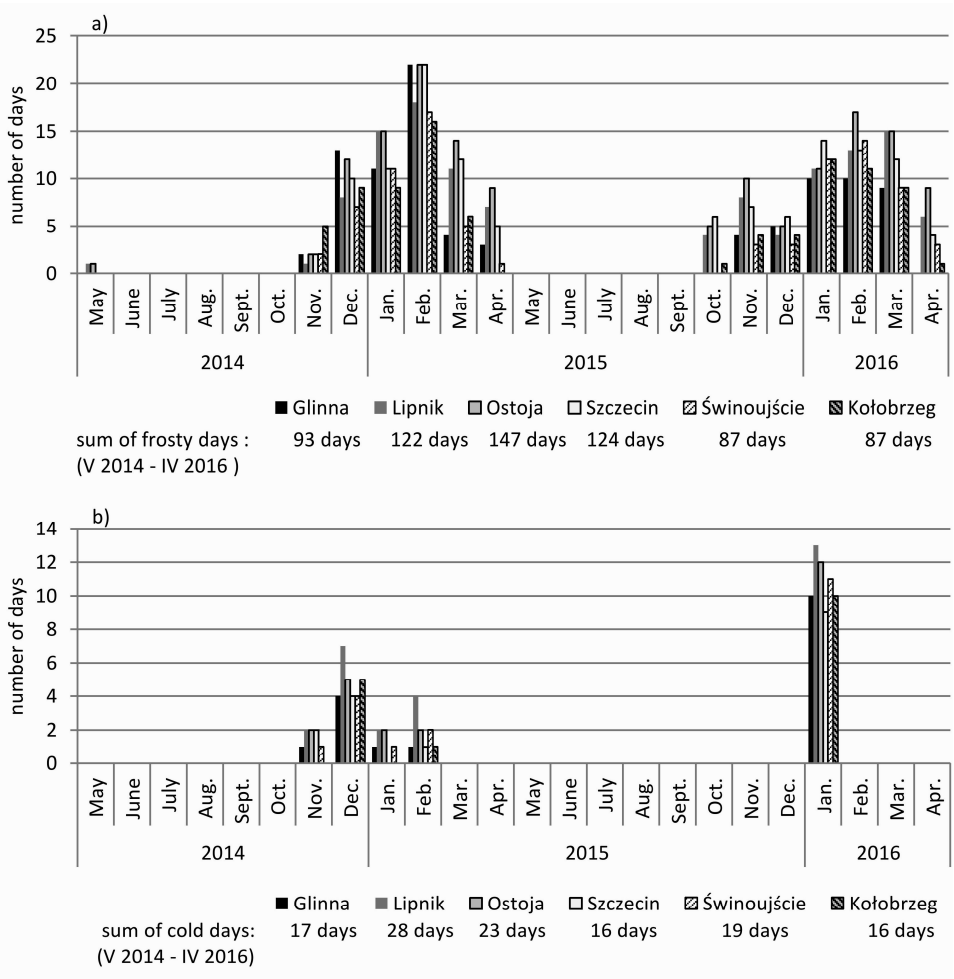

Fig. 5. Number of frost (a) and cold (b) days in particular months in the period from May 2014 to April 2016

remaining stations the frosts ended gradually from 2 April (Kołobrzeg) to 29 April (Ostoja). The study by Koźmiński et al. (2012) shows that in the Szczecin Coastal Region, spring frosts end, on average, in the period from 15 to 30 April, which means that in the analysed period the frosts ended sooner. Generally, it can be concluded that in the two analysed seasons the intensity of the earliest occurring autumn frosts was higher than that of the latest occurring spring frosts.

In addition, it is important to bear in mind that the aforementioned temporal and spatial variability in frost occurrence was determined with the use of data taken at 200 cm a.g.l. which is representative for larger areas, while data taken at the near-ground layer of air (5 cm a.g.l.) characterise the local thermal conditions determined by the type of surface, land relief and baric situation. Koźmiński (2010) points to the fact that in the area of the Bukowe Hills, which shows great variation in terms of alti-

