INFLUENCE OF FOREST CURTAINS ON CROPS IN SOUTH DOBROGEA

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***Abstract**: The position of the Dobrogea Plateau in the south-east of Romania and in the close vicinity of Black Sea accounts for its top continental climate in Romania. The climatic changes which determined within the latest years the intensification of extreme phenomenon, who has an unfavourable influence on the planted or spontaneous vegetation. To reduce and prevent these phenomena have planted a series of experimental protective forest belt near Mangalia, observing a series of advantages in terms of protection and evolution of cultivated plants. Experimental network in Mangalia contains a 20 number of protective forest belts, aged 5 to 10 years, of which 15 consist of mixtures of locust and 5 acacia. Curtains of mixed species differ both as age, height, width and planting scheme, and hence their penetrability is different. Measurements were made with anemomete and portable vane, in June, July, August, which were taken into account during the growing season and the angle that the wind made him the veil of protection from which direction it was blowing at the time making observations. Research has shown that wind speed is reduced so before curtain (the wind) and the forest behind the curtain and the reduction of wind speed value is a function of density veil, its penetrability and height oftrees. The same veil of wind acting differently in a year, depending on seasons. Thus, trees and shrubs, summer, the leaf had a much lower penetration compared to the months of autumn and early when leafless. Network protection act and the microclimatic conditions in winter, by keeping snow and spring, summer and autumn plants by reducing evapotranspirations. At the same time, installing curtains forest is a prerequisite for growth forest. Network of forest belts will actually be a basis for a possible extension of forest in such dry areas that prove to be less favorable and profitable for agricultural use.*

Key words*: *forest curtains, evapotranspiration, wind speed

INTRODUCTION

South Dobrogea Plateau is the most exposed to desertification phenomenon, due to both climate change and reduction of wooded areas for cultivated areas. Dobrogea land fall into the category of deserts, arid and dry sub-humid, because the relationship between rainfall and potential evapotranspiration is between 0,05 - 0,65. Except the area south-west of the line Rasova-Negru-Vodă, which is steppe (OS Baneasa), the county of Constanta is engaged in the steppe zone.

MATERIAL AND METHODS

To protect crops from Dobrogea powerful winds, but also to achieve better yields experimentally a number of coastal steppe protection curtains were achieved, Mangalia area, and to the interior plateau in the central steppe, in the Village Ciocârlia. Because their effectiveness has been observed on agricultural production, protecting soil from erosive action of wind, now the whole plateau were surveyed for the location of such protective curtain efficiency.

Following field research has proven that changing the growing conditions in plots protected by forest belts, due to the action of curtains to reduce wind intensity. It is known that evapotranspiration is more intense, as the turbulent exchange is stronger, winter made snow,

which ought to protect crops is shattered under the influence of Powerful winds and thus reduce soil moisture, crops are scattered by winds than in calm conditions, and therefore tje need to install curtains forest is high.

Research has shown that wind speed is reduced so before curtain (the wind) and the forest behind the curtain and the reduction of wind speed value is based on the curtain thickness, its penetrability and height of trees that it's made of.

The same wind curtain act differently during a year, depending on seasons. Thus, trees and shrubs, during summer when they are leafed have a much lower penetration compared to the months of autumn and early spring when leafless. Protection curtain acts upon the microclimatic conditions in winter as well, by keeping snow and during spring, summer and autumn by reducing plant evapotranspiration.

RESULTS AND DISCUSSIONS

The first area chosen for the experiment was 5 km north of Mangalia, in the area Feast Forest, an area falling within the seaside steppe climate and the second place near the town Ciocarlia in collaboration with ICPA Constanta and Constanta Agricultural Directorate, a area with a dry steppe climate.

The experimental network from Mangalia contains a number of 20 protective forest curtains with ages from 5 to 10 years old, 15 of which consist of mixtures and 5 of pure acacia. Curtains of mixed species differ both in age, height, width and planting scheme, and hence their different penetrability.

Curtains were named with the letter A and P, along which measurements were made. Curtain were composed of mixed forest type monoarbustive poplar with ash and elm, poplar with Glad, with elm and willow bushes on the edge, oak and flowering shrubs on the edge. The distance between rows varied between 1 m and 1.50 m. Height of trees between 5 and 9 m and the orientation of the was curtains EV and NS. Land configuration where measurements were made was generally horizontal and slightly inclined in some areas with earth walls and small depressions.

