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AGRO-METEOROLOGICAL CONDITIONS FOR THE CULTIVATION OF AUTUMN WHEAT IN SOUTH DOBRUDJA

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Key words: autumn wheat, air temperature, atmospheric precipitations.

Abstract. The importance and evolution of wheat crops in Dobrogea. In Dobrogea, wheat is an old crop, a fact attested by old and new discoveries in Constanta (Tomis), Mangalia (Callatis), Harsova (Carsium) and other ancient settlements. The coins of the old towns of Dobrogea, dating back to the 4th century BC, bore wheat ears on them, which proves that the existence of these settlements was mainly connected to the wheat trade, a plant that represented both the product and the main commodity of the inhabitants. Carbonized wheat grains were found during the archaeological diggings at the Roman mosaic edifice in Constanta, which dates back to the 3rd and 4th centuries AD. After Dobrogea had become a migration and invasion route for many peoples, as well as the background for devastating wars, the descriptions on this province were scarce. Ion Ionescu de la Brad, in his paper "Excursion agricole dans la plaine de la Dobrodjia," shows the extensive character of agriculture in Dobrogea at that time, which was characterized by "little use of the plough, a lot of pasture and scarce population.".

Introduction

After 1878, as a result of the extension of capitalist relationships and revitalization of commerce with agricultural produce, the arable surfaces increased considerably, and with them the surfaces cultivated with wheat. From the beginning of the century till the Second World War, cereals occupied 76-90.8% of the arable surface of this province.

The arable surface of Dobrogea increased considerably, from 80000 – 90000 ha before the annexation, to 241597 ha in 1885, reaching 718 000 ha in 1938, within only 50 years (according to P. Tomoroga, 1969).

Between 1931 and 1935, wheat was cultivated on 7.6% of the arable land (51058 ha), compared to the rest of the country where wheat was cultivated on 22% of the arable land. The most important cereal species cultivated at that time in Dobrogea were: barley (36.8% of the arable land – compared to only 13.4%, the

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Tab. 1 - The weight of wheat cultivation on arable land between 1960 – 1990 (%)

Specification	1960	1970	1980	1990
Total country	29.9	23.8	23.8	24.4
Dobrogea	31.3	28.4	23.1	25.7

country average), maize (26.4% of the arable land – compared to 36.8%, the country average), and oat (11.4% of the arable land – compared to only 6.2%, the country average). After the First World War, and especially after 1950, the surface occupied by wheat crops increased considerably. Barley, which occupied extensive surfaces due to its use for the feed of draft animals, was gradually replaced by wheat.

1. Materials and method

Autumn wheat requirements in terms of environmental factors. According to N. Ceapoiu (1984), the biological characters of wheat display high variability, generated by the following factors: genetic diversity determined by the large number of taxonomic units (species, subspecies, convarieties, varieties) and biological units (cultivars, populations); ecotypes diversity (wheat is cultivated on a vast area made up of countless ecological niches and the various types of wheat are inevitably subjected to natural selection, which determines adaptation to the environment); high phenotypical plasticity (flexibility, adaptability) of certain biological features. The climatic, soil, topographic, biotic and anthropic (phytotechnical) factors influence the phenotypical expressivity of certain biological characters.

2. Results and discussion

Air temperature. The 11 ºC annual isotherm passes approximately at the border between Casimcei and Medgidiei Plateaus, on a general west-east direction. North of Tasaul Lake it goes on the south-north direction, separating the continental compartment of Dobrogea from the maritime one. Isolated in the south there is a sector with average annual temperatures below 11ºC. It results that south Dobrogea (where the experiments described are located), as a whole, is characterized by annual temperature values above 11 ºC. In January, the average air temperature values are between -2 ºC and above 0 ºC. Towards east, parallel with the shore and overlapping it till Navodari, there is the -1 ºC isotherm. South of Navodari, this isotherm enters inside the south Dobrogea Plateau. Only in the south-east, in Mangaliei Plateau, temperatures in January exceed 0 ºC.

In July there are average values of 21 ºC and 22 ºC in Central Dobrogea, framed by regions with values above 22 ºC. In the south-west, they exceed 23 ºC.

From a long line of recordings and comparisons with values from the Romanian Plain, it can be noticed that, because of the influence of the Black Sea, July is the most moderate month from the thermal point of view. This is also due to the moderating influence of the breeze. Not a similar thing happens inside south Dobrogea, where the increases of air temperature are comparable to the Romanian Plain.

