ANALYSIS PERIOD AND DURATION OF FREEZING IN SOUTH DOBROGEA AND CONSEQUENCES OF THESE FACTORS ON CROPS

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***Abstract**: Soil temperature has a strong influence on plant growth and development, the processes taking place is normally only between plant-specific thermal limits, and each phase of vegetation. With falling temperatures below 0^0C, involved process of freezing, which in some conditions can become harmful to plants cultivate.To prevent the damages from these phenomena, it is necessary to know mainly the types of freezing that can affect crops, the period of freezing, etc. Frosts can occur in three different periods: winter, autumn and spring. Winter frosts called "black frost" causes, in general, less damage to agriculture, since intervening in a dormant period. However, these frosts, have a sensible action on vegetation when a period of several days, the temperature values fall below a threshold lowered. In the same time autumn frosts cut off vegetation cultures by providing the date of harvesting.In South Dobrogea was analyzed duration and period of freezing, using climate data for a period between 1965-2000, the main weather stations (Constanta, Mangalia, Medgidia, Adamclisi, Harsova). Based on these data, using statistical methods as the frequency and duration, could determine the index of the persistence of freezing that can characterize the degree of harshness of the climate. To calculate the index of thepersistence of freezing in the territory of South Dobrogea werw used multiannual average annual number of days with frost and no frost during the annual interval, resulting lenghth of days with frost possible. Thus, one can notice a lower persistence of frost in the Black Sea , because of its moderating influence, while in the freezeng high plateau is greater persistence due to thermal inversions.In conclusion, the index of the persistence of frost can characterize the degree of harshness of the climate particulary for crops. Depending on these results we can see the consequences of these phenomena on crops, but also measures may be taken to prevent damage crops.*

Key words: *black frost, crops*

INTRODUCTION

Amid invasion of cold air and cool the underlying surface by the intense radiation during sunny and calm nights, resulting in frost. Depression landforms are also an important factor in producing the conditions offered frost accumulation and stagnation cold air longer. Such situations are encountered especially in the highest relief in South Dobrogea. As noted above, these phenomena have particularly harmful effects on agriculture. Thus, late spring frosts, causing interruption to plant vegetation period and the early winter crops leading to compromise.

Frosts can occur in three different periods: winter, autumn and spring. a. winter frosts called "black frost" causes, in general, less damage to agriculture, as occurs in a dormant period. However, these frosts have a sensible action on vegetation when a period of several days, the values fall below a threshold temperature lowered (eg.-15^0C for grape-vine). b. frosts of autumn fruit trees and vegetation cut short the grape-harvest VIES conditional on many crops, eg maize harvest.

In turn, thaws accompanied by sudden melting of snow or winter sowing jeopardize helps accelerate soil erosion.

MATERIAL AND METHODS

Be considered as those days with frost in the air minimum temperature is less than or equal to 0^0C. Thaws is characterized as a state of thaw in the cold season, when air 0^0C or above this value. If the frost period is accepted that there are up to the first and last 0°C, the time days with minimum temperature less than or equal to 0 C° during interval with thaws there is a unanimous opinion, that crossed the threshold of the average daily temperature of 0 C°.

Of great importance for agriculture and knowing the average duration of annual frost-free interval, average time between the date of the last average frost date of spring and first autumn frost. Statistical data show a more than 220 days without frost on the east coast and in the central plateau south of Dobrogea (Constanta 231, Mangalia, 224) and between 220 and 210 days in the western part of South Dobrogea.

Crossing the spring season occurs gradually, usually by the occurrence of hot days, which is explained by the proximity of marine waters, alleviating air temperature variations. Autumns, but they are warm and sometimes extended until late December under the same influence of the sea, namely its effect of thermal inertia.

To highlight the concept of days with frost, two features are important: the annual frost-free period and monthly and annual number of days with frost

The annual frost-free period is defined by the following parameters:

a) the last day of spring frost

b) the first day of autumn frost

c) the frost-free interval

Monthly and annual number of days with frost is absolute frequency of days with frost occurs within annual frost-free, ie the interval between the first day of autumn frost and the last day of spring frost.

This range of frost-free days of special importance in agriculture, and data resulting from calculations of average and extreme absolute last spring frost and first frost of autumn, giving the average, maximum and minimum absolute annual range without frost.

To highlight the frequency and duration of frost statistical methods we use the following relationship:

$$I = \frac{N}{D}$$

where: I = index of the persistence of frost, N = annual number of days with frost, D = duration of days with frost possible in a year.

To calculate the index of the persistence of ice in the territory of Southern Dobrogea were using average annual values of the annual number of days with frost (N) and annual frost-free time interval denoted by 'd', resulting in possible duration of days with frost (D) a year, ie: D = 365 - d

RESULTS AND DISCUSSIONS

Calculations resulting in a reduced persistence of frost I <05 in the coastal zone and because of the moderating influence of the Black Sea. High plateau area of South Dobrogea is I> 05, is characterized by a higher persistence rate due to frost and thermal inversions in relation to height increase both parameters N and D.

