HORTICULTURĂ, VITICULTURĂ, SILVICULTURĂ ŞI PROTECŢIA PLANTELOR

CZU:634.11:632.958.31

PREPARATION FOR PROTECTING APPLE FRUIT TREES AGAINST DAMAGES CAUSED BY WILD RABBITS (LEPUS EUROPEUS PALL)

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Rezumat: În perioada toamnă-iarnă a anilor 2009-2011, pentru a-i proteja de iepurii Lepus europeus Pall, au fost stropiţi în pepinieră portaltoii MM 106 şi în livadă pomii de măr din soiul Golden Delicious cu preparatul EM-12. S-a stabilit că preparatul EM-12 protejează pomii, inclusiv tulpinile şi ramurile de schelet de iepurii sălbatici. Dauna, în versiunea de test, la începutul lunii aprilie a constituit 40% la portaltoi, în timp ce la pomi - 100%. Preparatul "Arbinol B" protejeaza pomii numai la începutul lunii februarie. În aprilie gradul de afectare a fost de 86%.

Cuvinte cheie: Iepuri sălbatici, Plantaţiile de măr, Pomi fructiferi, Portaltoi, Repelent.

INTRODUCTION

In the period autumn-winter the wild rabbits make significant damages to the orchards of young fruit trees, being mostly expressed in those of apples, pears and cherries. Completely damaged bark leads to drying out of trees. If it is done partially, the damaged places become centres of infection leading to decreased quality and quantity of the plant production.

There is method for protecting fruit trees against damages caused by wild rabbits (Lepus europeus Pall), when tree stems are covered with packing paper at the end of autumn. The main disadvantage of this method, according to A. Lazarov, B. Kovachevschi (1987), consists in the fact that it protects only the stems. The skeleton branches and the embranchments are not protected and after heavy snowfall they are accessible for rabbits. In addition, the wrapping of stems is a slow and labour-consuming work. Very often the paper falls down because of rainfall and winds.

Also, there is another method of protecting young fruit trees, when the tree stems are covered with PVC net after the first winter trimming. The disadvantage of this method, according to G. Pepelyankov, G. Trenchev (2001), is that it protects only the stems. The skeleton branches and their embranchments are not protected. In the modern fruit-growing sector, parallel with increasing the number of trees per unit of field, for such fruit trees like apples, cherries etc., according to K. Hrotko (1998), in agreement with J. Poniedzalek (1994) and R. Wilckens (1998), it is necessary to plant trees that have more embranchments. It excludes the use of PVC net as an integral protection against damages.

The preparation EM-10 was developed by Nikolov (2010) on the base of sulfur and water-soluble polymer (CMC), and protects the fruit trees during the whole autumn-winter season. The disadvantage of this preparation is that it requires that the fruit trees to be treated at least twice, because of its partial water solubility.

The aim of present work was to create a water insoluble preparation for the protection of young fruit trees against damages caused by wild rabbits, ensuring their integral protection during the whole autumn-winter period after one treatment.

MATERIAL AND METHODS

In order to achieve the aim of present work there was created the preparation EK-12 on the base of an organic solvent with the following chemical composition: 700 g/kg of xylol (LUKOIL NEFTOHIM, Bourgas), presenting a mixture of three structural isomers of the aromatic hydrocarbon dimethylbenzene – 1,2-, 1,3- and 1,4- dimethylbenzene (xylene), 100 g/kg of sulfur powder as an active substance, 50 g/kg chloroform /p.a./ and 150 g/kg of repellent L-11 as second active substance.

Formulation of EM-12. For preparing 1 kg of EM-12 preparation, 150 g of L-11 were dissolved at a

temperature of 50^{0}C in 50 g of chloroform. To this solution, 700 g of xylene were added. Then to the received solution 100 g of sulfur powder were added by mixing. The obtained preparation was kept in glass bottles.

