

## RESEARCH REGARDING THE EPIDEMIC EVOLUTION OF CERCOSPORA LEAF SPOT (*CERCOSPORA BETICOLA* SACC.) UNDER EZARENI FARM CONDITIONS

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### Abstract

*Cercospora* leaf spot caused by *Cercospora beticola* Sacc. is the most destructive disease of sugar beet. Disease varies from year to year, depending on weather conditions, at economic losses is contributing the cultivated cultivar, the moment of infection, effectiveness of control disease, harvesting age also the presence of abiotic stress factors or other diseases.

Analysis of this pathogen attack depending on climatic conditions and in terms of no- treatments is concluded with useful results regarding forecasting and warning of treatments against this pathogen in order to obtain high and stable sugar beet crops.

This experience was conducted for two years, at the experimental field from Ezareni Farm. Observations focused on the timing of the onset and epidemic evolution occurring *Cercospora beticola* Sacc. fungus, under natural conditions of infection also on the knowledge of the behavior of the five sugar beet cultivars (Brasov, Barsa, Libero, Merak and Victor) to the attack of the pathogen, depending on climatic conditions.

Analyzing the evolution of *Cercospora beticola* Sacc attack., under the studied cultivars was observed that they showed different levels of resistance to fungus attack.

Also in this paper presents results regarding the roots production of studied cultivars. The analyze of the sugar beet root production and their average production reveals an differential behavior of the studied cultivars, due to the climatic conditions that were favored the attack *Cercospora beticola* Sacc.

**Key words:** *Cercospora beticola* Sacc., epidemic evolution , cultivar

*Cercospora* leaf spot in sugar beet (*Beta vulgaris* L.) caused by *Cercospora beticola* Sacc. occurs worldwide and may cause a 25-50% reduction of gross sugar yield. In severe epidemics the foliage will be totally destroyed and the beet starts to produce new leaves. If leaf spot cover at least 3% of the foliage by harvest, economic losses occur through reduced root tonnage and sucrose content (Windles și colab., 1998).

Analysis and monitoring of *Cercospora* leaf spot attack is necessary because it is extremely widespread and severity of damage due to this disease varies from year to year depending on climatic conditions and the effectiveness of disease control (Bălău Andreea, Irimia Nicoleta, 2010). In the field, cercospora leaf spot (fig. 1) is usually observed after the rows have been completed in shaded areas, that due to the humidity and temperature of the culture. The fungus produces conidia that are dispersed by rain or wind.

Depending on the variation of climatic factors, especially the change of the humidity that fungus like, during the growing season are created differences between the moment of infection and

the moment of the first spots appearance and then between the latter and the time of the an massive attack.

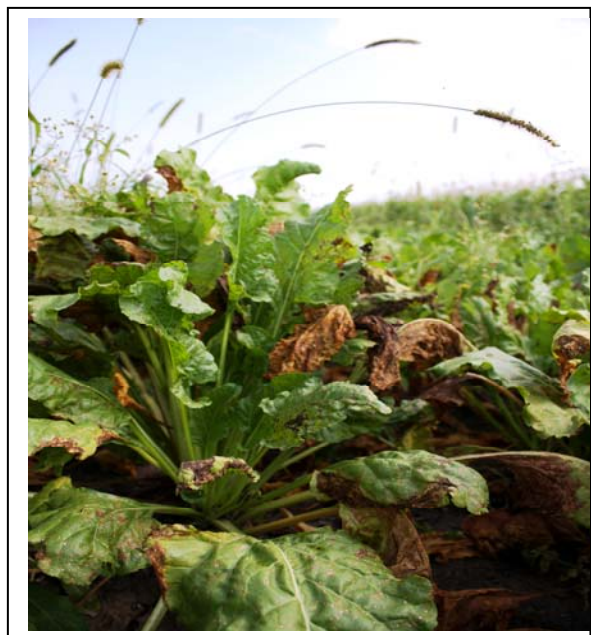


Figure 1 Severe *Cercospora beticola* attack on sugar beet plants

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Recorded observations based on *Cercospora beticola* Sacc. biological cycle, these three moments were very close between them, which led to a continue developing of new generations of conidia.

## MATERIAL AND METHOD

Experimental field were conducted during the years 2009-2010, and the settlement of cultivar was based on blocks method, in three repetitions of bi-factorial type, without irrigation. The first factor is the cultivar and the second is given by azote fertilization (F1 – no fertilization, F2 - fertilization N180, F3 - fertilization N140, F4 - fertilization N100, F5 - fertilization N80. Each plot had a surface area of 9 m<sup>2</sup> (6 rows 15 m long). Sugar beet was sown in April with 45 cm row spacing, at 18 cm distances.