Tab. 2 - The average monthly and annual temperatures registered in Valu lui Traian between 1986-2008 (^{o}C)

Agricultural year	MONTH												Annual sum
	X	XI	XII	I	II	III	IV	V	VI	VII	VII	IX	
1986-1987	10.6	4.4	-0.3	-36	-1.1	-1.6	7.6	13.4	19.7	22.7	19.5	16.9	9.0
1987-1988	10.2	7.8	0.9	2.3	1.7	5.1	8.7	15.4	19.2	23.7	21.5	16.8	11.1
1988-1989	9.7	0.8	1.6	0.3	3.4	7.2	12.0	14.9	18.4	21.4	21.9	16.2	10.6
1989-1990	11.3	5.2	2.5	-1.6	4.3	8.0	10.3	14.6	19.8	22.0	20.8	22.8	11.7
1990-1991	11.7	9.2	3.5	0.7	-0.5	3.2	9.3	14.0	19.9	22.9	20.7	16.4	10.9
1991-1992	11.9	6.6	-2.5	-0.2	0.0	5.4	9.9	14.2	19.9	21.2	23.0	15.5	10.4
1992-1993	13.2	6.9	-0.1	0.1	-0.6	2.8	8.6	15.0	19.9	20.3	20.5	16.2	10.2
1993-1994	13.5	2.4	3.8	3.7	1.5	6.1	11.6	16.5	19.4	23.0	22.2	20.0	12.0
1994-1995	12.3	4.5	1.8	-0.1	5.3	5.9	10.1	14.6	21.2	23.0	20.9	16.8	11.4
1995-1996	10.4	3.2	0.5	-2.5	-1.4	0.6	8.5	17.9	20.5	22.1	21.2	15.2	9.7
1996-1997	11.4	9.3	1.5	-2.0	0.8	3.5	6.7	16.4	20.2	21.8	19.9	14.2	10.3
1997-1998	10.0	6.8	1.9	2.1	2.0	3.9	12.9	15.3	21.2	22.6	22.2	16.8	10.6
1998-1999	13.1	4.6	-2.9	1.3	2.1	5.8	11.5	14.9	21.7	24.7	22.2	18.4	11.5
1999-2000	12.4	6.0	3.9	-3.5	2.8	4.8	11.9	15.9	21.3	24.2	22.6	18.3	11.2
2000-2001	11.8	10.2	4.3	2.7	3.0	8.5	9.8	15.0	19.3	24.8	23.2	18.5	12.6
2001-2002	12.9	4.9	-3.1	-1.0	5.9	7.0	9.4	16.4	20.7	22.4	21.3	17.6	11.2
2004-2005	12.1	8.9	-2.4	0.1	-4.0	2.1	7.9	17.8	21.5	22.6	23.2	15.9	10.7
2005-2006	10.9	7.9	1.8	-1.9	1.4	6.3	10.4	14.7	19.5	21.9	21.7	17.8	10.7
2006-2007	14.0	7.7	3.8	2.7	-.06	4.1	9.7	16.5	19.3	22.5	22.5	18.4	10.8
2007-2008	11.9	6.2	2.5	-2.4	0.0	5.3	16.4	15.7	20.6	22.5	23.3	18.4	11.7
Mean on 60 years	**11.4**	**6.5**	**2.2**	**-0.4**	**0.9**	**4.0**	**9.7**	**15.2**	**19.4**	**21.8**	**21.3**	**16.9**	**10.7**

The average temperatures on seasons emphasize the existence of cold springs, very hot summers and moderate winters. An interesting fact is the occurrence in

November, more frequently than in other areas, of both winter days and summer-type days, which are very important for certain agricultural works. In Dobrogea, the earliest dates for frost are registered between October 21-November 11. The last day of frost does not exceed, on average, April 12. The average number of frost days is between 75 and 90. The duration of the frost-free interval is between 200 and 300 days. The littoral registers the highest number of frost-free days in the country (approx. 240 days). Even though spring comes early, the days at the littoral remain cold, the sea consuming part of the land heat in the warming process. The number of summer days (maximum temperature > 25ºC) is on average 70 days in Constanta, and the number of tropical days is over 40 days in central Dobrogea and 40 days in south Dobrogea.

