

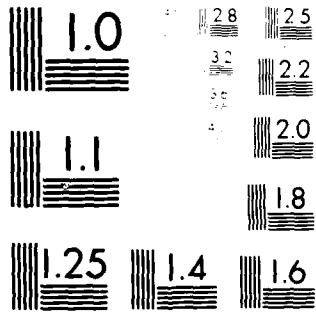
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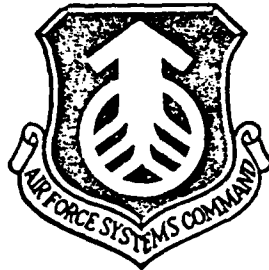
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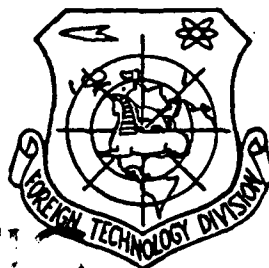
# FOREIGN TECHNOLOGY DIVISION



CLIMATOLOGIC CHARACTERIZATION OF THE "SUHOVEI"  
WIND IN THE ROMANIAN PLAINS

by

F. Fetov, El. Mihai, St. Cristescu

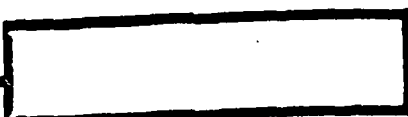


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## EDITED TRANSLATION

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By: F. Fetov, El. Mihai, St. Cristescu

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CLIMATOLOGIC CHARACTERIZATION OF THE "SUHOVEI"  
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SUMMARY

In the present paper we present the characteristic traits of the dry wind called "Suhovei" described as having the characteristic relative humidity (under shelter) or  $\leq 30\%$ , the air temperature (under shelter) of  $\geq 25^{\circ}\text{C}$ , and a wind velocity (determined with a wind vane) of  $\geq 5$  m/s.

The following data were taken into consideration in order to determine the "Suhovei" in the Romanian Plains:

- a) The mean monthly and annual number of "Suhovei" days;
- b) The maximum monthly and annual number of "Suhovei" days, with specification of the year (in the entire period of observation, 1896-1960).
- c) The annual number of "Suhovei" days for the 1936-1960 period;
- d) Distribution of "Suhovei" days for the years 1945, 1950 and 1955;

- e) Probability (%) of "Suhovei" days in pentads;
- f) Probability (%) of "Suhovei" days in decades;
- g) Diagram expressing the probability (%) of "Suhovei" days on a monthly basis (April-October);
- h) Probability (%) of intervals showing a different time span of "Suhovei" days;
- i) Wind frequency (%) during "Suhovei" days (1940-1960);

Finally, we present the zonal distribution of the "Suhovei" over the Romanian Plains.

"Suhovei" is the name given by Russian climatologists to a dry and hot wind blowing from the South and South-East of the U.S.S.R.

The first references regarding this hot and dry wind of the Russian plains are as old as 1774, being first made by P.S. Pallas, later, in 1836, by Haurorvitz, and in 1847 by Hochgut and others.

In 1857, R.S. Weslovsky wrote in the "Russian Climate" that the dry and hot wind called "Suhovei" is a phenomenon characteristic of the entire plain zone from the South of Russia.

During the same period, the "Suhovei" of the Russian plains attracted the attention of the Russian agronomists. So, for instance, in 1885-1895 A. Sishkin and P. Protopopov describe the destructive effect of this dry and hot wind on the crops, especially during the spring months.

In 1904, N. Adamov mentions in his book "Climate and Physical Conditions" that in the Ukraine the strong, dry and hot winds could damage many crops. He emphasizes that, during the period of ripening of the crop, the "Suhovei" might destroy in one day all the work done in one year.

The great Russian climatologist A.I. Vosikov, in his book "Meteorologiva", Vol. III, published in 1903, speaking about the "Suhovei" describes it as a hot and dry wind that can be observed in the South and South-East of Russia, having a damaging effect on many plants.

We therefore see that the "Suhovei" was observed by many Russian researchers, but none of the books published so far presented any quantitative data when describing it.

These criteria were taken into account by the Ukrainian climatologists during the years 1930-1940, when special agro-meteorological studies regarding the "Suhovei" were undertaken.

The climatologists who especially studied the "Suhovei" in the flat areas of Ukraine include E.A. Tuberbiller, M.S. Kulik and I.E. Bucinski.

The first one, when defining the "Suhovei", considers the criterion of a saturation deficit of  $\geq 20$  mb, during the day hours. The other two Ukrainian climatologists define the "Suhovei" by taking into consideration the following complex of meteorological elements, recorded simultaneously:

- relative humidity of the air (under shelter) of  $\leq 30\%$
- the air temperature (under shelter) of  $\geq 25^{\circ}$
- the speed of the wind (determined with an anemometer) of  $\geq 5$  m/s.

In his work "Climatologic study of the Suhovei in the Ukraine", published in 1958, I.E. Bucinski believes that the saturation deficit cannot be considered as a criterion when defining the "Suhovei", and he maintains that one should definitely take into consideration the three meteorological factors shown above, with the limits as indicated.

Although at present there are more different criteria to be considered when defining the "Suhovei", we ought to mention that all Russian scientists consider the "Suhovei" as a dangerous agro-meteorological phenomenon, which disturbs the water balance of the plants, and which should be thoroughly examined.

Since until now no study has been undertaken in this direction in our country, we thought it would be useful to take one step in this direction, by describing the characteristics of the "Suhovei" in the Romanian Plains.

The objective criterion we followed in the present study is the one adopted by I.E. Bucinski.

In formulating this paper, we studied the daily data regarding the wind, temperature and relative humidity of the air from 68 stations in the Romanian Plains, for the entire period we considered.

In the first stage in our work, we critically analyzed the data gathered, eliminating all erroneous information, as well as those we could not consider due to the location of the stations.

Observations gathered from 25 stations for the years 1941-1960 were used for determining the frequency of the "Suhovei" in the Romanian Plains; the data obtained are expressed in Table 1.

TABLE 1. Mean monthly and annual number of "Suhovei" days (1941-1960).