The biological material was represented by five different cultivars and hybrids of sugar beet (Brasov, Barsa Libero, Merk and Victor). The field observations and determinations were in scoring the attack of *Cercospora beticola* Sacc. on sugar beet leaf, aiming the frequency (F%), intensity (I%) and attack level (GA %).

As criteria for assessing the degree of attack on the plant, was reported the attacked surface with the area observed, using a scale with six classes of attack, corresponding to specific percentage ranges of the intensity of the attack (Rafailă, C., 1980).

## RESULTS AND DISCUSSIONS

Taken observations allowed for setting of the onset and epidemic evolution of *Cercospora beticola* fungus, under natural conditions of infection also for the knowledge of the behavior of the five sugar beet cultivars to the pathogen attack, depending on weather conditions

Analyzing the evolution of the *Cercospora beticola* attack, have found that during 2009 the climate conditions were favorable for the fungi attack (fig.2). Although at the first scoring made, at the end of July, there were recorded low values of attack, in the third decade of August, due to favorable conditions for the pathogen was triggering a strong attack of cercospora leaf spot.

The period from observation of the sporulation to the an massive manifestation of the attack was quite long, 57 days. This year, the maximum level of attack varied from one cultivar to another, from 39.90% for Victor cultivar to 50.90% for Barsa cultivar.

Last assessing of degree of the attack was made in mid-September, when its values were very high. At this time, as in the case of previous

observations the degree of the attack values of the *Cercospora beticola* fungus were very significant for all the analyzed cultivars. The greatest degree of the attack was recorded on cultivars Brasov and Barsa with values of 50.90% and 50.20%, and for the cultivars Libero, Victor Merak the degree of the attack values were 40.20%, 40.90% and 39.90%.

From the average taken as control the recorded values of degree of the attack were very significant negative to the imported cultivars, Libero, Merak and Victor. The registered values were statistically provided and show a better resistance to these cultivars on the *Cercospora beticola* pathogen attack compared to the autochthonous cultivars Barsa and Brasov.

During the growing season of sugar beet cultivars under study were the temperature values were optimal for sporulation of *Cercospora beticola* a fungus and high humidity among September increased the intensity of the attack.

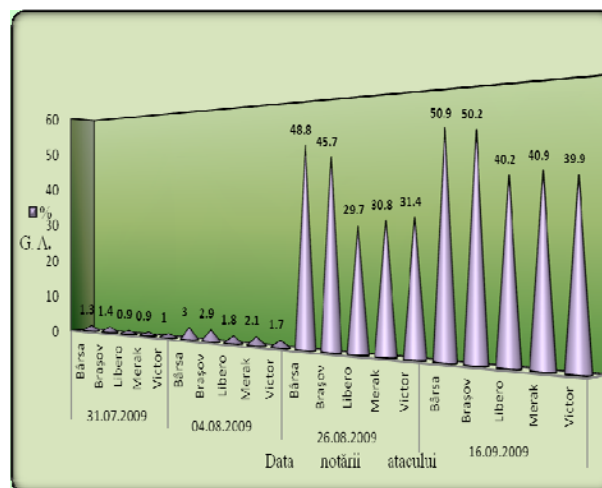


Figure 2 Epidemic evolution of *Cercospora beticola* on analyzed sugar beet cultivars, year 2009

Studies made during 2010 on the epidemic evolution of the *Cercospora beticola* pathogen have shown higher values and an earlier onset of the attack compared with previous year, due to climatic conditions favorable for the fungus development.

Due to the high temperatures from the second decade of July (25.2°C) and the relative humidity about 85%, infectious reserve from the soil allowed the sporulation of the fungus so that the first scoring to determine the degree of the attack, the frequency of the attacked plants was 100% with an reduced intensity of the attack. Degree of attack values were significantly distinct for autochthonous cultivars Barsa and Brasov, being 2.90% respectively 3.00% (fig. 3).

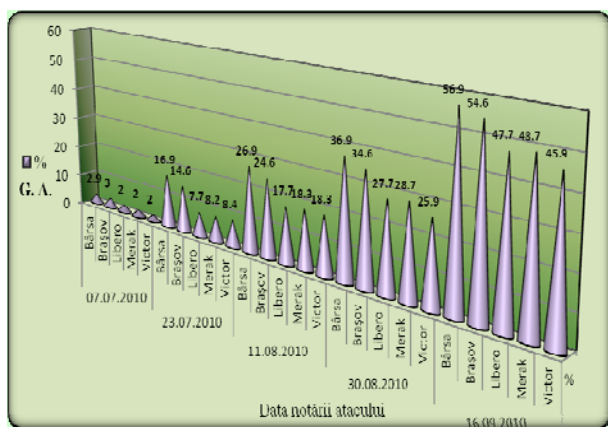


Figure 3 Epidemic evolution of *Cercospora beticola* on analyzed sugar beet cultivars, year 2010

On the cultivars Libero, Merak and Victor the degree of the attack values ranged from 2% to 2.4% with insignificant differences compared with control.

