

## **CONTROL OF *PERONOSPORA SCHLEIDENII* UNGER OF ONION IN UKRAINE**

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### Summary

There are shown ways and methods for parasitism control of the downy mildew causal organisms on onion. Efficiency of fungicides and elicitors of plants resistance is evaluated.

key words: onion, fungicide, elicitor, downy mildew

### INTRODUCTION

Practically every year on onion sowings, especially in the second year of growing there is observed considerable affection of plants by downy mildew, which is provoked by the fungus *Peronospora schleidenii* Unger. The distinctive peculiarity of the affection is a greyish – violet coating or yellowish diffuse spots. Conidium – carriers are dichotomously branched, final stalks are arched bended, and spores are rather big, egg – shaped, greyish – violet colored. The generally used technological scheme for growing of this crop, does not always give the possibility to protect plants from the disease successfully, that results in considerable losses of the yield, qualitative indices of the marketable production reduce. In addition many times spraying of plants by fungicides can induce resistance of the pathogen to pesticides active ingredients and considerable obstruction of marketable onion. Our investigations were an attempt to approach the solution of these problems.

### MATERIALS AND METHODS

Phytopathologic calculations of onion plants affection by downy mildew were conducted according to generally used methods. Biologic indices of peroxidase activity were defined by Mikhlis and Bronovits'ka, titrated acidity – by titration, dry matter – by refractometer, vitamin C – by Muri. Presence of fungicides in plant tissues was defined on test – objects according to recommendations suggested by Erwin. Contents of amino acids, nitrates and potassium in

plants were defined by the infra-red analyzer of quality, model 4500, with the use of a computer program «NIR System».

## RESULTS AND DISCUSSION

In our previous investigations we evaluated some fungicides, which are present on the Ukrainian market. In particular we determined the rather high biological efficiency of Unomil MC, Previcur 607 SP, Tattu, derivatives from ditiocarbamic acid, strobilurins, Tanos and tank mixtures of fungicides. But with epiphytic development of the disease for successful plant protection it is necessary to conduct 5-6 spray and then the threat of exceeding pesticides residues arises. We also determined that with weak and moderate development of downy mildew on onion the harmfulness reduction may be achieved owing to the increase of plants resistance when treating them by polyunsaturated fatty acids and the biofungicide Mycosan.

That is why it is necessary to combine in a tank mixture a little bit lower standards of fungicides and elicitors of plants resistance expenditures. The results of conducted investigations showed the rather high efficiency of proposed mixtures (Table 1).

Table 1. Biological efficiency of preparations and their mixtures against downy mildew on onions (v. Borova, 2003-2005)

Treatments of the trial	Development of the disease	Biological efficiency (%)
Onion of the 1st year, variety Skwyr'ska		
Control without treatment	34.2	0
Ridomil Gold MC - 2.5 kg·ha <sup>-1</sup>	6.3	81.6
Arachidonic acid - 0.002 L·ha <sup>-1</sup>	14.6	57.3
Mycosan B - 10 L·ha <sup>-1</sup>	12.0	64.9
Ridomil Gold MC - 1.5 kg·ha <sup>-1</sup> + Arachidonic acid - 0.001 L·ha <sup>-1</sup> + Mycosan B - 5 L·ha <sup>-1</sup>	3.7	89.2
Onion of the 2nd year, variety Skwyr'ska		
Control. without treatment	72.3	0
Ridomil Gold MC - 2.5 kg·ha <sup>-1</sup>	16.6	77.0
Arachidonic acid - 0.002 L·ha <sup>-1</sup>	36.7	49.2
Mycosan B - 10 L·ha <sup>-1</sup>	30.4	58.0
Ridomil Gold MC - 1.5 kg·ha <sup>-1</sup> + Arachidonic acid - 0.001 L·ha <sup>-1</sup> + Mycosan B - 5 L·ha <sup>-1</sup>	8.8	87.8

It is generally known that products of oxidation of arachidonic acid even in microdoses induce synthesis of phytoalexins in plants, which increase their resistance to diseases. The biofungicide Mycosan B characterized by analogous activity.

At the same time we studied some mechanisms of plants and preparations interaction, in particular, the change of peroxidase activity and variation of dry matter content, vitamin C and titrated acidity in plant tissues. Conducted analyses have not revealed considerable changes in the content of vitamin C and dry matter in plants, but differences in peroxidase activity, depending on treatments and terms after sprayings were found (Fig. 1).

