THE STRONG WINDS - CLIMATIC HAZARDS TO THE AGRICULTURAL CROPS IN DOBRUDJA

VÂNTURILE TARI – HAZARDURI CLIMATICE PENTRU CULTURILE AGRICOLE DIN DOBROGEA

Marius LUNGU*, Liliana PANAITESCU*, Anca ALBU*, Simona Niță**

**Universitatea Ovidius Constanța*
***USAMVB Timişoara*
Universitatea Ovidius Constanța, bdul Mamaia nr 124,
e-mail: lilipanaitescu@yahoo.com

Abstract: *The knowledge of strong wind climatology is important for the precise forecast of their occurrence and also for the elaboration of efficient protection methods against their harmful effects. In meteorology, strong winds are defined as atmospheric phenomena characterized by air currents with a speed of ≥ 15m/s (calculated for a time period of 2'). In the synoptic activity, the average wind speed of ≥ 10m/s (calculated for a time period of 10') is included in the category of "warning messages", characteristic to the dangerous meteorological phenomena. The strong winds represent one of the risk hydrometeors with particular impact on the agricultural activities (especially on the tree and vine culture). The well-known marine breezes are formed close to the sea (up to 15-20 km inside the province) and they influence positively the relative air humidity but also contribute to a decrease in the rain regime. Thus, Dobroudja has been known as the land of winds since Antiquity. The wind speed is between 18-90 km/h, while the frequency is up to 85%, the dominant directions being north, north-west and north-east (43.8%), then south and south-east (30.4%).*

Rezumat: *Cunoaşterea vânturilor tari este deosebit de importantă în climatologie, iar prognoza apariției lor este de asemenea importantă pentru elaborarea de metode eficiente de protecție împotriva eventualelor efecte dăunătoare.In meteorologie, vânturile tari sunt definite ca fenomene atmosferice caracterizat de curenții de aer, cu o viteza ≥ 15m/s (calculate pentru o perioadă de timp de 2'). În activitatea sinoptică, în medie, viteza vântului ≥ 10m/s (calculată pentru o perioadă de timp de 10'), este inclusă în categoria" mesaje de avertizare",fiind o caracteristică a fenomenelor meteorologice periculoase. Vânturile tari reprezintă unul dintre riscurile hihrometeorologice speciale, cu impact asupra activităților agricole (în special cu privire la cultura de viță de vie şi pomi). Este cunoscut faptul ca brizele marine se formează aproape de mare (până la 15-20 km în interiorul provinciei) şi au o influență pozitivă asupra umidității relative a aerului, contribuind şi la o scădere a regimului pluviometric. Astfel, Dobrogea a fost cunoscută încă din antichitate sub numele de teren vântos. Viteza vântului este cuprinsă între 18-90 km / h, în timp ce frecvența este de până la 85%, direcții dominante fiind nord, nord-vest şi nord-est (43,8%), apoi spre sud şi sud-est (30,4%).*

Key words**:** *strong wind, distribution, climatic risk, agricultural crops*
Cuvinte cheie**:** *vânt tare, distribuție, risc climatic, culturi agricole*

INTRODUCTION

In meteorology, the strong winds are defined as atmospheric phenomena characterized by air currents with a speed of ≥ 15m/s (calculated for an interval of 2'). In the synoptic activity, the average speed of wind is ≥ 10m/s (calculated for an interval of 10') is included in the category of "warning signals" typical for the dangerous meteorological phenomena.

MATERIAL AND METHODS

The knowledge of strong wind climatology is important for the precise prevention of

their occurrence and also for the elaboration of the most efficient protection methods compared to their harmful effects. For gust wind, the "warning signals" are transmitted when the speed is ≥ 12m/s. If the average speed increases and becomes ≥15m/s, and the maximum gust is ≥ 16m/s, the so called "aggravation signal" is transmitted. Gust wind is all the more enhanced as the air instability and speed of the air current are higher. In summer, the intensification of the wind gusts is observed during storms and downfalls.

RESULTS AND DISCUSSIONS

The knowledge of strong wind climatology is important for the precise prevention of their occurrence and also for the elaboration of the most efficient protection methods compared to their harmful effects.

Strong winds distribution in Dobrogea.

The frequency of strong winds (≥10m/s) decreases inside Dobrogea with the increase of the distance from the sea. On this background, a tendency for wind intensification is noticed in the high areas – hill and plateau – (Tulcea hills, Casimcea plateau) or on the Danube bank (in Harsova), considering the channeling of air currents along the river valley where the frequency of strong winds (≥101m/s) is close to the one registered on the Black Sea shore. On the sea surface, the frequency of strong winds (≥ 10m/s) increases. In Sulina station, located approx. 7 km from the shore, on the seawall that continues the Danube navigation canal, the average annual frequency of strong winds (≥10m/s) is over 14% (more than 50 days), while in the Gloria drilling platform, it reaches almost ¼ of the year days.

A high annual frequency of strong winds (≥10m/s) of over 11% (more than 40 days) is noted in Mahmudia station – (located in the superior side – ridge – of the hilly landscape), due to the orographic intensification of air currents (the union of current lines when crossing the landscape obstacle).

The direction regimen characteristic to strong winds (≥10 m/s and ≥15 m/s) was presented on seasons in Constanta and also comparatively for January and July – in Valu Traian, Medgidia and Harsova, sketching thus the way in which these winds manifest between the eastern and western extremity of the Dobrogea territory.

