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BIOLOGICAL CONTROL OF GROWN GALL IN HORTICULTURE

*Development of measures to control crown-gall is carried out in direction for obtaining tumorless plants at the expense of preventive treatment of woundings so as to deteriorate the interaction of pathogen with the cell of host plant. Utilization the strain of soil inhibiting *Pseudomonas fluorescens* CNMN-PsB-4 which synthesize the substances (bacteriocins) with preventing activity to nopaline and octopine strains of pathogenic agrobacteria. Liquid concentrate suspension of this bacteria - biological preparat "Paurin" - were applied for preplanting treatment of rooted saplings and in nursery.*

*Биологический метод борьбы с бактериальным раком плодовых пород обеспечивает получение безопухолевых растений после нанесения суспензии почвообитающей бактерии *Pseudomonas fluorescens* CNMN-PsB-4 в места ранений. Бактериоцины в метаболитах бактерии активны по отношению к октопиновым и нопалиновым штаммам возбудителя бактериального рака *Agrobacterium tumefaciens*.*

Биофунгицид "Paurin" на основе суспензии этого штамма успешно применяется в плодовом питомникодестве при укоренении вегетативно-размножаемых подвоев яблони, для бактеризации косточек в питомнике и корней плодовых саженцев перед посадкой сада.

Keywords: grown gall; bacterial strain; biological control.

Ключевые слова: бактериальный рак; бактериальный штамм; биологический контроль.

Grown gall is disease that are large number of plants-hostes. The causative agent of disease is gram-negativ bactrie *Agrobacterium tumefaciens* (Smith and Towns) – the heterogene, presented in the nature by various strains with specific properties depending on a plant. In fruit nurseries of Moldova the tumors of a grown gall develop on roots of vegetative multiple stocks of an apple-tree, seed stocks of stone cultures and in places of graft. Their growth breaks of nutrients intended for plants. The quantity of saplings of an apple-tree on a stock of M-4 reaches 65,4 %, on M-9 - 24,3 %, on MM-106 – 14,7 %. At an grafting on seed stocks defeat of saplings of a pear makes 42,4 %, a peach on almonds-3,2 %, an apricot on zherdele-5,8 %, plums on a cherry plum-5 %, sweet cherry-5 %. For this reason annual saplings in nursery often don't conform to the standard and after plant to a garden trees lag behind in growth and often perish, without having reached fructification. Many yellow leaves, trunks with less volume are visually observed. The attacks of plants in gardens with a weak and average damaged roots make to 18 % from total number of plants on 1ra. In some gardens of plum and a peach about 94 % of trees are struck. Tumors are result of genetic interaction of agent parasite in plants cell, the consequence control of disease can't be solved by the standard chemical methods. Problem of science is search of alternative systems of the prevention and fight against a grown gall at the expense of application of ecologically safe biological preparations of a microbic origin. The particular interest in this sense is represent the bacteria picked from rhizosphere of plants.

Team of researchers from Institute of molecular genetics of the Russian Academy of Sciences on the basis of studying of numerous isolates of bacteria, allocated around a radical zone of plants, selected the strain of *Pseudomonas fluorescens* CNMN-PsB-4 producing the bacteriocins - the low-molecular substances of not proteinaceous nature suppressing activity of *Agrobacterium tumefaciens* [1; 2]. Two-daily suspension of living bacterial cells of *Pseudomonas fluorescens* CNMN-PsB-4, with the delution 10⁷ CFU/ml was applied to bacterization of plants before a sowing and landing material. Bacterial suspension of a strain antagonist of the causative agent of grown gall use for treatment the stones of cherry, plum, peach, and also the layers of

vegetative increased scrops of an apple rootstoks before plant in nursery, sprayed the places of woundings on mother bushes of rootstocks. Before planting of fruit trees in the garden the suspension of *Ps. fluorescens* used for bacterization of root system of a landing material year-old saplings fruit trees and added them with irrigation water. The biological preparation on the basis of strain *Pseudomonas fluorescens* CNMN-PsB-4 - "Paurin" is registered by the State Center for Certification of phytosanitary production in the Republic of Moldova.