| Station            | Amount |     |     |     |      |     |     | Year   |        |      |
|--------------------|--------|-----|-----|-----|------|-----|-----|--------|--------|------|
|                    | IV     | V   | VI  | VII | VIII | IX  | X   | IV-VII | VIII-X | Ann. |
| Turnu Severin      | 0.1    | 0.1 | 0.3 | 0.2 | 0.4  | 0.4 |     | 0.7    | 0.8    | 3.7  |
| Craiova            | 0.2    | 0.5 | 0.3 | 0.7 | 0.9  | 0.5 |     | 1.7    | 1.3    | 3.9  |
| Dragasani          | —      | 0.1 | —   | 0.2 | 0.1  | —   |     | 0.4    | 0.1    | 0.5  |
| Caracal            | —      | —   | 0.1 | 0.1 | 0.3  | 0.1 |     | 0.2    | 0.4    | 0.6  |
| Corabia            | 0.2    | 1.8 | 1.1 | 0.7 | 0.8  | 0.2 |     | 3.8    | 1.0    | 7.8  |
| Turnu Magurele     | 0.3    | 0.2 | 0.3 | 0.4 | 0.8  | 0.4 |     | 1.2    | 1.2    | 2.4  |
| Giurgiu            | 0.4    | 0.5 | 0.7 | 0.7 | 1.1  | 0.2 |     | 2.3    | 1.7    | 3.6  |
| Alexandria         | 0.2    | 0.4 | 0.8 | 0.9 | 0.8  | 0.2 |     | 2.3    | 1.9    | 3.5  |
| Roşiori de Vede    | 0.3    | 0.5 | 0.4 | 0.3 | 0.3  | 0.2 |     | 1.5    | 0.7    | 2.2  |
| Hucureşti-Băneasa  | 0.1    | 0.2 | 0.2 | 0.2 | 0.1  | 0.1 |     | 1.0    | 0.2    | 1.2  |
| Tîncăbeşti         | 0.3    | 0.5 | 0.6 | 0.4 | 0.4  | 0.3 |     | 1.5    | 0.8    | 2.6  |
| Ploieşti           | 0.1    | 0.5 | 0.3 | 0.5 | 0.5  | 0.6 | 0.1 | 1.4    | 1.2    | 2.6  |
| Valca Călugăreasca | 0.1    | 0.3 | 0.2 | 0.2 | 0.5  | 0.1 |     | 0.8    | 0.6    | 1.4  |
| Mizil              | 0.2    | 0.4 | 0.3 | 0.1 | 0.1  | 0.4 |     | 1.0    | 0.5    | 1.5  |
| Buzău              | 0.2    | 0.2 | 0.2 | —   | 0.1  | 0.1 | 0.1 | 0.6    | 0.7    | 1.3  |
| Urziceni           | 0.3    | —   | —   | 0.2 | 0.1  | 0.2 |     | 0.5    | 0.5    | 1.0  |
| Călăraşi           | 0.6    | 1.5 | 1.0 | 1.0 | 0.7  | 0.6 | 0.2 | 4.1    | 1.5    | 5.6  |
| Feteşti            | 0.2    | 0.3 | 0.1 | 0.4 | 0.5  | 0.2 |     | 1.0    | 0.7    | 1.7  |
| Suditi             | 0.2    | 0.2 | 0.5 | 0.2 | 0.5  | 0.2 | 0.1 | 1.1    | 0.8    | 1.9  |
| Mărculeşti         | 0.5    | 0.5 | 0.2 | 0.6 | 0.8  | 0.3 |     | 1.8    | 1.1    | 2.9  |
| Slobozia           | 0.4    | 0.4 | 0.5 | 0.3 | 0.6  | 0.3 |     | 1.6    | 0.9    | 2.5  |
| Griviţa            | 0.5    | 0.8 | 0.8 | 0.5 | 0.3  | 0.4 | 0.4 | 2.6    | 1.1    | 3.7  |
| Viziru             | 0.5    | 0.6 | 0.8 | 0.5 | 0.2  | 0.2 | 0.1 | 2.4    | 0.5    | 2.9  |
| Galaţi             | 0.1    | 0.1 | 0.1 | 1.2 | 0.8  | —   |     | 1.5    | 0.8    | 2.3  |
|                    | 0.3    | 0.8 | 0.7 | 0.4 | 0.5  | 0.2 |     | 2.2    | 0.7    | 2.9  |

This table includes the mean monthly and annual frequency of "Suhovei" days, as well as the mean frequency for the intervals April 1st - July 31 and August 1st - October 31.

When considering the data gathered, we see that during the month of April the mean number of "Suhovei" days varies between 0.1 and 0.6, and we notice a slight increase toward the East of the Romanian Plains. During May, the frequency increases up to 1.5 days, being at a maximum in the Baragan Plain. During the months of June and July, the number of "Suhovei" days is still on the increase, and in August the frequency touches the maximal values on the entire Romanian Plain, being between 0.1 and 1.1 days. In September,

the frequency of "Suhovei" days diminishes suddenly, and in October such days are very sporadic.

When examining the data for the intervals April-July and August-October, one can notice that the average frequency of "Suhovei" days for the first period varies between 0.3 and 4.1, presenting two nuclei with a maximal frequency, which are in the Oltenia Plain, with 1.2-3.8 days, and in Baragan, with 1.5-4.1 days. For the August-October period, the "Suhovei" has a frequency varying between 0.1 and 1.5 days.

The annual distribution of the days with "Suhovei" can be seen on Figure 1.

When examining this figure, one notices that in the entire Baragan Plain there are, annually, an average of 1-5 "Suhovei" days, and the frequency of such days increases from North to South. One may also notice the presence of two nuclei of maximal frequency: The first in the Oltenia Plain, with a center in Caracal-Craiova, where there are 4-5 "Suhovei" days; the second in the Baragan Plain, with a center at Urziceni-Grivita, and a frequency of 5-6 days.

For a detailed presentation of the frequency of the "Suhovei" on the Romanian Plains, we give in Table 2 the maximal monthly and yearly number of "Suhovei" days, with an indication of the year when they occurred. For each station we also gave the period used when formulating this table. When examining the data presented on Table 2 one notices that, while in April the maximal frequency of the "Suhovei" varies between 1 and 7 days, in May it becomes almost double at all stations on the Romanian Plains, getting to 8-10 days in the Baragan Plain — meaning 40-50% of the annual amounts for this area. During June-August, the maximal number of "Suhovei" days varies almost within the same limits, namely 2-8 days. In September, the maximal number of "Suhovei" days starts diminishing, and in

October there are only 2-5 days in the Baragan Plain.



Figure 1. Diagram of the annual mean distribution of "Suhovei" days.

Also from the examination of the maximal number of "Suhovei" days on a monthly basis one could draw the following conclusion: In the northern part of the Romanian Plain, in the narrow area located along the Danube, the maximal frequencies occur during the months of July and August, and in the Central part of the Romanian Plains during the months of May and June, exactly at the time when the "Suhovei" could be most damaging on the crops.

The maximal annual number of "Suhovei" days can be seen on Table 2, as well as on the diagram in Figure 2.

By examining Figure 2, one sees that there are indeed two areas with a higher frequency of "Suhovei" days, which have already been identified when discussing the distribution of the annual mean number of such days. In the first area — the one in Oltenia — the maximal annual number of "Suhovei" days

TABLE 2. Monthly and annual maximal number of "Suhovei" days with specification of the year. For the entire period of study.

