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Researches on the presence and agresivity of the blueberry root rot (*Phytophthora cinnamomi*) in a Dâmbovița county plantation

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Abstract The development of blueberry orchards (Vaccinum corymbosum L.) in the last years increased the challenges regarding the pest and diseases for the farmers. New diseases emerged, very few known in Romania in this crop. This study presents the researches regarding the existence and agresivity of the blueberry root rot (Phytophthora cinnamomi) in a Dâmbovița county plantation. P.cinammomi it is an endemic pathogen of blueberry orchards in United States of America, being one of the most destructive globally, more than 1000 species being attacked by it. There are no specific treatments for cure only methods to prevent or to slow down the evolution.

Key words

Vaccinum corymbosum, 'Duke' variety, soil borne pathogen

In the last years, the importance of berry crops increased exponentially, the high demand of fruits leading to development of berry orchards with cultivated varieties. One of the most appreciated berry fruit is the blueberry (*Vaccinum corymbosum*), discovered also by the Romanian consumers and producers (1, 5, 6).

Originary from United States of America, in Romania it behaves like a plant tolerant to common pest and diseases. The most diseases known for blueberry are: fruit mummification (*Monilinia vaccinii-corymbosi*); stalk cancer (*Botryosphaeria corticis, Godronia cassandrae*); burning branches (*Phomopsis* sp.); *Botrytis cinerea;* rust (*Pucciniastrum myrtilli*); mildew (*Microsphaera penicillata* var. *Vaccinii*); viruses and stains (3, 4, 9, 10, 13,15,).

The aim of the paper is to present the researches on the presence and agresivity of the blueberry root rot (*Phytophthora cinnamomi*) in a Dâmbovița county plantation.

Blueberry root rot (*Phytophthora cinnamomi*) it is an important disease of blueberries, in southeastern USA the pathogen being endemic. It is considered as one of the most destructive pathogens globally (more than 1000 species affected (8). *P. cinnamomi* is native to Southeast Asia, but now it can be found in most temperate to tropical areas (14). The symptoms of attack are discoloration of the leaves, defoliation, stunted growth, reduction of the number of roots and root necrosis. The possible causes can be the initial infection of the seedlings, the soil with poor drainage (11, 12, 14). This pathogen is hard to control, being predominately soil-borne. Biocontrol microbes were in the few options that showed potential (14).

Materials and Methods

The research was conducted on a commercial orchard from Dâmbovița county, I.L. Caragiale village, on a blueberry orchard of 85 ha (fig. 1). The monitored area was of 2.8 ha with 13,334 blueberry plants. The orchard soil is luvosol with stagnogleyzation (40% - 46.5% clay); fine texture and high degree of compaction leading to water stagnation and low organic soil content (110 - 200 t/ha in 0 – 50 cm horizon).

Fig. 1 – Dâmbovița county blueberry orchards

The studied plants are of 'Duke' variety. At the planting moment, the plants were 2-4 years old living in containers of 0.9 – 3 liters (fig.2), with an old radicular system and infested in 50% proportion with different pathogens (*Phomopsis* spp., *Monilinia* spp. and bacteriosis).

Fig. 2 – Blueberry 'Duke' variety, 2-4 years plants in containers 0.9 – 3 liter

The planting scheme consisted in trapezoidal raised beds to which were added 300 m^3 peat, covered with black agro textile (100 x 40 x 40 cm); the planting distance was 0.7m with 3.0 m on the row. A fertigation system was installed with the dripping pipes under the mulch (fig. 3).

Fig. 3 – 'Duke' variety planted on raised beds covered with agro-textile

Two experimental areas were settled: one control plot (Area a), with 7.143 plants per 1.50 ha and Area 2 with 6.191 plants per 1.30 ha (table 1).

Table 1

Experimental plots

No area	No plants	Control method	Product name	Active substance	Concentration
1 (control)	7.143/1.5 ha				
2	6.191/1.3 ha	foliar	sublic	*Bacillus subtilis* inoculum	0.1 %
			nutryaction	fermentation extract containing brown algae	0.2 %
		fertigation	sublic	*Bacillus subtilis* inoculum	2 ml/plant
			nutryaction	fermentation extract containing brown algae	4 ml/plant

On Area 2 were applied 3 treatments at 10 days distance each.