In conclusion, the persistence of frost index can characterize the degree of harshness of the climate especially for crops.

Table 1

Distribution of the number of days with frost, monthly and annually in South Dobrogea (1965-2000)

Mount Station	Altitud	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year summ
Mangalia	6	17,2	14,5	5,7							0,4	4,6	12,3	54,7
Constanța	13	19,7	14,8	7,9	0,2						0,3	5,1	13,9	61,8
Hârşova	38	25,4	19,3	12,7	0,9	0,06				0,11	1,9	9,7	19,4	88,3
Medgidia	70	23,5	17,7	11,7	0,8					0,01	1,3	8,6	18,6	82,2
Adamclisi	159	23,5	18,5	13,5	1,1					0,01	1,5	8,7	19,0	85,8

The first frost occurs on average at the end of September in central part of South Dobrogea high. Generally the first frost date both the mean and extreme south are recorded in Dobrogea close every time under the influence of autumn cooling, which affects the whole region. Average last frost recorded in South Dobrogea in the high plateau Cobadin - Negru Voda - Oltina plateau and plateau Medgidia, gradually moving up on average by the end of April (around the time of 22-25 April). This thanks to the altitude but also to factors related to radiative and advecțiilor cooling air spring. The coastal area around the last frost date is recorded 12/04/1995 in Constanta and Mangalia 13/04/1994.

The average duration of frost-free interval is a function of altitude, ranging between 280-283 days in the high parts of South Dobrogea plateau and coastal plateau between 303-307 days. Analyzing how the production of frost and thaw in Southern Dobrogea were considered comments on the air temperature in a period of 35 years (1965-2000) made 5 weather stations representative of South Dobrogea (Table 1).

In the cold waters of the thermal influence is felt on the Black Sea coast, an area which is warmer than the land area, it is highlighted by a number of characteristics of air temperature in the cold when thaws and frosts occur. Thus, the average annual increase of frost about 2 months on the Black Sea, about 3 months in the western part of South Dobrogea reaching 3 months and half in the high (Figure 1).

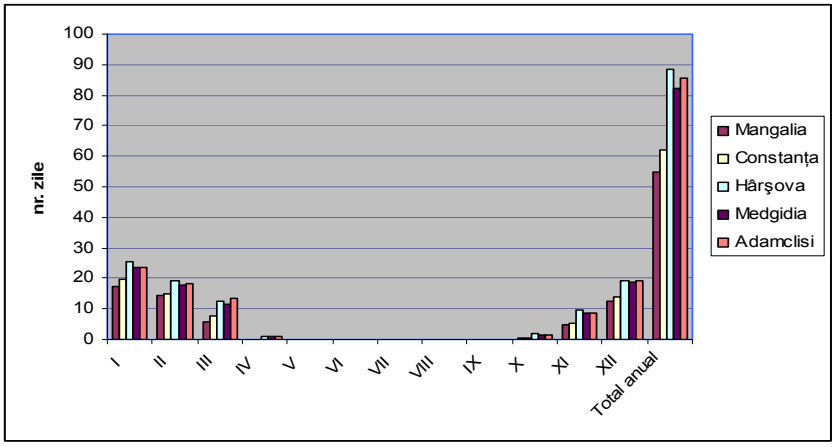

Figure 1. Multiannual monthly variation in frost days in South Dobrogea (1965-2000)

The earliest recorded frost in late September in the plateau and in the second decade of October, on the coast of South Dobrogea, while the latest freeze was observed in the first decade of April on the season and the first days of May in the western part of South Dobrogea. Maximum frequency of days with frost (Table 1) is in January, is between 17-19 days and 24-25 days on the coast of South Dobrogea. On average, taken over the entire period 1965-2000, the annual number of days with frost is between 55-62 days and 82-88 days on the coast of mainland South Dobrogea.

This gap has reduced frequency on the coast from stations located within the South Dobrogea. This is because in the first cold period (the months of November-December) sea water heat accumulated yields, surrounding area, while the cold end (March), sea water enters the heat accumulation phase. Coastal zone can also notice a reduction ranges from 12-17 days with frost on the season, over 2 months in the western part of South Dobrogea. Thaw distribution, shown by a stable ice is characterized by an increased frequency compared with increasing distance from the sea and by altitude station.

In the southern extreme of South Dobrogea, Mangalia thaw average duration of South Dobrogea reaching 35-40 days depending on the depth at which soil had frozen, and the intensity of frost and solar radiation values. The highest frequency of thaws seen in February when the sun rises and the height of the global radiation values are higher. Plant resistance to frost depends on both variety and growing conditions that determine the degree of hardening of plants. In winter cereals, low temperatures slow causes sugar accumulation in plants and thus increased resistance of frost. If fall temperatures remain higher for a long time, and their decline is suddenly hardened enough plants in the winter, giving a lower resistance to frost in winter.

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CONCLUSIONS

In conclusion, the persistence of frost index can characterize the degree of harshness of the climate especially for crops**.**

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