Tab. 3 - The quantity of monthly and annual precipitations recorded in Valul lui Traian between 1986-2006 (mm)

Agricultural year	MONTH												Annual sum
	X	XI	XII	I	II	III	IV	V	VI	VII	VII	IX	
1986-1987	72.6	2.1	27.8	22.8	13.3	15.0	46.0	56.8	53.8	36.1	82.0	4.8	433.1
1987-1988	22.9	24.6	33.4	31.0	14.4	61.2	55.8	54.3	59.2	11.7	0.5	61.9	430.9
1988-1989	40.8	61.2	43.8	4.1	22.8	6.9	9.3	25.4	72.8	24.6	2.3	58.7	327.7
1989-1990	54.0	49.5	64.1	7.3	14.3	0.0	36.2	37.9	8.2	5.6	2.6	47.6	327.3
1990-1991	18.0	43.1	27.9	5.1	10.7	16.8	41.0	95.6	130.1	50.4	93.3	14.8	546.8
1991-1992	28.4	39.3	21.8	2.8	12.0	40.2	38.8	28.2	23.6	127.8	4.9	9.7	377.3
1992-1993	14.7	56.4	23.6	3.4	12.4	67.5	27.9	47.9	72.1	63.5	33.5	31.6	433.5
1993-1994	10.6	70.1	18.3	20.8	4.2	23.7	15.3	22.7	41.0	26.5	30.0	12.6	295.8
1994-1995	41.5	7.0	59.5	73.2	4.5	58.8	31.2	26.8	46.0	4.7	31.7	118.2	503.1
1995-1996	26.4	74.5	59.4	23.8	53.9	27.8	28.7	19.7	11.1	18.4	13.0	117	475.4
1996-1997	26.8	34.7	52.6	12.2	11.5	36.6	85.5	84.2	86.9	83.0	76.3	5.6	595.9
1997-1998	53.8	57.0	36.1	34.3	21.5	19.5	10.9	37.0	114.8	39.4	37.4	22.3	498.9
1998-1999	50.9	91.3	19.6	8.9	15.5	27.2	44.2	23.8	37.4	7.7	115.9	55.0	497.4
1999-2000	56.5	18.0	52.2	37.4	28.9	26.1	16.8	12.6	45.5	9.0	0.0	23.9	326.9
2000-2001	8.4	23.2	7.1	39.0	40.1	40.8	35.7	23.3	27.4	25.5	3.6	29.0	303.1
2001-2002	2.5	45.5	33.4	18.4	3.1	83.8	10.7	8.1	27.1	170.0	38.1	80.4	521.1
2002-2003	65.0	25.3	30.7	39.5	20.4	21.0	21.0	7.4	28.1	39.8	42.0	136.9	412.7
2003-2004	74.3	21.5	20.9	44.6	23.8	24.3	1.4	129.9	75.4	40.9	204.6	25.0	416.9
2004-2005	11.5	13.7	83.3	56.4	65.4	41.9	33.0	27.9	24.8	131.8	39.2	144.3	423.9
2005-2006	49.2	115.5	40.4	32.8	32.8	70.3	30.0	72.9	24.0	118.8	60.0	84.7	731.4
Mean on 60 years	38.2	42.0	40.8	26.8	23.6	27.5	82.8	36.8	48.8	33.8	34.1	31.5	410.98

*according to the meteorological station in Valu lui Traian

Atmospheric precipitations. The average annual precipitations, by the amounts registered (350-510mm), place Dobrogea among the regions with the lowest values in the country. Approximately 15-20% of the total annual precipitations are

registered between July and September. The 400 mm isohyet delineates the littoral compartment, with a direction parallel to the shore, indicating the change from maritime Dobrogea to continental one. The smallest quantities of atmospheric precipitations fall along this strip of maritime littoral (Mangalia 388 mm, Constanța 380 mm, Unirea 380 mm, Sulina 359 mm).

The 450 mm isohyet overlaps the forest-steppe boundary in the southern part. The 600 mm isohyet delineates the highest layer of landscape, in north Dobrogea, representing the maximum quantity of atmospheric precipitations in the region.

In Medgidiei Plateau, the amount of atmospheric precipitations goes below 420 mm annually. On the Danube side of Dobrogea, the values are between 455 mm in Macin and 457 mm in Ion Corvin. Dry periods longer than 10 days when the precipitations fall under 5 mm in 24 hours are on average 5 per year, with an increase to 8 in the dry years. The maximum duration of drought was 117 days in Cernavoda and 124 days in Mihail Kogalniceanu (1946).