On the local meteo station and with specific equipments, the following parameters were monitored: rainfall quantity, average temperature in the air, average quantity used for irrigation, soil average humidity at the root level (observation made at 40-75 mbars) (fig. 4).

Fig. 4 – Humidity parameter monitored in the soil

Results

First observations revealed 6 plants with visible signs of stagnation of development, followed by a quickly dehydration and finally totally drying of the plants in the 4-26 July period (fig. 5 and 6).

Fig. 5 – Plants affected by the pathogen

At the root level there was a mass of old roots with irregular development, brawny and without new growths; brawny conducting vessels; at the collet level were present bark brawny until the cambium level. At the soil level was non-homogeneous peat mass, leading to a wicker development of the roots or a reorientation to the homogeneous and aerated peat areas.

Fig. 6 - Attack registered in the 'Duke' variety

In table 2 the data obtained in the monitoring of the evolution of disease are presented.
T0 was the interval between the beginning of the observations and the first application of treatments, T1 and T2 were moments when treatments were applied and T3 the interval between the last treatment and evaluation.
The evolution of affected blueberry plants in time is presented in fig. 7, the number of plants increased without significant differences between Area 2 and Area 1 (control plot).

Table 2

The number of affected plants at different intervals and losses rate in the monitored area

No area	No plants	T0	Losses rate (T0) (%)	T1	Losses rate (T1) (%)	T2	Losses rate (T2) (%)	T3	Losses rate (T3) (%)
1 (control)	7,143	7	0.1	12	0.17	15	0.21	18	0.25
2	6,191	5	0.08	9	0.15	13	0.21	15	0.24

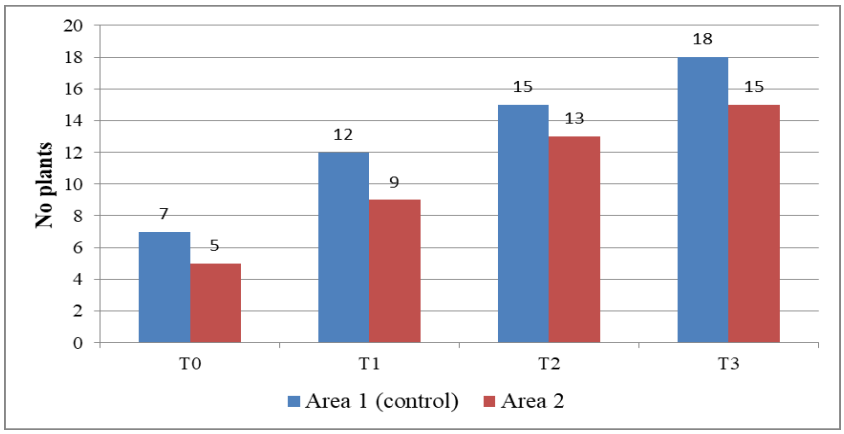

Fig. 7 - Evolution of the affected plants

The losses rate (%) of plants in time is presented in figure 8, both experimental areas suffering in the same proportions attack of the pathogen.