In time of vegetative multiplication the rooting stem of rootstocks of apple MM 106, M 26, the bacterization the roots of scions before landing of the first field of nursery was carried out. In time of dig up the saplings from nursery the essential decrease galled roots on landing material of an apple-tree after treatment by "Paurin" in relation to control was observed. The received results are presented in the table 1.

Table1. Influence of prelanding treatment of rootstocks with "Paurin" on gall inhibition of roots the saplings in nursery

	Breeds	Rootstook	Variants	Quantity of plants	Galled saplings piece	% of disease	Biological effect %
1	A p p l e	MM-106	Control	1500	246	16,4	-
		M-26	Control	1420	112	7,9	-
2		MM-106	Paurin	1450	37	2,6	84,1
		M - 26	Paurin	1210	16	1,3	83,5
3	Sweet cherry	Bitter cherry	Control	1620	68	4,2	-
			Paurin	1540	12	0,8	80,9
4	P l a m	Wild plam	Control	2300	73	3,2	-
			Paurin	2300	9	0,4	87,5

Treatment the layers of vegetative stock of an apple-tree (M106 and M26) before landing in the first field of nursery by biopreparat "Paurin" suspension promoted down to infection by grown gall to 2,6 % – 1,3 % at 16,4 – 7,9 % in control where landing of layers was made without biological product. Thus, biological efficiency of a biological product of "Paurin" if compared to control against grown gall in time of raise saplings of an apple in nursery made 84,1 % and 83,5 % depending on a stock clone. After bacterization of stones of sweet cherry and a wild plum by preparation "Paurin" suspension the yield of healthy saplings of these breeds increased by 5–8 times in comparison with control. Biological efficiency of biofungicide against a grown gall at cultivation of saplings of sweet cherry and a cherry plum made 80,9 % and 87,5 %. Before landing of gardens with rooting apple saplings take bacterisation of root system of saplings by "Paurin" biological product on the total area of 86 hectares. Submitted data testify to considerable decrease in galled roots of apple trees in comparison with control (tab. 2).

On materials of the table show that in control apple saplings on a rootstock of MM106 are infected with grown gall more (14,3 %), than on M26 – 9,7 %, while after "Paurin" treatment the number of plants with tumors decreased by 6–9 times and made 2,4 % – 1,2 % at 16,4 % – 9 % in control. Biological efficiency of biofungicide "Paurin" to control against a grown gall when landing young saplings of an apple made 83,2 % and 87,6 %.

Table 2. Influence of prelanding treatment the roots of apple saplings by “Paurin” on gall inhibition of roots the saplings in the garden

	Breeds	Rootstock	Variants	Quantity of plants	Galled (piece)	% of disease	Biological effect %
1	A p p l e	MM-106	Control	1000	143	14,3	-
		M-26	Control	1020	97	9,7	-
2		MM-106	Paurin	1000	24	2,4	83,2
		M - 26	Paurin	1000	12	1,2	87,6

Conclusion

Preplanting treatment of vegetative stocks of an apple-tree and seeds of stoun-fruit cultures with “Paurin” (titre 10^7 CFU/ml) reduced level of a disease of fruit plants in comparison with control (biological efficiency of 80,9 % to 87,5 %) depending on breed. Bacterisation by biofungicide “Paurin” the roots of saplings of an apple before landing in a garden reduced number of no galled plants to 2,4–1,2 % in comparison with control of 14.3–9,7 %. The received results testify that the biological product “Paurin” can be applied successfully to prelanding bacterization of root system vegetative sets of apple rootstocks and seedlings of stoun fruit crops in nursery and saplings at a laying of young gardens to control against a grown gall.

Use of these properties, along with primary development of the microorganism on surfaces of stones, roots, shanks, a layer, trunk plants and in a rhizosphere creates a physical and biochemical obstacle to development of pathogenic strains of the agent of a root cancer.

Reference

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