Experimental network to a total of 10 forest curtains Ciocârlia contains protective forest surrounding agricultural land with an area of 200 hectares. These curtains are made of acacia mixed with Glad, poplar Canada, sofoara, American ash, red seabuckthorn and willow. Almost all plot is horizontal. Here the curtains were numbered 1 to 10, with 1 m distance between rows and 1.20 m height trees between 5 and 8 m and was oriented curtains EV and NS direction. Measurements were made with portable vane anemometers and located at 1.4 m, as most crops do not exceed this height, except maize, which can reach up to 2m, over and perpendicular the protective curtains in some of the wind and in the sheltered. Measurements were made in June, July, August, was taken into account the crop growing period and wind angle that made him the veil of protection from which direction it was blowing at the time of observations.

To highlight the protective role of forest belts we have chosen to illustrate the measurements taken in Mangalia, in June, with values measured on days 5, 6, 7, 8, 9, June at 07 o'clock, 13, 19 in the A1-A2, A6-A7 observation points, with added control point located in the open, by which point I could make a comparison of wind speed. Points A1-A2 is the first protective curtain over which these measurements were made and we have chosen for illustration here because the wind speed will register higher values, whereas points A6-A7, situated at a distance first 10-12 meters, wind speed values will be much reduced, indicating the protective role of these curtains. The period of measurement plots were covered with crops of barley was about 90 cm -1 m.

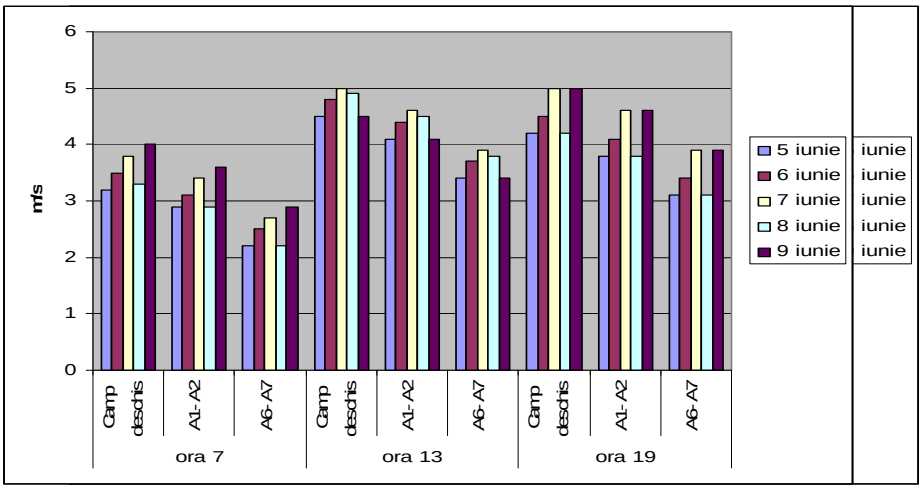

Figure 1. Average wind speed distribution at Mangalia experimental points in the period of maximum leaf protection curtains

We see that at 7 am, the wind speed in open field is oscillating between 3.2 and 4 m / s to increase at midday, even when the value reaches 5 m / s, and still found on some days even at 19 , while the other oscillates around values of 4.2 and 4.5 m / s. Making measurements in the first profile, there is a decrease in wind speed about 0.3 m / s, and if we remove the wind speed profile for last fall by around 0.7 m / s, which means that as the protection curtains multiply the wind speed is reduced (Table 1, Figure1). It should be noted that the protective curtains were highest during leaf period when these measurements were made so that the degree of wind penetration was much lower. If the same measurements will be made in a period in which curtains are leafless forest and farmland plots without differences in speed between the open areas and areas protected by curtains, will be much lower, sometimes even nonexistent.

Table 1

Average wind speed in Mangalia experimental observation points in the period of maximum leaf protection curtains

Observation point	Hour	October 25	October 26	October 27	October 28	October 29
Open field	07	7.5	8.5	5.8	6.3	7.2
	13	10.6	10.2	9.7	8.5	10.3
	19	9.4	8.5	10.6	8.0	11.2
A_1- A_2	07	7,2	8.4	5.6	6.1	7.2
	13	10.6	10.0	9.6	8.3	10.0
	19	9.4	8.3	10.6	7.8	11.2
A_6- A_7	07	7.0	8.2	5.4	6.0	7.0
	13	8.9	9.0	9.5	8.1	9.8
	19	9.1	8.0	9.5	7.6	10.8

The second period was analyzed between 25 -29 October, measurements were made at the same time as the first case (Table 2), the differences was that the protective curtains have been partially lost all leaf device, and protected parcels they had no crops. In this case there is a significant change in wind speed, time for that as we move towards autumn wind speed in the region grows, and then due to changes in wind direction and angle of these measurements were made.