Field experiment. The experiments with EM-12 were carried out during the autumn-winter season of 2009-2010 and 2010-2011 in the region of Plovdiv city. The treatment in the nursery garden was made using 1,5 kg of EM-12 for 75 inoculated branches of apple rootstocks – MM 106 and in the apple orchard using 3,0 kg of EM-12 for 50 3-year old apple trees of Golden Delicious variety. The solution was sprayed on the tree bark in the form of aerosol, using the spraying machine "Matabi" (Spain) with a volume of 12 l, and the trees were treated at the both sides, including their stems, the skeleton branches and their embranchments. For control, 75 non-treated rootstocks and 50 apple trees were used. As standard preparation, for 50 apple trees, we used Arbinol B (Zeller - Germany), in the form of paste, containing 0,1% of the active substance "denatonium benzoat". The covering of trees bark, in the standard variant, was done with a brush. The results of the experiment were recorded twice - at the 10th of February and after passing the danger of attack, on the 10th of April. There was counted the number of fruit trees with damaged barks and calculated the percentage, according to the whole number of rootstocks or apple trees.

The statistical processing of obtained results was made using the program BIOSTAT.

RESULTS AND DISCUSSIONS

The experimental data regarding the tested apple rootstocks MM 106 are given in the Table 1. The damages, in the control variant, calculated as degree of damage (%) at the 10th of February was 29,3% and at the 10th of April - 37% for the first period – 2009-2010 and respectively 32,0% and 42,7% for the second period – 2010-2011. The average degree of damage for the both investigated periods on the 10th of April was 40%. For the variant I, where the preparation EM-12 was used, there were found no damaged rootstocks (Table 1).

The obtained results were mathematically processed and showed a high degree of proof by using the preparation EM-12 (variant I), in terms of apple rootstocks protection from the attack of wild rabbits during the autumn-winter period, for the both investigated years.

Table 1

Degree of damage caused by wild rabbits to apple rootstocks MM 106 during the autumn-winter period, 2009-2011

№	Variant	Number of rootstocks	Degree of damage (the 10th of February).%	Degree of damage (the 10th of April),%
2009-2010				
1	Control	75	29,3	37,3
2	Variant I	75	0,0	0,0
2010-2011				
3	Control	75	32,0	42,7
4	Variant I	75	0,0	0,0
	Average value for the period 2009-2011			
5	Control	150	30,6	40,0
6	Variant I	150	0,0	0,0
	GD 5%		14,2	21,5

The protective effect of EM-12 preparation was the most strongly expressed in the case of the apple orchard. In the control variant of trees the damages, caused by wild rabbits was 100% ,while in the case of trees treated with EM-12, there were no damaged tree stems and skeleton branches for the whole investigated periods – 2009 - 2011 (Table 2). The analysis of the results obtained after the use of the standard preparation Arbinol B shows that it ensures the full protection of the tested apple trees just till the beginning of February. For the second deadline, by the end of April 10th, the degree of damage was 84% for the first period and 88% for the second period, or on average 86% for the whole investigated period (2009-2011). The reason of a shorter period of protection is probably because of washing away of the preparation by the spring rains, while the coating with EM 12 preparation is better due to its higher resistance to washing away. Moreover, the use of brush to ensure a protective coating by Arbinol B is a slow and labour-consuming work. These results were also mathematically processed and presented in the following table (Table 2).

Table 2

Degree of damage caused by wild rabbits to apple trees of "Golden Delicious" variety during the autumn-winter period, 2009-2011

№	Variant	Number of apple trees	Degree of damage (the 10th of February), %	Degree of damage (the 10th of April), %
2009-2010				
1	Control	50	85	100
2	Standard	50	0,0	84
3	Variant I	50	0,0	0,0
2010-2011				
4	Control	50	75	100
5	Standard	50	0,0	88
6	Variant I	50	0,0	0,0
	Average value for the period 2009-2011			
7	Control	100	80	100
8	Standard	100	0,0	86
9	Variant I	100	0,0	0,0
	GD 5%		27,4	35,1
2009-2010				
1	Control	50	85	100
2	Standard	50	0,0	84
3	Variant I	50	0,0	0,0
2010-2011				
4	Control	50	75	100
5	Standard	50	0,0	88
6	Variant I	50	0,0	0,0
	Average value for the period 2009-2011			
7	Control	100	80	100
8	Standard	100	0,0	86
9	Variant I	100	0,0	0,0
	GD 5%		27,4	35,1

CONCLUSIONS

1. The treatment with EM-12 preparation ensured the integral protection of the tested apple rootstocks MM 106 and apple trees of Golden Delicious variety against damages caused by wild rabbits, including the stems, the skeleton branches and their embranchments.

2. The method of using the preparation EM-12 is highly effective. Large fruit trees orchards can be treated in a shorter period of time.

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Data prezentării – ***26.09.2011***