| Station           | Period of study        | Year       | Year       | Year   | Year   | Year       | Year   | Year   | Year |
|-------------------|------------------------|------------|------------|--------|--------|------------|--------|--------|------|
| Stația            | Perioada de observație | IV         | V          | VI     | VII    | VIII       | IX     | X      | XI   |
| Turnu Severin     | 1899-1927              | 2          | 1          | 3      | 5      | 4          | 4      | 1      | 9    |
|                   | 1916, 1960             | 1943       | 1956       | 1950   | 1935   | 1949       | 1928   | 1956   | 1946 |
| Craiova           | 1896-1936              | 2          | 5          | 7      | 9      | 4          | 4      | 3      | 18   |
|                   | 1915, 1960             | 1952       | 1901       | 1900   | 1934   | 1899       | 1959   | 1903   | 1904 |
| Drăgășani         | 1933-1960              | --         | 1          | 5      | 1      | 1          | 1      | 6      | 6    |
|                   |                        |            | 1953       | 1943   | 1946   | 1949       | 1945   | 1945   | 1945 |
| Caracal           | 1899-1945              | 3          | 10         | 6      | 6      | 5          | 2      | 20     | 20   |
|                   | 1915, 1960             | 1949       | 1949       | 1949   | 1946   | 1945       | 1952   | 4      | 49   |
| Corabia           | 1896-1928              | 2          | 2          | 3      | 3      | 7          | 3      | 12     | 12   |
|                   | 1916, 1930             | 1950       | 1908       | 1952   | 1902   | 952        | 1900   | 1952   | 1952 |
| Turnu Măgurele    | 1895-1923              | 4          | 7          | 4      | 4      | 11         | 7      | 17     | 17   |
|                   | 1915, 1960             | 1943       | 1949       | 1950   | 1950   | 1946       | 1959   | 1946   | 1946 |
| Giurgiu           | 1896-1927              | 2          | 3          | 5      | 7      | 4          | 2      | 14     | 14   |
|                   | 1915, 1960             | 1948       | 1950       | 1949   | 1948   | 1959       | 1952   | 1949   | 1949 |
| Alexandria        | 1899-1924              | 2          | 7          | 7      | 7      | 7          | 4      | 17     | 17   |
|                   | 1917, 1960             | 27, 34, 49 | 1907       | 1927   | 1910   | 1910       | 1948   | 1915   | 1910 |
| Rosiori de Vede   | 1917-1940              | 1          | 4          | 5      | 4      | 4          | 2      | 14     | 14   |
|                   | 1919, 1960             | 949, 907   | 1950       | 1950   | 1919   | 1918       | 1918   | 1950   | 1950 |
| Găești            | 1900-1948              | --         | 2          | 2      | 5      | 1          | 2      | 7      | 7    |
|                   | 1916, 1956             |            | 904, 907   | 906    | 903    | 1952       | 1953   | 1904   | 1904 |
| București-Băneasa | 1929-1960              | 2          | 5          | 3      | 3      | 2          | 2      | 1      | 12   |
|                   |                        | 1943       | 1945       | 1947   | 945    | 42, 45, 48 | 31, 44 | 42, 45 | 1945 |
| Ploiești          | 1899-1921              | 2          | 2          | 3      | 3      | 4          | 2      | 11     | 11   |
|                   | 1918, 1960             | 1830       | 45, 46, 50 | 946    | 1946   | 1949       | 1965   | 1946   | 1946 |
| Buzau             | 1931-1960              | 2          | 1          | 1      | 2      | 2          | 4      | 1      | 6    |
|                   |                        | 943, 52    | 1951       | 34, 37 | 31, 34 | 31, 34     | 953    | 1942   | 1942 |
| Armășești         | 1899-1921              | 4          | 9          | 7      | 5      | 7          | 4      | 1      | 29   |
|                   | 1916, 1960             | 934        | 1924       | 1924   | 1927   | 1925       | 1946   | 1923   | 1925 |
| Urziceni          | 1944-1960              | 4          | 8          | 5      | 6      | 3          | 4      | 1      | 21   |
|                   |                        | 1950       | 1951       | 1945   | 1945   | 1950       | 1950   | 48-50  | 1945 |
| Călărași          | 1898-1917              | 3          | 7          | 2      | 4      | 8          | 3      | 2      | 17   |
|                   | 1914, 1960             | 1899       | 1920       | 1914   | 1959   | 1939       | 1939   | 1917   | 1920 |
| Mărculești        | 1926-1960              | 2          | 3          | 6      | 2      | 3          | 1      | 12     | 12   |
|                   |                        | 1947       | 50-51      | 951    | 1953   | 1951       | 53-56  | 1951   | 1951 |
| Slobozia          | 1923-1945              | 3          | 5          | 8      | 3      | 3          | 3      | 5      | 25   |
|                   | 1928, 1960             | 1950       | 1950       | 1950   | 1950   | 1950       | 1950   | 1923   | 1950 |
| Grivița           | 1929-1960              | 7          | 10         | 5      | 7      | 2          | 4      | 2      | 27   |
|                   |                        | 1950       | 1950       | 1951   | 1939   | 1937       | 1950   | 1941   | 1950 |
| Galați            | 1899-1922              | 3          | 6          | 7      | 7      | 2          | 6      | 1      | 26   |
|                   | 1916, 1960             | 1950       | 1950       | 1927   | 1925   | 1929       | 1927   | 1945   | 1927 |

was of 20 in Caracal, and in the second area — namely the Baragan — there were 25-27 such days.

We would like to add that the annual maximum of days with "Suhovei" in Caracal occurred in 1945 and 1949, that at Urziceni in 1945, and at Slobozia and Grivita in 1950.

In order to clearly express the annual frequency of "Suhovei" days we have presented on Figure 3 its annual fluctuation for the last 25 years, for the stations Caracal, Bucharest and Grivita, which were selected as being representative for the West, Center and East of the Romanian Plains.

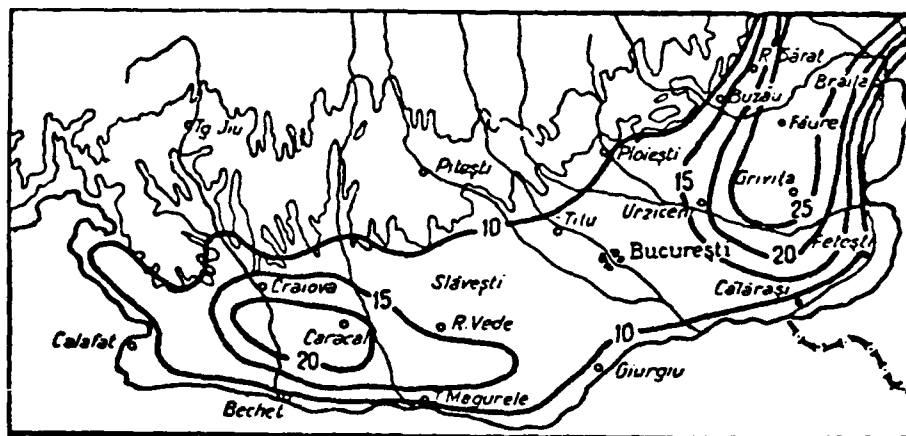


Figure 2. Diagram expressing the annual maximal distribution of "Suhovei" days.

One observes first of all the great fluctuation of the "Suhovei" from one year to the next — and this independently of the area under consideration; secondly, the maxima recorded for the Central part of the Romanian Plains were never as high as the ones recorded in Oltenia or Baragan.