Very significant differences compared to the average occurred to the autochthonous cultivars Brasov and Barsa that showed maximum values of degree of the attack, respecting 56.90% and 54.60%. Compared to this, imported cultivars showed slightly lower values and very significantly negative compared to the average.

Thus, Libero and Victor cultivars showed a maximum degree of the attack of 47.70% and 45.90%.

Also the Merak cultivar showed a high degree of the attack, by 48.70%, which is negative significantly distinct from the average.

On the root production, in the studied years were obtained small and approximately equal yields in all studied cultivars (fig. 4).

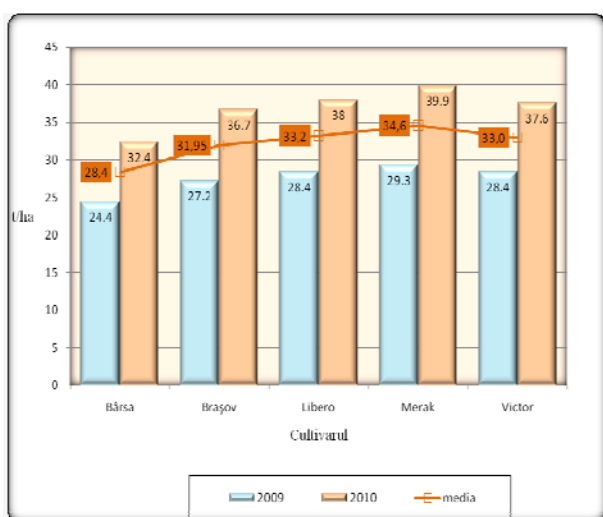


Figure 4 Production of sugar beet roots studied cultivars

Years average was about 32.15 t/ha and from this has been provided an increase of imported cultivars (Libero Merak and Victor with

33.20 t/ha, 34.60 t/ha respectively 33.00 t/ha) and lower production, with differences statistically provided were registered on Barsa autochthon cultivar, 28.40 t/ha.

In 2009, the obtained production values for Barsa cultivar (24.40 t/ha) were very significant negative from annual average taken as a master. Significant distinct positive differences from average were observed to Merak imported cultivar with a roots production value of 29.30 t/ha.

The sugar beet root obtained over 2010 was obviously higher than in the previous year. In this year because of rainy weather during the growing season the sugar beet roots were well developed. So, the highest efficiency regarding roots production was observed to Merak cultivar, of 39.90 t/ha, Libero and Victor cultivar also showed highly significant values of root production by 38.00 t/ha respectively 39.90 t/ha. Roots production average over 2010, on the studied cultivars was 36.80 t/ha, very significant negative values compared to the annual average occurred on Barsa cultivar, 32.40 t/h

Analysis of annual roots production and their average, reveals a differentiated behavior of the studied cultivars, mainly due to the climatic conditions.

The sugar beet root production obtained over 2010 was higher in comparison with the one from 2009.

## CONCLUSIONS

Being a plant with a rich foliage, sugar beet easily retain humidity and thus creates conditions for a friendly foliage pathogens microclimate, like *Cercospora beticola*; following the research made, it was noticed that rains with over 100 mm depth of water, accompanied by high temperatures around 25-26°C, are favorable to appearance of disease.

Taking into consideration the values of *Cercospora beticola* Sacc. fungi attack, when no pesticides treatments are applied, this attack was extremely virulent. The hybrids with the best resistance were the imported ones (Libero, Merak and Victor).

The biggest attack grade of the *Cercospora beticola* fungi was on the Brasov and Barsa cultivars, with values of 50.90% and 50.20% respectively, while on the Libero, Merak and Victor cultivars the attack grade values were 40.20%, 40.90 and 39.90%, respectively.

Research done during 2010 on the attack evolution showed increased values and an earlier visible attack comparing with the 2009, because of

the really favorable weather conditions for the fungi growth.

At first 2010 addnotation in order to establish the degree of attack, the attacked plant frequency was 100%, with a reduced intensity of the attack.

Looking at the favorable weather conditions for the fungi growth, the maximum values of the attack grade varied over 2010 from a cultivar to another between 45.90% and 56.90%. Nevertheless, the climate conditions of 2010 were very good for the sugar beet crop, the root production being larger then the previous year.

The analyze of the presented data about the attack grade of the *Cercospora beticola* fungi reveal small differences regarded the amount of the nitrogen used for fertilization. This being said, it is considered crucial that the correct quantity of nitrogen to be used, as well as ensuring the climate conditions to create a biological balance, favorable to maintain the plants healthy.

The sugar beet root production obtained over 2010 was higher in comparison with the one from 2009, but due to the weather conditions which favored the *Cercospora beticola* attack, the sugar content was a little bit lower.

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