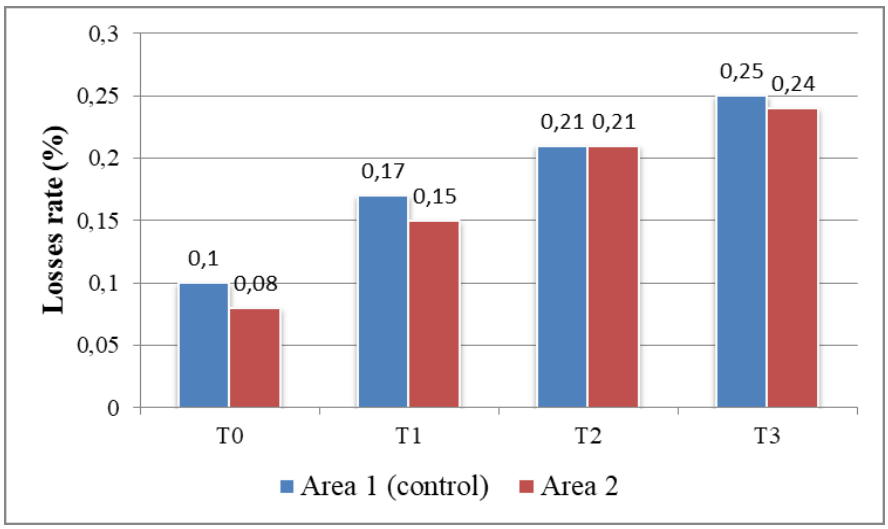

Fig. 8 - Losses rate (%) of plants in time

Conclusions

In the blueberry orchards were *Phytophtora cinnamomi* pathogen emerges it is very difficult to control the disease. The treatments applied were not efficient, this pathogen couldn't be eliminated after installation and the treatments only slowed down its evolution.

To avoid the appearance and spread of this pathogen we recommend the following measures: phytosanitary analyses of the seedlings before planting; acquisition of 2 year plants in 1 liter contain; soil analyses before planting; correct planting with soil level under the collet, the roots well distributed on the pit to make a good socket with the ground; adding rooting bio stimulatory (ex. Razormin, Radacsprint, Rhyzo etc). In blueberry orchards, soil has to have medium texture and to be well aerated.

The irrigation must be controlled to prevent the excess of soil humidity.

It is mandatory to apply a proper phytosanitary hygiene to the plants and continue monitoring.

References

1.Asănică A., Bădescu A., Bădescu C., 2017. Blueberries in Romania: past, present and future perspective, XI International Vaccinium Symposium, Orlando Florida USA, 10-14 April 2016, Acta Hortic. 1180, 293-298 DOI: 10.17660/ActaHortic.2017.1180.39

2.Botez M., Bădescu Gh., Botar A., Cultura arbuştilor fructiferi. Editura Ceres, Bucureşti, 1984.

3.Bounous G., 1996. Piccoli frutti; Ed. Agricole, Bologna, Italy

4.Chira L., 2000. Cultura arbuştilor fructiferi; Ed. MAST, Bucureşti, ISBN 973-8011-01-9.

5.Ghena N., Branişte N., Stănică F., 2004. Pomicultură generală, Editura Matrix Rom, Bucureşti, ISBN 973-685-844-8, 555 pg.

6.Hoza D., 2001. Cultura căpşunului, semiarbuştilor şi arbuştilor fructiferi. Editura Elisavaros, Bucureşti, 280 pag.ISBN 973-98601-9-2.

7.Kotrotsios I., Hoza D. 2017. Preliminary research regarding the behaviour of some blueberry varieties in the are of Garditsa Grecia. Jour of Hort., Forest., and Biotechn.21(1):47-49.

8.Nopsa J.F.H., Thomas-Sharma S., Garrett K.A., 2014. Climate Change and Plant Disease; EncyclopediaofAgricultureandFoodSystems,Volume 2 doi:10.1016/B978-0-444-52512-3.00004-8, p. 232-243

9.Sava Parascovia, 2015. Cercetări orientate la dezvoltarea culturilor bacifere. Akademos 2:111-116.

10.Sava Parascova, 2013. Cercetări la cultura afinului în Republica Moldova. Lucrari stiintifice, Horticultura, Chisinau, 36(1):136-139.

11.Smith B.J., Miller-Butler M.A., 2017. Effect of cultural practices and fungicide treatments on plant vigor and mortality of blueberries grown in *Phitophtora* infested soil; Acta Horticulturae no 1180, p.53-60

12.Smith B.J., Miller-Butler M.A., Curry K.J., Sakhanokho H.F., 2017. Effect of *Phytophtora cinnamomi* isolate, inoculum delivery method, and flood and drought conditions on vigor, disease severity scores, and survival of blueberry plants; Acta Horticulturae no 1180, p.93-103

13.Stănică F., Branişte N., 2011. Ghid pentru pomicultori; Editura Ceres, Bucureşti, ISBN 978-973-40-0859-9. p. 211.

14.Syed Ab Rahman S.F., Singh E., Pieterse C.M.J., Schenk P.M., 2018. Emerging Microbial Biocontrol Strategies for Plant Pathogens, Plant Science https://doi.org/10.1016/j.plantsci.2017.11.012

15.Tillard S.; 1998; Myrtilles, groseilles et fruits des bois; Centre technique interprofessionnel des fruits et légumes, France, ISBN 2-87911-117-X.