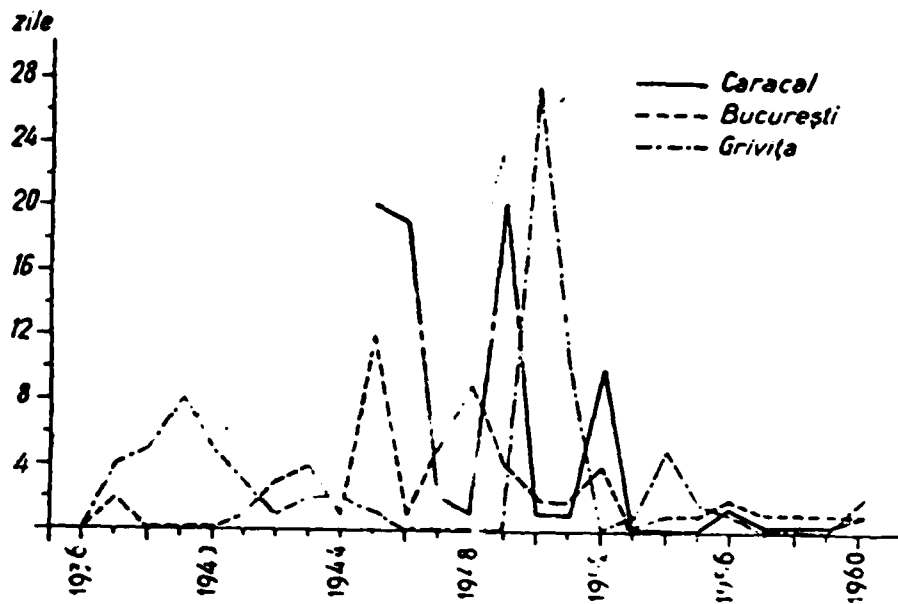


Figure 3. Annual number of "Suhovei" days. On an annual basis, between 1936 and 1960.

We also noticed that for the last 15 years — when results were similar for the two areas, in the West and Central zones of the Romanian Plains, the "Suhovei" showed three times maximal annual values, namely: for 1945, 1948, 1949 and 1952, and in the East zone only twice, namely in 1950 and 1954.

When we examined the number of "Suhovei" days for the years 1945, 1950 and 1952, we noticed that, although the distribution of the "Suhovei" on the territory of the Romanian Plains was different, there was still one common characteristic, which is the continuous presence of the two nuclei in Oltenia and Baragan.

Indeed, the graph of the annual distribution of "Suhovei" days for 1945, shown in Figure 4, establishes that the Oltenia nucleus kept its normal position, whereas that from Baragan

shifted toward South-West. We can also see that in Oltenia the annual frequency of the "Suhovei" was 20 days, and in Baragan 10-15 days. For the rest of the Romanian Plains, the annual number of "Suhovei" days varied between 1 and 5.

The annual distribution of the "Suhovei" days in 1950 is given on Figure 5.

This time the Oltenia nucleus drifts toward South-East, and the one in Baragan has an almost normal position. We also see that in Oltenia there were 10-15 "Suhovei" days and in Baragan 20-25 such days.

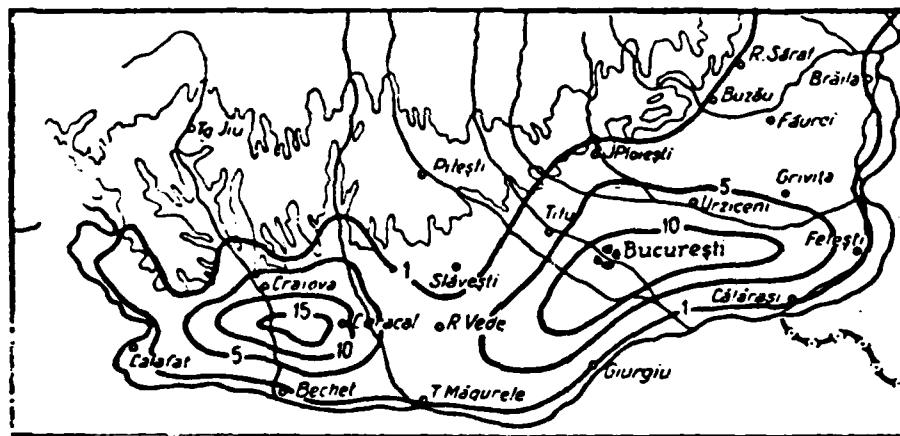


Figure 4. Diagram of the distribution of "Suhovei" days in 1945.

Finally, the distribution of the "Suhovei" days in 1952 can be seen on Figure 6. One can notice that the center of high frequency in Baragan drifts noticeably toward the South-West, and the one in Oltenia — toward the West. At the same time, one observes that in Baragan the number of "Suhovei" days

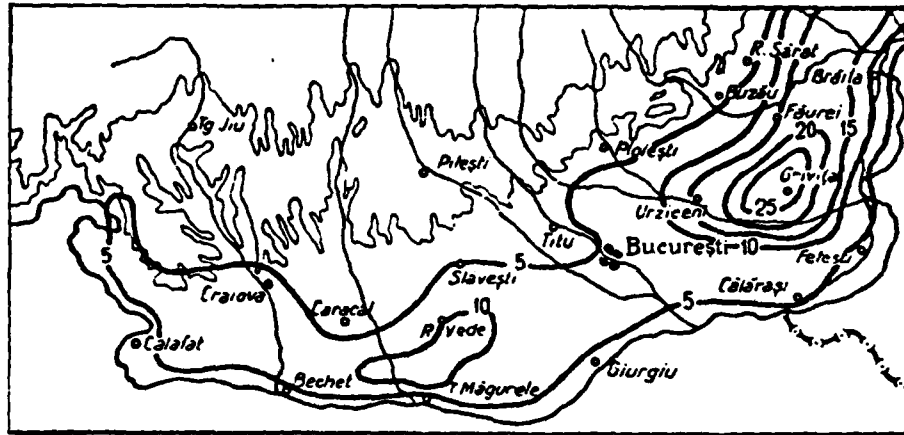


Figure 5. Diagram of the distribution of "Suhovei" days in 1950.

is half of those recorded in Oltenia.

The high number of "Suhovei" days during the three years examined above occurred during years with very high temperatures and extremely low amounts of precipitations, conditions which led to very hot weather, and extreme drought on the entire Romanian Plain.

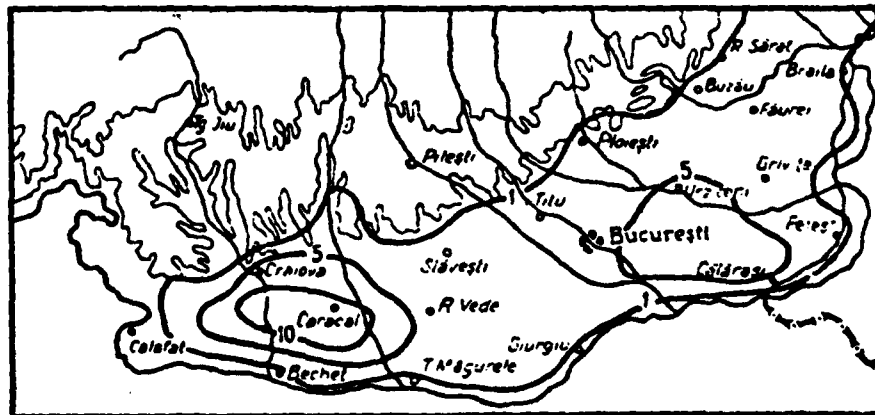


Figure 6. Diagram showing the distribution of "Suhovei" days for 1952.

To complete the data regarding the annual fluctuation of the "Suhovei", we also examined, for a limited number of stations, — where we could examine data accumulated during a period of at least thirty years — the probability (in %) of "Suhovei" days on five, and ten year periods, as well on a monthly basis. The results obtained are shown in Tables 3-5.

We specify that under the term of "probability" we mean the statistical frequency of the phenomenon we studied — computed from a long period of observations, and expressed in percentages of the total number of situations examined.