In Constanta there is a 0.16 mm average rate of reduction of the annual volume of precipitations. This observation can support the hypothesis of a long-term aridization process. Similar conclusions also result for the Mangalia station. The precipitation quantities during the warm period of the year are between 224 and 326 mm. Between November (December) and March, when two subperiods are distinguished (November-January – wet and February-March – dry), the precipitations are frontal, while in south Dobrogea they are influenced by the thermokarstic conditions. The quantity of precipitations is up to approx. 200 mm at this level, which represents 33-40% of the volume of average annual precipitations.

The largest amounts of precipitations fall during the second half of spring and beginning of summer. In south Dobrogea, there is a second maximum in November and a second minimum in January. A distinct feature of the precipitations is represented by their torrential character. The maximum quantity fallen within 24 hours registered values between 117 mm in Corugea (October 18, 1943) and 196.6 mm in Leta (August 29-30, 1924).

The regime of atmospheric precipitations in the form of snow has differential characteristics for the north and south of Dobrogea, as well as for the maritime sector and littoral. The average annual number of snowy days is 15 in Tulcea, 12 in Constanta and 8 in Mangalia. The average annual number of days with snow layer is under 14 in the Danube Delta and the littoral, growing towards the inside of Dobrogea and west to 20-40 days (20 in Cernavodă, 23 in Medgidia, 24 in Unirea, 28 in Oltina etc.). The thickness of the snow layer is generally reduced, with regional differentiations on the north-south and east-west directions. The values of the average thickness vary from a few cm (5-7 in the Danube Delta and the southern extremity of the littoral) to a few dozen cm (20-40 cm) in the west and north-west.

Air humidity. The average annual values of relative air humidity vary between 78% in Unirea and 85% in Mangalia. In January, the values are between 84-88 % and between 68-82 % in July. In August, the average values reach 50%. Some days in July and August, relative humidity drops under 30% in the littoral area (0.4 days registered in Sulina, 1.6 days in Constanța, and 2.8 days in Mangalia etc.).

It is important to remark that several periods in June and July, when there is a frequency of relative air humidity under 50%, can hinder certain physiological processes of crops such as pollination. In what regards the average hourly relative humidity, the littoral zone registers the highest values. In July, the relative humidity has very low values. The lowest relative humidity (under 56%) is known in the continental compartment of central and south Dobrogea.

Solar radiation. On most of the territory, solar radiation has the highest values in the country: over 125 kcal/cm2/year. In Constanța, approx. 127 kcal/ cm^2/year were registered, while on the east and west sides of Dobrogea, the average values of solar radiation are between 115 and 125 kcal/cm^2/year. The highest monthly sums of total radiation during the year are in July, when fair weather is predominant, and the values reach 18-20 kcal/cm^2 on average, exceeding thus the values specific to December by 15-16 kcal/cm^2.

Nebulosity. Dobrogea has the most reduced nebulosity in the country, the annual mean being among 5.0 tenths in Mangalia, 5.3 tenths in Sulina and Constanta, 5.0-5.4 tenths in Tulcea and Unirea, and 5.1 tenths in Isaccea. Thus, the values increase from south to north, in full concordance with the quantity of fallen atmospheric precipitations.

The average annual number of clear days is between 87 in Mangalia and 65 in Tulcea. The maximum average number of annual clear days reaches the record in the Danube Delta and on the Black Sea littoral (150-160 days/year), decreasing towards the inside of Dobrogea at approximately 110 days/year. Reported to the seasons, the highest number of clear days is recorded in the second half of spring till the end of autumn. On months, the highest number of clear days is in July and August (between 18 and 22 days/month).

The average number of cloudy days decreases from north to south. Thus, the cloudy days are 207 in Tulcea, 200 in Unirea and 189 in Mangalia.

The sunshine duration, a meteorological aspect connected directly to the phenomenon of nebulosity, displays an annual mean exceeding 2200 hours. There were years when this number increased to 2500 hours. The number of sunshine hours is: 2 502 in Sfantu Gheorghe, 2337 in Medgidia, 2 475 in Sulina, 2 425 in Mangalia, and Tulcea 2 260 in Tulcea. The highest number of sunshine hours is registered in July (between 318 and 358 hours), while the smallest is in January (51-65 hours). More than half of the sunshine duration occurs in the interval July-September.

Wind. As a result of the modifications of atmospheric pressure in the surrounding areas compared to the extreme values of 1000-1019 mm characteristic to Dobrogea, above this region there are movements of the air in various directions and with different intensities.