tude, extremely great (reaching several degrees) spatial variability in near-ground temperatures is to be expected, e.g. between the bottom of the valley, hillsides and uplands. Within the area of the garden, on moist soils in the southern parts with the lowest altitude, a cold air damming forms on the area of approximately half a hectare, which is taken into consideration in planning of planting (Tumiłowicz 2009).
Fig. 5 shows the number of days with frost and additionally the number of ice days which constitute a threat to overwintering of plants, particularly in a situation of lack of snow cover. In the area of Szczecin, snow cover occurs on average on 9 December and disappears on 4 March. In this period, on average, 35 days with snow cover of no more than 10 cm in depth are recorded (Czarnecka 2012).
In the analysed two-year long period, the lowest number of days with frost, i.e. 87, was recorded in the stations representative for the coastal region, slightly higher number was recorded in Glinna – 93 days, and in Lipnik and Szczecin the number was 122 and 124 respectively. The highest number of days with frost was recorded in Ostoja – 147 days. In comparison with days with frost, cold days occurred, depending on the station, from 4 to as much as 7 times less frequently. The lowest number of cold days was recorded in Kołobrzeg and Szczecin (16), Glinna (17), slightly more were observed in Świnoujście (19) and the most in Ostoja (23) and Lipnik (28). It is worth noting that the distribution of days with frost as compared to that of cold days was relatively equal in both cold seasons. However, as is shown in Fig. 5, cold days in the season 2014/2015 in the period from November to February were recorded on 1 to maximum 7 days in a month, and in the season 2015/2016 cold days occurred only in January and its number, depending on the station, amounted to 9 to 13 days.

CONCLUSIONS

The analysis of the thermal conditions in the area of the Szczecin Coastal Region in the period of two years (May 2014 - May 2016) shows very high spatial variability of the basic element of a climate, which was also statistically confirmed.
As for mean 24-hour and minimum temperatures, the greatest thermal contrasts were determined between Glinna and Ostoja, despite the fact that the two stations are located in the same frost resistance zone (7a) and the Ostoja station is an extra-urban station. In turn, the value of maximum temperature in Glinna deviated from maximum temperature recorded in the coastal stations (Świnoujście, Kołobrzeg) to the greatest extent. Statistically significant differences were not found only in two cases: between mean 24-hour period air temperature in Glinna and Szczecin and the minimum temperature in Glinna and Kołobrzeg.
In order to assess the thermal conditions in Glinna with the use of mean values from 24-hour period, it is reasonable to refer to multiannual data from IMGW station in Szczecin.
Taking into consideration such characteristics as: the minimum temperature, amplitude, time of occurrence of spring and autumn frosts, as well as the number of days with frost and cold days, the Dendrological Garden in Glinna shows greater thermal similarity to the coastal area than to areas directly adjacent to the garden.

Favourable thermal conditions of the Dendrological Garden in Glinna predominantly result from its location which has a significant influence on the garden's microclimate. Such microclimate has a beneficial effect on plant cultivation, particularly regarding trees and shrubs vulnerable to low temperatures.
Given the fact that thermal favouring of Glinna Dendrological Garden was identified in the period in which most of the months were by far warmer than the norm (Biuletyn... 2014, 2015, 2016), further long-term research including the average and cooler conditions is needed.

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SPECYFIKA TERMICZNA OGRODU DENDROLOGICZNEGO W GLINNEJ NA TLE WARUNKÓW WYSTĘPUJĄCYCH W MEZOREGIONIE POBRZEŻA SZCZECIŃSKIEGO

Streszczenie

Praca jest próbą oceny warunków termicznych Ogrodu Dendrologicznego w Glinnej w porównaniu z panującymi w mezoregionie Pobrzeża Szczecińskiego, reprezentowanym przez pięć stacji (Lipnik, Ostoja, Szczecin, Świnoujście, Kołobrzeg), przeprowadzoną na podstawie dwuletniej serii (V 2014 - IV 2016) pomiarowej temperatury powietrza z 200 cm n.p.g. Stwierdzono bardzo duże przestrzenne zróżnicowanie warunków termicznych na badanym obszarze, potwierdzone statystycznie. Średnia wartość temperatury powietrza w analizowanym okresie w Glinnej wyniosła 10,2°C i w porównaniu z pozostałymi stacjami była to wartość najwyższa. Absolutne minimum wynoszące -12,7°C zarejestrowano w Glinnej w styczniu 2016 roku, a absolutne maksimum o wartości 35,6°C w sierpniu 2015. Wykazano, że przy ocenie warunków termicznych w Glinnej na podstawie średniej dobowej temperatury powietrza, uzasadnione jest odwoływanie się do danych wieloletnich ze stacji IMGW w Szczecinie. Na podstawie temperatury minimalnej, amplitudy, czasu wystąpienia przymrozków wiosennych i jesiennych oraz liczby dni przymrozkowych i mroźnych wykazano termiczne uprzywilejowanie Ogrodu Dendrologicznego w Glinnej w stosunku do obszarów sąsiadujących.