In Constanta, strong winds (≥10 m/s) are prevalent in all seasons, the northern ones followed by the north-eastern. In spring and especially in summer, the frequency of strong winds (≥10 m/s) increases on west and north-west direction, which evidences the intensification of the influence of zonal circulation. Of the total strong winds (≥10 m/s) recorded in the analyzed period in Constanta, the northern ones reach maximum frequency, of approx. 50%, in winter and autumn and approx. 40% in spring and summer. In winter, there is an increase of intensity and frequency of northern winds. Thus, of the total strong winds (≥15 m/s) registered in Constanta, the northern ones exceeded 70%. However, in spring and summer, the north-eastern strong winds (≥15 m/s) become prevalent and their frequency has been recently exceeding the frequency of northern winds as the western winds have intensified.

The association of northern and north-eastern directions with the strong-prevalent winds is observed in the Black Sea littoral up to the western extremity of Dobrogea, especially in winter. Their frequency is high where the landscape configuration sets the wind on these directions. For example, the Black Sea shore (in Constanta) or the Danube bank (in Harsova). In the meteorological stations located in the relatively high area of landscape, there is an increase of strong wind frequency on western direction, such as in Medgidia in January. In these points, the western strong winds or those oriented by the landscape from the western side of the horizon can become dominant in summer. This phenomenon is observed in July in Medgidia and Valu Traian.

In the daily evolution, there is an enhancement of strong winds over night and in the morning, whose frequency, of the total of similar cases, did not decrease below 70% in winter, and under 50% in the other seasons – at intensities of ≥15 m/s and under 50% in winter and autumn and under 40% in spring and summer – at intensities of ≥10 m/s.

During the day, there is a decrease of northern and north-eastern strong winds in summer. As a whole, the annual frequency of north and north-eastern strong winds in Constanta has exceeded 70% of the total cases with a speed of ≥10 m/s, and 90% of the total cases with a speed of ≥15 m/s.

In general, on the Black Sea shore and the bank of littoral lakes, the annual average frequency of strong winds (≥10 m/s) oscilates between approx. 3%-4.5% (10-16 days). Most of the high areas of the Dobrogea plateau are inscribed in this frequency register. The fewest days with strong winds are registered in the lowest part of the landscape and especially in the sectors located in the areas of aerodynamic shelter. Thus, the lowest annual average frequency of strong winds (≥10 m/s) of almost 0.5% (under 2 days) was registered on the bottom of the Taita valley, in Horia. The annual average of strong winds (≥15 m/s) in the 16 meteorological stations with a long period of observations (1960-1997) was approx. 3.5 times smaller that that of the strong winds (≥10 m/s).

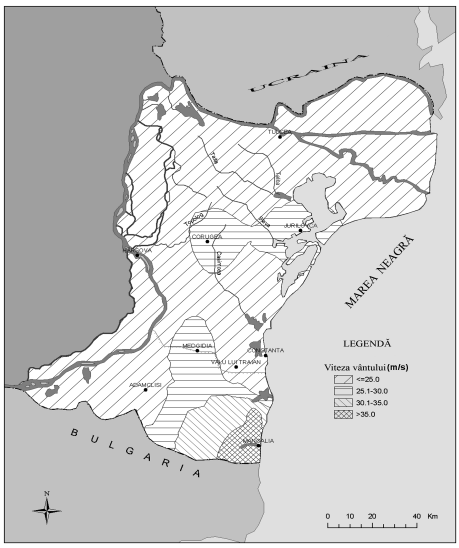

Figure 1. Distribution of areas with wind maximum speed in the warm semester in Dobrogea

Table 1

Maximum wind speed in the warm semester and the corresponding directions

Meteorological station	Wind speed (m/s)	Direction
Adamclisi	24	V, NE
Constanţa	20	NE, V, N, NNV
Corugea	28	NE, VNV
Hârşova	20	NNE, VSV
Jurilovca	28	V
Mangalia	36	NE
Medgidia	28	V
Tulcea	20	SV, V, NV, NNV, SE, SSE, S

CONCLUSION

The strong winds represent one of the risk hydrometeors with particular impact on the agricultural activities (especially on the fruit tree and vine crops).

On a distance of 15-20 km from the sea inside the province, the well-known marine breezes are formed and they influence positively the relative humidity of air, but also contribute to the depletion of the rain regimen. Thus, Dobrogea has been known as the *wind country* since Antiquity: (*As the wild north wind, with its rough blow / Freezes the wavy sea and Danube*, wrote Ovid in his Tristia two thousand years ago). Currently, the high wind frequency of winds, as well as their intensity, remains a specific feature of the Dobrogea climate.

The wind speed is between 18-90 km/h and the frequency is 85%, the dominant directions being north, north-west and north-east (43.8%), then south and south-east (30.4%). The dominant wind is the north wind, which blows from the north-east, it is a cold and dry wind which lowers the temperature abruptly. In spring, it causes a strong evaporation of soil water and in winter it blows the little snow deposited on the soil and autumn crops. The summer winds (the Black Wind) are warm and dry, causing the degradation of cereals and then of corn, sunflower, soy etc. Winds also harm irrigation, especially those by aspersion as they deviate the water spray and prevent the uniform distribution of water.

BIBLIOGRAPHY

1. BACINSCHI D. „Meteorologie şi climatologie", Ed. Did. şi Ped., Bucureşti, 1962
2. BOGDAN O. „Fenomene climatice de iarnă şi de vară", Ed. Academiei R.S.R. Bucureşti, 1980
3. ERHAN ELENA „Curs de meteorologie – climatologie (partea I şi II)", Iaşi, (1982, 1985)
4. STOENESCU ŞT., PATRICHI S. „Indici regionali ali vitezei vântului", Culegere de lucrări ale I.M. Buc., (1967)
5. *** „Atlasul Climatologic al R.S.R.", Buc. 1966 .
6. *** „Clima R.P.R., vol. II, Date Climatologice", Buc. 1961.