As it results from the meteorological stations in Sulina, Sarichioi, Unirea, Constanta and Mangalia, the littoral is dominated by north, north-west and north-east winds. On the Danube side, the predominant winds are north-west and north-east. In January, the dominant winds on the Danube side are from the north-east and south-west, while on the maritime side, the north and west air currents predominate. The data from Constanta and Mangalia show that in June, at the littoral, the south-east and north winds are frequent, while the south-east and north-east ones dominate the Danube sector. The greatest average speed is recorded in winter, especially in the maritime compartment (Constanta – 8 m/sec). The great speeds occur at noon, while the low ones in the morning hours. The breezes occur permanently in the littoral perimeter of the Black Sea, as a result of the contrast between water temperature and the thermal regime of the continental land. The greatest wind potential is represented by the maritime sector of Dobrogea. Thus, in over 60% of the year, which represents approx. 6000 hours, wind speed registers values between 3 and 8 m/s. This wind potential of great proportions is generated by the almost permanent movement of the air with the local circulation specific to the breezes which blow along the strip of maritime littoral. The average values of the wind potential are reduced (4400-5200 hours) inside Dobrogea, decreasing gradually westward, in the direction of the wide Danube valley. In Dobrogea, wind, as well as solar energy, represents a source of meteo-climatic energetic potential of great importance for economic exploitation.

Particular atmospheric phenomena. Blizzard represents one of the climatic phenomena specific to winter, but which occurs rarely, 3-5 days/year, on average. Its area is the eastern part of Dobrogea, where the snow is blown by the strong wind whose speed exceeds 20-25 m/s (e.g. in February 1954).

Glaze is a phenomenon that occurs rarely in Dobrogea, its annual frequency being 1-2 days.

Rime occurs rarely, being present for maximum 3-5 days a year in the northern half of Dobrogea and about 2-3 days in the southern sector of the region. South of Mangalia, the rime phenomenon is almost inexistent.

Frost has adequate formation conditions between 12 and 25 days a year in north Dobrogea and approx. 10-12 days in south Dobrogea. The frequency decreases along the maritime shore.

Fog is a frequent meteorological process both at the littoral and inside the region, in the Danube Delta and along the Danube valley. The average number of

foggy days is approx. 40-42, being exceeded in the sectors where the aquatic domain predominates.

Storm phenomena (thunder and lightning) occur less than 20 days on the Black Sea littoral and Danube Delta. Inside Dobrogea, the average annual number for such phenomena is between 20 and 30 days. Also, their frequency is higher between May and August, with a monthly rate of over 4-5 days.

Wheat requirements in terms of temperature. According to Gh. Bâlteanu (1991), wheat provides high productions in zones where the temperature is low at the beginning of vegetation, moderate during the period of intense growth and high in the ripening period.

Germination occurs at a minimum temperature of 4-5 ºC, optimum of 15-20 ºC and maximum of 30-35 ºC. In the conditions of our country, in order to emerge, wheat needs 119 ºC of temperature above 0 ºC, with variation limits 100-140 ºC. If during springing the temperature is 15-18 ºC, then the plants are vigorous, have high biological potential (the springing is energetic), but if humidity is ensured as well, the plants emerge in approx. 5 days. If springing is delayed more than 15 days, it can have a negative effect because it delays vegetation. Ideally, the optimum springing duration for our country is 10 days.

Wheat tillering occurs in optimum conditions at temperatures below 8-10 ºC and continues in good conditions until temperature decreases under 5 ºC.

In winter, autumn wheat can withstand temperatures of -15…-18 ºC, while the most resistant cultivars withstand -20 ºC, at the level of tillering, on the condition that the plants enter winter well rooted, well tillered and hardy. In our country, in the wheat culture areas, there are relatively rare cases of temperatures so low at the level of the tillering node, and it is usually covered with a thin layer of earth and a thick layer of snow. It is not winter low temperatures that are dangerous for wheat crops, but the sudden keen frosts, when the plants are not hardy yet. According to V. Roman (1995), the greatest damage is registered in crops at the coleoptile stage (about to spring) that are suddenly shocked by frost.

With the regeneration of plants in spring, their demands for temperature increase. The favorable temperatures for wheat are: 8-10 ºC before the stage of straw elongation, 14-18 ºC during straw elongation, 16-18 ºC at earing, 11 ºC (at night) and 25 ºC (during the day) (16-20 ºC optimally) for blossoming, pollination and fecundation. For the accumulation of nutritive substances in the seed, as well as for the gradual maturation of the seeds, the temperature must be 20 ºC.