By examining the values recorded on Tables 3 and 4, one can see that, due to the annual fluctuation of the "Suhovei", the probability on a pentad basis reached quite low maximal values, between 5.5% at Armasesti during the first pentad of June and August, and 15.2% at Calarasi during the fifth pentad in August. On a ten day basis, the probability of "Suhovei" days — in maximal values — varied between 8.7% during the third ten day period of July at Armasesti, and 19.2% for the same ten day period of August in Calarasi.

The probability of "Suhovei" days on a monthly basis is presented in Table 5, as well as on the diagram in Figure 7.

After examining the data and the graph, we concluded that, for the majority of stations, out of the total number of "Suhovei" days almost one third occur in August (probability 20-30%), and only at the stations Caracal, Bucharest and Grivita the maximal probability of "Suhovei" days occurs in May (24-34%). We also noticed that at the stations in Baragan, a secondary maximum of "Suhovei" days occur in May with a probability of 20%.

TABLE 3. Probability (in %) of "Suhovei" days on a pentad basis.

| Station       | yr- | iv  | v    | vi  | vii | viii | ix   | x   |
|---------------|-----|-----|------|-----|-----|------|------|-----|
| Turnu Severin | 1   | 0.0 | 1.5  | 0.0 | 3.0 | 6.1  | 10.7 | 0.0 |
|               | 2   | 0.0 | 1.5  | 1.5 | 0.0 | 4.6  | 6.1  | 3.0 |
|               | 3   | 0.0 | 1.5  | 3.0 | 1.5 | 6.1  | 3.0  | 0.0 |
|               | 4   | 4.6 | 0.0  | 3.0 | 1.5 | 1.5  | 4.6  | 0.0 |
|               | 5   | 1.5 | 1.5  | 6.1 | 3.0 | 3.0  | 0.0  | 0.0 |
|               | 6   | 1.5 | 3.0  | 0.0 | 7.6 | 3.0  | 1.5  | 0.0 |
| Craiova       | 1   | 0.6 | 0.6  | 2.5 | 3.7 | 0.0  | 3.1  | 0.0 |
|               | 2   | 0.6 | 1.9  | 2.5 | 9.2 | 2.5  | 1.2  | 0.0 |
|               | 3   | 0.0 | 3.7  | 1.2 | 4.3 | 5.6  | 2.5  | 0.0 |
|               | 4   | 0.6 | 3.1  | 3.7 | 3.1 | 3.1  | 1.2  | 0.0 |
|               | 5   | 1.2 | 3.7  | 3.1 | 4.9 | 6.2  | 0.6  | 0.0 |
|               | 6   | 1.2 | 5.6  | 2.5 | 5.6 | 4.3  | 0.6  | 0.0 |
| Caracal       | 1   | 0.0 | 4.6  | 2.3 | 0.0 | 1.2  | 0.0  | 0.0 |
|               | 2   | 1.2 | 10.5 | 2.3 | 2.3 | 1.2  | 1.2  | 0.0 |
|               | 3   | 0.0 | 5.8  | 4.6 | 4.6 | 5.8  | 1.2  | 0.0 |
|               | 4   | 1.2 | 5.8  | 1.2 | 2.3 | 3.5  | 2.3  | 0.0 |
|               | 5   | 1.2 | 3.5  | 5.8 | 3.5 | 5.8  | 0.0  | 0.0 |
|               | 6   | 2.3 | 3.5  | 5.8 | 2.3 | 1.2  | 0.0  | 0.0 |
| Corabia       | 1   | 0.0 | 2.6  | 0.0 | 6.4 | 3.9  | 3.9  | 0.0 |
|               | 2   | 0.0 | 0.0  | 2.6 | 5.2 | 5.2  | 5.2  | 0.0 |
|               | 3   | 2.6 | 1.3  | 7.8 | 1.3 | 7.8  | 3.9  | 0.0 |
|               | 4   | 2.6 | 2.6  | 1.3 | 2.6 | 3.9  | 2.6  | 0.0 |
|               | 5   | 2.6 | 2.6  | 0.0 | 3.9 | 7.8  | 0.0  | 0.0 |
|               | 6   | 0.0 | 0.0  | 3.9 | 1.3 | 2.6  | 0.0  | 0.0 |
| Giurgiu       | 1   | 0.0 | 2.0  | 3.9 | 4.8 | 2.9  | 2.0  | 0.0 |
|               | 2   | 1.0 | 1.0  | 2.0 | 8.8 | 1.0  | 1.0  | 0.0 |
|               | 3   | 1.0 | 5.9  | 4.8 | 1.0 | 2.9  | 2.0  | 0.0 |
|               | 4   | 2.9 | 2.9  | 1.0 | 0.0 | 6.9  | 1.0  | 0.0 |
|               | 5   | 2.0 | 2.0  | 3.0 | 2.9 | 7.8  | 0.0  | 0.0 |
|               | 6   | 2.0 | 2.9  | 4.8 | 5.9 | 2.0  | 2.0  | 0.0 |
| Alexandria    | 1   | 1.4 | 3.5  | 1.4 | 1.3 | 0.7  | 0.7  | 2.8 |
|               | 2   | 0.7 | 4.1  | 2.1 | 4.1 | 9.1  | 3.5  | 1.4 |
|               | 3   | 2.1 | 2.1  | 5.8 | 1.4 | 2.1  | 1.4  | 2.8 |
|               | 4   | 0.0 | 2.1  | 0.7 | 2.1 | 2.8  | 1.4  | 0.7 |
|               | 5   | 1.4 | 3.5  | 1.4 | 2.1 | 4.9  | 3.5  | 1.4 |
|               | 6   | 3.5 | 4.1  | 4.9 | 2.1 | 2.1  | 0.7  | 0.0 |
| Bucuresti     | 1   | 1.4 | 1.4  | 2.8 | 1.4 | 0.0  | 4.2  | 4.2 |
|               | 2   | 2.8 | 8.6  | 2.8 | 0.0 | 2.8  | 4.2  | 0.0 |
|               | 3   | 0.0 | 0.0  | 7.2 | 1.4 | 1.4  | 1.4  | 0.0 |
|               | 4   | 4.2 | 4.2  | 1.4 | 4.2 | 2.8  | 2.8  | 0.0 |
|               | 5   | 0.0 | 5.7  | 1.4 | 2.8 | 4.2  | 1.4  | 0.0 |
|               | 6   | 1.4 | 5.7  | 2.8 | 4.2 | 2.8  | 0.0  | 0.0 |