Table 2

Average wind speed in Mangalia experimental observation points during the reduction of foliage Protection

Observation point	Hour	October 25	October 26	October 27	October 28	October 29
Opern field	07	7.5	8.5	5.8	6.3	7.2
	13	10.6	10.2	9.7	8.5	10.3
	19	9.4	8.5	10.6	8.0	11.2
A_1- A_2	07	7,2	8.4	5.6	6.1	7.2
	13	10.6	10.0	9.6	8.3	10.0
	19	9.4	8.3	10.6	7.8	11.2
A_6- A_7	07	7.0	8.2	5.4	6.0	7.0
	13	8.9	9.0	9.5	8.1	9.8
	19	9.1	8.0	9.5	7.6	10.8

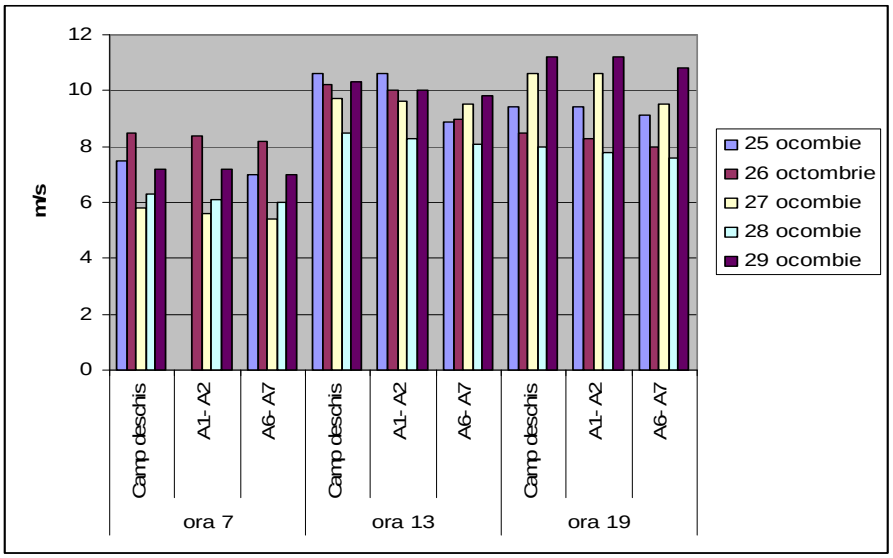

Figure 2. Average wind speed distribution of experimental points Mangalia foliage during the reduction of protective curtains

Like the first case, the wind speed was lower in the morning, and by noon we reach this increase, sometimes even remaining constant at 19, with cases (October 29) when it was even higher. The protective curtain to the first wind speed has not decreased as in June, the differences being smaller 0.1-0.2 m/s at 07 o'clock when at noon and were between 0 and smaller 0.2 m / s. 19 hours differences retained their spread as at 13. The situation is slightly

modified since the last profile, if indeed it still felt the difference between open field and the profile, because the role offered by other shelter forest belts, which, even leafless, for decreasing wind speed (Figure 2).

CONCLUSIONS

In conclusion, we can say that on the basis of such studies and currently Institutes Forest noted the role of forest belts of lowland areas of Bridge. South Dobrogea, both agricultural land, irrigation systems, roads (national, county and municipal) and other socio-economic objectives (towns, farms, orchards, vineyards, etc.).

Installation of protective forest system field was done taking into account ecoprotective and aesthetic functions - to be completed by these .The creation of social network protective forest field will therefore first increase in agricultural production. Forest belts reduce evaporation and plant transpiration, so that agricultural production in the field increases up to 20%, even if a portion of land is covered by curtains. Research has estimated that the optimum ratio of the area occupied by forest belts is between 4 and 6% of the agricultural field. While installing the forest belts is a prerequisite for growth forest. Network protective forest field will actually be a basis for a possible expansion of forest in such arid areas that prove to be less favorable and profitable for agricultural use. In future, the perimeter of lands curtains enclosed forest will be completely wooded, forest bodies being connected by the remaining network of curtains.

Given the known beneficial influence of forest belts on agricultural crops and livestock production, soil and water, biodiversity, human health and human settlements, in a word on the environment in areas where they are installed by the Law no. 289/2002, establishing forest belts in Romania was promoted as the public, being a good national interest. Thus regulating the establishment of networks of regional protective forest, which will eventually form the national system of forest belts.

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