Wheat requirements in terms of humidity. Though more resistant to drought than other plants, wheat still needs a considerable supply of water for growth and development. The factors that influence wheat water consumption are: air temperature, the intensity of air currents, air relative humidity, the vegetation stage, the plant's rhythm of growth, leaves position etc.

In terms of soil water, wheat has moderate but balanced demands over the entire vegetation period. According to F. Angelini (1965), quoted by Gh. Balteanu (1991), a satisfactory production requires 225mm of precipitation during the vegetation period. Under this quantity, the precipitations represent the limitative factor of production. According to Gh. V. Roman (1995), the optimum amount of precipitations for wheat during the entire vegetation period is 600 mm. The perspiration coefficient is 350-400, which indicates a good exploitation of water by the wheat plant.

In order to germinate, the wheat seeds absorb 40-50% of water reported to the dry mass of seeds. Taking this fact into account, it is necessary that soil humidity be between 70-80% of the soil capillary capacity for water.

Since in our country the autumns are generally dry, wheat germination and springing are delayed and not uniform, the rain that falls in autumn being decisive for the crop success. Usually, the crop losses due to autumn drought are irreversible, which is why it is necessary that all agrotechnical works follow the accumulation and preservation of rain water in the soil.

Wheat requirements in terms of water increase gradually in spring, being at their maximum at earing, fecundation and seed formation. The insufficiency of soil water at this time creates an imbalance in the water circuit inside the plant: the level of perspiration exceeds the level of absorption, the metabolism of the entire plant modifies negatively and so does the transport of assimilated substances from the leaves to the seed. Dry and hot weather during seed formation causes the shriveling of the seeds (temperatures above 30 ºC and dry winds). The critical period for shriveling lasts approx. 10 days and overlaps the period of the migration of nutritive substances from the leaf to the seed (the “hydric landing” interval) (fig. 2.3, according to A. Falisse, 1990, quoted by Gh. V. Roman, 1995). The decrease of harvest productivity and quality are all the greater if the conditions that favor shriveling occur at the beginning of the critical period.

Light influence on plants. Wheat loves light. The researchers accomplished by Kohn and Levitt (1965, 1966, 1972) and Paulsen (1968), quoted by N. Ceapoiu (1984), indicate that photoperiod and low temperature have an important role on plant hardiness before entering winter. Long photoperiod and low temperature intensify the adaptation process and increase winter endurance. Abundant light increases the number of tillers and also their vigor, enhancing thus the resistance to falling. The reduction of photosynthesis due to shading during tillering, strawing, earing, blossoming, fecundation and seed formation has a negative effect on plants. During the reproduction period, wheat must benefit from the richest light flux.

Light contributes to the formation of the phytochrome, a pigment that plays an important role in wheat hardiness and in the process of vernalization. All these show that photonic stress is an important limitative factor of wheat production.

Wheat requirements in terms of soil. Wheat prefers medium soils, loamy and clay-loamy, with high capacity for water retention, pervious, with neutral or low-acidic reaction (pH 6-7.5). Improper soils for wheat are those on which water bogs, as well as those on which plants are exposed to the danger of asphyxiation or frostbite in winter. Also improper for wheat are light soils with high permeability, where plants can suffer from drought or be easily uprooted during winter. Wheat provides low productions on soils that are too acidic or too alkaline. The adequate pH is between 6 and 7.5.

The best productions are obtained on light-colored soils, on chernozems, cambic chernozems, clay-illuvial chernozems and on brown-reddish soil. Lately, because of the soil-improving agricultural measures taken to ameliorate the quality of certain low-productive soils, wheat culture has extended on these as well, with satisfying results.

Mollisols represent one of the classes of soils specific to Dobrogea Plateau, occupying a surface of 1007090 ha, namely 65% of the total of 1548558 ha represented by the counties of Constanta and Tulcea (Răuță et al, 1994). These soils are characterized by the existence of the Am horizon (mollic) and cover almost entirely the Plateau of central and south Dobrogea, as well as wide surfaces of north Dobrogea Plateau, with the exception of the highest areas in the Macin Mountains, Babadagului Plateau and the Danube Delta.

Conclusions

By analyzing the requirements of autumn wheat in terms of the environmental factors, as well as the agro-meteorological conditions of south Dobrogea, it can be observed that the conditions in this region are adequate for the cultivation of autumn wheat. In the years following climatic calamities, it can be noticed that the surfaces cultivated with this crop are diminished.

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