TABLE 3. (cont'd)

|           |   |     |     |     |     |     |
|-----------|---|-----|-----|-----|-----|-----|
| Armășești | 1 | 0.8 | 3.1 | 5.5 | 2.3 |     |
|           | 2 | 0.0 | 3.1 | 1.6 | 4.1 |     |
|           | 3 | 0.8 | 3.1 | 1.6 |     |     |
|           | 4 | 3.1 | 3.5 | 3.1 |     |     |
|           | 5 | 1.6 | 3.1 | 2.3 |     |     |
|           | 6 | 4.8 | 3.9 | 1.6 |     |     |
| Călărăși  | 1 | 1.6 | 4.0 | 0.8 |     |     |
|           | 2 | 0.8 | 2.4 | 0.8 |     |     |
|           | 3 | 0.8 | 2.4 | 2.4 |     |     |
|           | 4 | 1.6 | 1.6 | 0.0 | 0   |     |
|           | 5 | 4.0 | 1.6 | 2.4 | 3   |     |
|           | 6 | 1.6 | 6.4 | 1.6 | 2.4 |     |
| Grivița   | 1 | 1.3 | 0.3 | 1.3 | 1.3 |     |
|           | 2 | 0.0 | 2.5 | 1.3 | 0.0 |     |
|           | 3 | 0.0 | 1.3 | 1.3 | 1.3 |     |
|           | 4 | 3.8 | 3.8 | 2.5 | 5.1 |     |
|           | 5 | 8.8 | 3.8 | 2.5 | 0.3 |     |
|           | 6 | 5.1 | 6.3 | 2.5 | 7.5 | 0   |
| Galați    | 1 | 0.5 | 1.6 | 3.8 | 0.5 | 4.9 |
|           | 2 | 0.0 | 2.1 | 4.5 | 2.8 | 0.8 |
|           | 3 | 0.5 | 1.1 | 6.0 | 5.3 | 3.5 |
|           | 4 | 2.1 | 2.1 | 4.9 | 2.8 | 4.9 |
|           | 5 | 3.3 | 3.3 | 3.3 | 5.7 | 2.1 |
|           | 6 | 0.5 | 2.8 | 2.1 | 5   | 5.4 |

Up to now the monthly and annual distribution of the mean and maximum number of "Suhovei" days was studied without taking into discussion the length of this phenomenon. It is known though that the "Suhovei" could last several days at a time. The longer the period, the greater the danger of crop damage.

In his work "Laboratory Study of the Results on the 'Suhovei' Wind on the Spring Wheat in Various Stages of Development", E.A. Tuberbiller shows that if the wind lasts for three consecutive days, it could completely destroy the spring wheat, if this occurs during the blooming or earing stages.

The data regarding the length of the "Suhovei" periods were computed as probabilities (%) for the 11 stations where a longer observation period was available, and the results are shown on Table 6.

After examining these data, we see that in April the length of periods with "Suhovei" is 1 or at most 2 days. The probability of a two-day length period is of 8-20% and the "Suhovei" of such length does not appear in the East zone of the Romanian Plains. In May, the "Suhovei" lasts 2-4, and even 5 days. The probability of a "Suhovei" lasting for 2 days varies between 10-40%, and of one lasting 3-5 days between 5-10%. "Suhovei" lasting for 4 or 5 days occurs only sporadically in Oltenia and Baragan. In June the probability of a "Suhovei" lasting for 2 days is smaller than during the previous month (5-25%), whereas the probability of a "Suhovei" lasting for 3 days (5-14%) is higher, but it occurs only in the Eastern zone of the Romanian Plains. The probability of a "Suhovei" lasting for 4 days is very slim, and 5 day periods do not occur. In July, the probability of "Suhovei" lasting for 2 days is 5-20%, and of its lasting for 3 days is between 5 and 14%. During this month, the "Suhovei" lasts

TABLE 4. Probability (in %) of "Suhovei" days on decades.

| Station       | Decade | IV   | V    | VI   | VII  | VIII | IX   | X   |
|---------------|--------|------|------|------|------|------|------|-----|
| Turnu Severin | 1      | 0.0  | 3.0  | 1.5  | 3.0  | 10.7 | 16.8 | 3.0 |
|               | 2      | 4.6  | 1.5  | 6.0  | 3.0  | 7.6  | 7.6  | 0.0 |
|               | 3      | 3.0  | 4.5  | 6.1  | 10.6 | 6.0  | 1.5  | 0.0 |
| Craiova       | 1      | 1.2  | 2.5  | 5.0  | 12.9 | 2.5  | 4.3  | 0.0 |
|               | 2      | 0.6  | 6.8  | 4.9  | 7.4  | 8.7  | 3.7  | 0.0 |
|               | 3      | 2.4  | 9.3  | 5.6  | 10.5 | 10.5 | 1.2  | 0.0 |
| Iscăleț       | 1      | 1.2  | 15.1 | 4.6  | 2.3  | 2.4  | 1.2  | 0.0 |
|               | 2      | 1.2  | 11.6 | 5.8  | 6.9  | 9.3  | 3.5  | 0.0 |
|               | 3      | 3.5  | 7.0  | 11.6 | 5.8  | 7.0  | 0.0  | 0.0 |
| Corabia       | 1      | 0.0  | 2.6  | 2.6  | 11.6 | 9.1  | 9.1  | 0.0 |
|               | 2      | 5.2  | 3.9  | 9.1  | 3.9  | 11.7 | 6.5  | 0.0 |
|               | 3      | 2.6  | 2.6  | 3.9  | 5.2  | 10.4 | 0.0  | 0.0 |
| Giurgiu       | 1      | 1.0  | 3.0  | 5.9  | 13.6 | 3.9  | 3.0  | 0.0 |
|               | 2      | 3.9  | 8.8  | 5.8  | 1.0  | 9.8  | 3.0  | 0.0 |
|               | 3      | 4.0  | 4.9  | 7.8  | 8.8  | 9.8  | 2.0  | 0.0 |
| Alexandria    | 1      | 2.1  | 7.6  | 3.5  | 5.5  | 9.8  | 4.2  | 4.2 |
|               | 2      | 2.1  | 4.2  | 6.5  | 3.5  | 4.9  | 2.8  | 3.5 |
|               | 3      | 4.9  | 7.6  | 6.3  | 4.2  | 7.0  | 4.2  | 1.4 |
| București     | 1      | 4.2  | 10.0 | 5.6  | 1.4  | 2.8  | 8.4  | 4.2 |
|               | 2      | 4.2  | 4.2  | 8.8  | 5.6  | 4.2  | 4.2  | 0.0 |
|               | 3      | 1.4  | 11.4 | 4.2  | 7.0  | 7.0  | 7.0  | 0.0 |
| Armășești     | 1      | 0.8  | 6.2  | 7.1  | 7.1  | 6.3  | 5.5  | 0.8 |
|               | 2      | 3.9  | 6.8  | 4.7  | 4.6  | 8.7  | 6.4  | 0.0 |
|               | 3      | 6.4  | 7.0  | 3.9  | 3.9  | 7.0  | 3.1  | 0.0 |
| Călărași      | 1      | 2.4  | 6.4  | 1.6  | 5.6  | 3.2  | 7.2  | 1.6 |
|               | 2      | 2.4  | 4.0  | 2.4  | 4.0  | 9.6  | 4.0  | 1.6 |
|               | 3      | 5.6  | 8.0  | 4.0  | 5.6  | 19.2 | 1.6  | 0.0 |
| Grivița       | 1      | 1.3  | 8.0  | 2.6  | 1.3  | 2.5  | 3.8  | 3.8 |
|               | 2      | 3.8  | 5.1  | 3.8  | 6.4  | 6.3  | 3.8  | 1.3 |
|               | 3      | 13.9 | 10.1 | 5.0  | 13.8 | 1.3  | 1.3  | 0.0 |
| Galați        | 1      | 0.5  | 3.7  | 8.3  | 3.3  | 5.4  | 4.4  | 0.5 |
|               | 2      | 2.6  | 3.2  | 10.9 | 6.1  | 8.2  | 1.6  | 0.5 |
|               | 3      | 3.8  | 6.1  | 5.4  | 15.2 | 7.5  | 2.8  | 0.0 |

for two days especially in the East zone of the Romanian Plains, and it lasts for three days in the West, Central part, and less in the East zone of the Romanian Plains, and that

TABLE 5. Probability (in %) of days with "Suhovei" on a monthly basis.

Station

| Stația        | IV   | V    | VI   | VII  | VIII | IX   | X   |
|---------------|------|------|------|------|------|------|-----|
| Turnu Severin | 7.6  | 9.0  | 13.6 | 16.6 | 24.3 | 25.9 | 5.0 |
| Craiova       | 4.2  | 16.6 | 15.5 | 10.8 | 21.7 | 9.2  | 0.0 |
| Caracal       | 5.9  | 33.7 | 22.0 | 15.0 | 18.7 | 4.7  | 0.0 |
| Corabia       | 7.8  | 9.1  | 15.6 | 20.7 | 31.2 | 10.0 | 0.0 |
| Giurgiu       | 8.9  | 16.7 | 19.5 | 23.4 | 23.5 | 8.0  | 0.0 |
| Alexandria    | 9.1  | 19.4 | 10.3 | 13.2 | 21.7 | 11.2 | 9.1 |
| București     | 9.8  | 25.6 | 18.4 | 14.0 | 11.0 | 10.0 | 4.2 |
| Armășești     | 11.1 | 19.8 | 15.7 | 13.8 | 22.0 | 15.0 | 0.8 |
| Calărași      | 10.4 | 18.4 | 8.0  | 10.0 | 32.0 | 12.8 | 3.2 |
| Grivita       | 19.0 | 24.0 | 18.4 | 10.0 | 10.1 | 8.9  | 5.1 |
| Galati        | 6.9  | 13.0 | 21.6 | 12.0 | 21.1 | 8.8  | 1.0 |

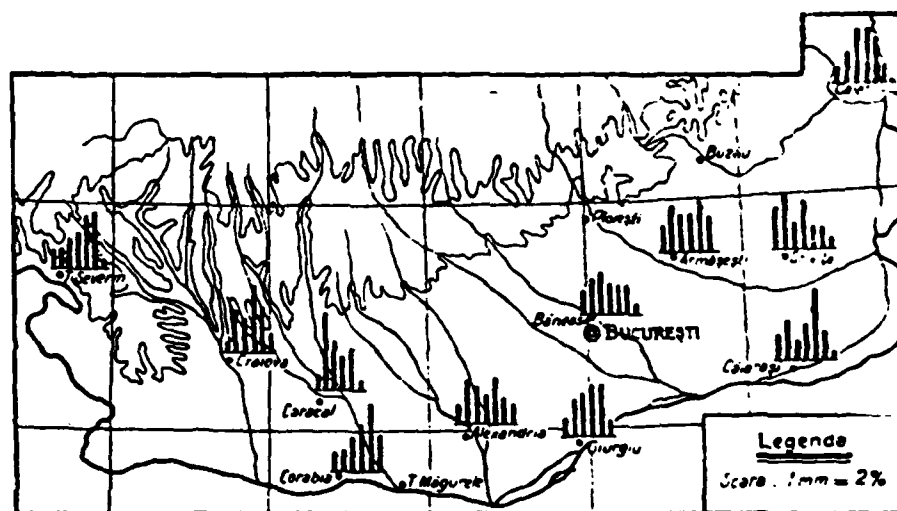


Figure 7. Diagram expressing the probability (in %) of "Suhovei" days on a monthly basis (April-October).

lasting for 4 and 5 days occurs only in isolated spots, such as the stations Galati and Grivita. In August the "Suhovei" lasting for two days occurs with a probability of 2-5% in

Oltenia and of 15-43% in Baragan. The probability of "Suhovei" lasting for 3 days is under 10%, and of that of 4 and 5 days absolutely insignificant, or even null. In September, the probability of a "Suhovei" lasting for two days is 6-25%, being more noticeable in the Eastern zone of the Romanian Plains, and the probability of a "Suhovei" lasting for a longer time is null. In October, the "Suhovei" lasts for only one day.

Besides the characteristics analyzed above, it is necessary to also know the main directions of the winds during the days with "Suhovei". For this purpose, we computed for the same 11 stations the frequency (in %) of the wind for the "Suhovei" days for the interval 1941-1960, for both the April-July, and the April-October intervals. The results obtained are shown on Table 7, and the wind-rose for the interval April-October is shown on Map No. 7.

When examining the frequency (%) of the wind for the two intervals, one notices that for both intervals there is a similarity in their main direction, which allowed us to express the wind rose for only one of the intervals — namely April-October (Figure 8).

When analyzing the wind data, one notices that on "Suhovei" days for the majority of the stations the main direction of the wind is westward.

In the West zone of the Romanian Plains one notices that the winds are mainly North-Westward and South-Eastward; in the Central zone, besides the West, great frequencies are shown by the East and the South-West, and in the Eastern zone of the Romanian Plains the main directions of the winds of the "Suhovei" days are: West, South-East and South.

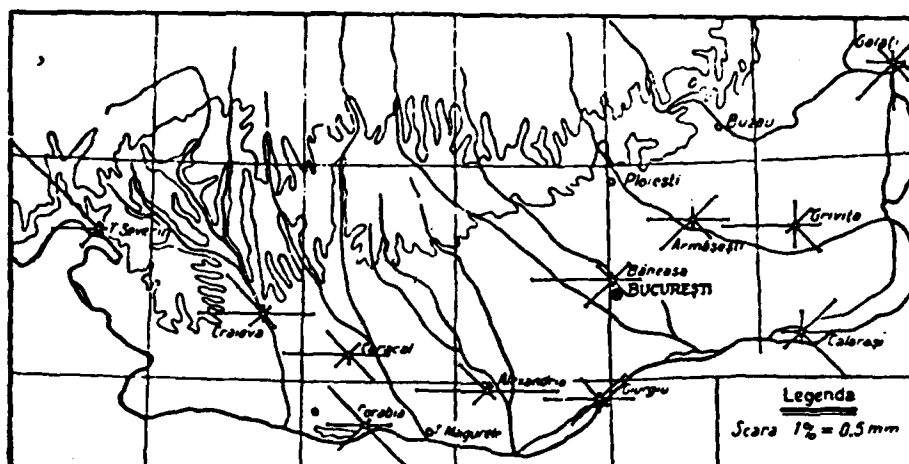


Figure 8. Frequency (in %) of the wind for "Suhovei" days, for the years 1941-1960 (April-October interval).

TABLE 6. Probability (in %) of intervals with variable length of the "Suhovei" period. (for the entire interval studied).

| STATION       | Durata suhoveiului in zile |    |     |    |   |   |    |     |    |    |   |     |     |    |    |   |      |   |   |   |   |     |     |   |  |     |    |     |     |
|---------------|----------------------------|----|-----|----|---|---|----|-----|----|----|---|-----|-----|----|----|---|------|---|---|---|---|-----|-----|---|--|-----|----|-----|-----|
|               | IV                         |    | V   |    |   |   |    | VI  |    |    |   | VII |     |    |    |   | VIII |   |   |   |   | IX  |     | X |  |     |    |     |     |
|               | 1                          | 2  | 1   | 2  | 3 | 4 | 5  | 1   | 2  | 3  | 4 | 1   | 2   | 3  | 4  | 5 | 1    | 2 | 3 | 4 | 5 | 1   | 2   | 1 |  |     |    |     |     |
| Turnu Severin | 100                        |    | 100 |    |   |   |    | 100 |    |    |   |     | 86  |    | 14 |   |      |   |   |   |   | 100 |     |   |  | 94  | 6  | 100 |     |
| Craiova       | 100                        |    | 73  | 23 |   | 4 |    | 96  | 4  |    |   |     | 83  | 14 | 3  |   |      |   |   |   |   | 98  | 2   |   |  | 93  | 7  | 100 |     |
| Caracal       | 100                        |    | 63  | 26 | 6 | 5 |    | 79  | 14 |    | 7 |     | 91  |    | 9  |   |      |   |   |   |   | 93  | 7   |   |  | 100 |    |     |     |
| Corabia       | 80                         | 20 | 83  | 17 |   |   |    | 91  | 9  |    |   |     | 100 |    |    |   |      |   |   |   |   | 100 |     |   |  | 91  | 9  |     |     |
| Giurgiu       | 100                        |    | 94  | 6  |   |   |    | 75  | 25 |    |   |     | 86  | 9  | 5  |   |      |   |   |   |   | 95  |     | 5 |  | 100 |    |     |     |
| Alexandria    | 80                         | 20 | 78  | 22 |   |   |    | 95  |    | 5  |   |     | 94  | 6  |    |   |      |   |   |   |   | 77  | 23  |   |  | 77  | 23 | 100 |     |
| Bucuresti     | 83                         | 17 | 50  | 50 |   |   | 10 | 91  |    | 9  |   |     | 72  | 15 | 14 |   |      |   |   |   |   | 57  | 43  |   |  | 75  | 25 | 100 |     |
| Urziceni      | 91                         | 9  | 79  | 10 | 6 | 5 |    | 89  | 6  | 5  |   |     | 73  | 20 |    |   |      |   |   |   |   | 82  | 18  |   |  | 89  | 11 | 100 |     |
| Calarasi      | 92                         | 8  | 83  | 12 |   |   | 5  | 89  | 11 |    |   |     | 94  | 6  |    |   |      |   |   |   |   | 78  | 18  | 4 |  | 94  | 6  | 100 |     |
| Givita        | 89                         | 11 | 50  | 51 | 9 |   |    | 86  |    | 14 |   |     | 82  | 9  |    |   |      |   |   |   |   | 9   | 100 |   |  | 100 |    | 100 |     |
| Galati        | 92                         | 8  | 86  | 14 |   |   |    | 90  |    | 10 |   |     | 81  | 9  | 6  | 2 |      |   |   |   |   | 83  | 7   | 7 |  | 3   | 92 | 8   | 100 |

TABLE 7. Frequency (in %) of the winds for "Suhovei" days (1940-1960).

| Station       | Interval | N  | NE | E  | SE | S  | SV | V  | NV |
|---------------|----------|----|----|----|----|----|----|----|----|
| Iarnu Severin | IV-VII   | 3  | 3  | 3  | 0  | 0  | 13 | 25 | 53 |
|               | IV-X     | 1  | 1  | 1  | 0  | 0  | 12 | 22 | 63 |
| Craiova       | IV-VII   | 2  | 0  | 26 | 15 | 3  | 0  | 33 | 21 |
|               | IV-X     | 1  | 3  | 22 | 9  | 3  | 8  | 30 | 24 |
| Caracal       | IV-VII   | 0  | 6  | 21 | 18 | 2  | 8  | 31 | 14 |
|               | IV-X     | 0  | 6  | 18 | 18 | 3  | 9  | 31 | 15 |
| Corabia       | IV-VII   | 0  | 4  | 13 | 30 | 0  | 22 | 9  | 22 |
|               | IV-X     | 0  | 2  | 11 | 26 | 0  | 17 | 19 | 25 |
| Giurgiu       | IV-VII   | 2  | 16 | 13 | 5  | 9  | 22 | 22 | 11 |
|               | IV-X     | 3  | 17 | 15 | 4  | 6  | 18 | 25 | 12 |
| Alexandria    | IV-VII   | 2  | 3  | 33 | 8  | 0  | 6  | 36 | 12 |
|               | IV-X     | 1  | 2  | 32 | 6  | 0  | 9  | 33 | 17 |
| Bucuresti     | IV-VII   | 1  | 7  | 13 | 12 | 1  | 18 | 41 | 7  |
|               | IV-X     | 1  | 10 | 12 | 10 | 2  | 19 | 37 | 9  |
| Armăsești     | IV-VII   | 7  | 16 | 16 | 15 | 1  | 22 | 23 | 0  |
|               | IV-X     | 9  | 17 | 17 | 13 | 2  | 21 | 21 | 0  |
| Calărași      | IV-VII   | 5  | 20 | 5  | 38 | 7  | 15 | 10 | 0  |
|               | IV-X     | 8  | 22 | 14 | 31 | 4  | 11 | 8  | 2  |
| Grivița       | IV-VII   | 7  | 10 | 12 | 19 | 7  | 7  | 38 | 0  |
|               | IV-X     | 10 | 10 | 10 | 19 | 11 | 5  | 35 | 0  |
| Galați        | IV-VII   | 6  | 11 | 7  | 14 | 16 | 31 | 10 | 5  |
|               | IV-X     | 4  | 11 | 5  | 10 | 22 | 27 | 12 | 9  |

Far from exhausting the climatological characterization of the "Suhovei" wind on the Romanian Plains, our paper, nevertheless, reaches certain conclusions, such as:

1. The mean annual number of "Suhovei" days in the Romanian Plains is between 0.5 and 5.8 days, and for the growing period (April 1-31 July), between 0.2 and 4.1 days.

2. On the Romanian Plains, the frequency of "Suhovei" days is higher in two zones: in the Oltenia Plain and in Baragan. For the first zone, the mean annual number of "Suhovei" days is 4-5 days, whereas in Baragan it is 4-6 days. In the Central zone of the Romanian Plains, where the soil and air have a greater coefficient of humidity, the frequency of "Suhovei" days diminishes (on the average 1-3 days per year).

3. In case a high-pressure area is predominant, and advection of tropical or continental air occurs during the year, the number of "Suhovei" days could reach 20 for the Oltenia Plain, up to 10-15 in the central zone of the Romanian Plain, and up to 25-27 in Baragan.

4. For most years, the highest monthly number of "Suhovei" days occurred in May or in June, exactly at the time when the "Suhovei" could be most damaging to the crops.

5. The probability of a mean number of "Suhovei" days is at a peak in August and in May, reaching as high as 20-34% from the annual total.

6. On the Romanian Plains, the "Suhovei" may occur during 1-5 consecutive days. The probability of a "Suhovei" lasting for 2 days is at its highest in May (10-40%), that of one lasting for 3 days in June (in Baragan) and July (in Oltenia), and the probability of a period of 4 and 5 days (generally speaking quite low — of 4-10%) is also occurring in May.

7. During "Suhovei" days the western wind is predominant — in case of advection of tropical air — and the eastern wind, in cases of great shifts of continental air.

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