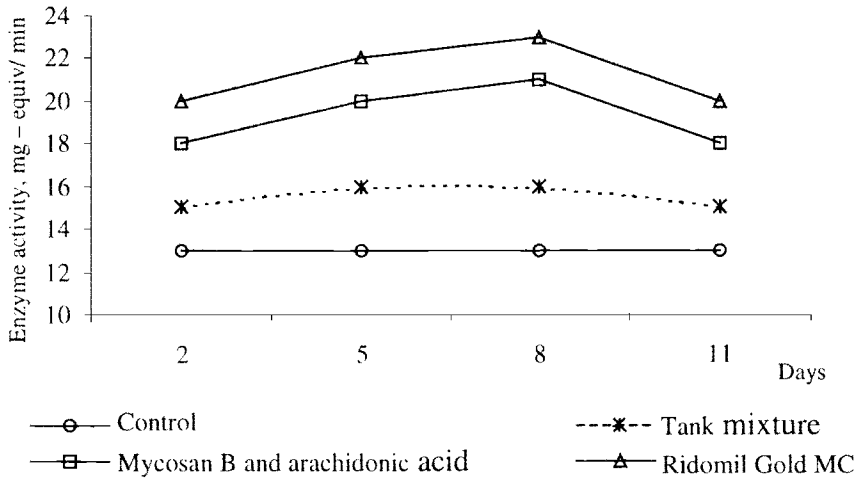


Fig. 1. Dynamics of peroxidase activity in onion plants

It is possible, that slight increase of the oxidoreductase enzyme activity stimulates to some extent, the synthesis of phenol compounds, which take part in protective reactions of plant organisms. An increase of titrated acidity of cell juice and its dynamics is marked in terms of observations, which coincide with the dynamics of peroxidase activity change. It is known that there is a close correlative connection between the increase of the cell juice acidity in tomato and the synthesis of steroid glycoalkaloid of  $\alpha$ -tomatin, which is an important inductor of plant resistance to a pathogenic microbiota. Most probably there is an analogous dependence in onion plants.

At the beginning of flowering of onion seed-plants of the 2-nd year as a rule the contact of plants occurs in rows and considerable density of stand. This prevents spraying of sowings by preparations and their access to the low parts of plants, which under some circumstances can be reservators of a pathogenic infection. That is why we studied the possibilities of access of active ingredients to low parts of onion (Fig. 2).

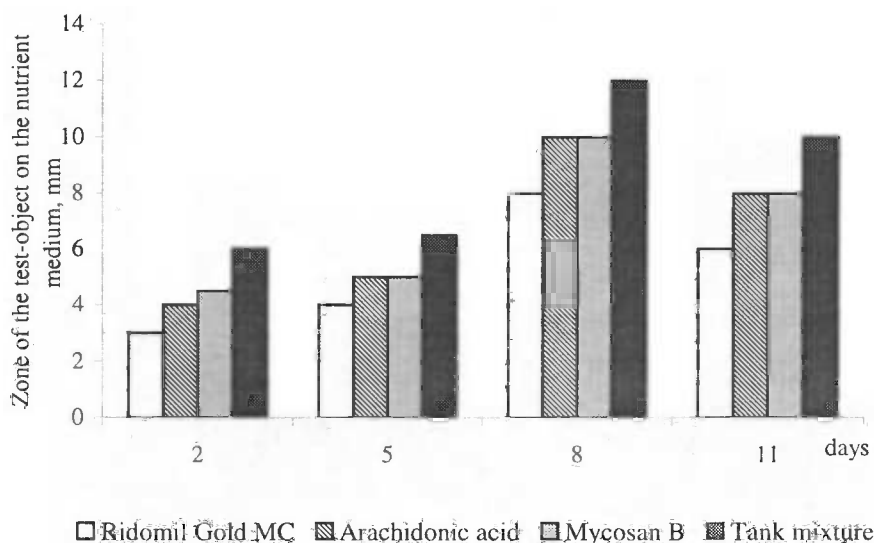


Fig. 2. Dynamics of chemical compounds of systemic action in the low part of onion plants

We have also found that after treatment of onion vegetative plants with chemicals some changes in the metabolism of nitrogen and potassium, in particular, the content of nitrates increased by 78-84% and glutamine - by 7-8% were observed. The content of potassium reduced by 29-32%, arginine, tyrosine and leucine - by 3.8-7.2%. At the same time there was no influence of fungicides on the content of isoleucine, threonine, lysine, phenyl-alanine, cystine, histidine, asparagines, serine, praline, glycine, alanine, tryptophane and methionine. It is possible that the revealed changes in the balance of potassium, amino acids and nitrates could induce, to some extent, protective mechanisms of plants, that oppress the parasite activity of *Peronospora schleidenii* Unger on onion.

## CONCLUSION

It was shown, that biological efficiency of the proposed complex of tank mixture of a fungicide and elicitors of plants resistance is rather effective even with epiphytic development of the disease on onion. There was found the possibility of plants resistance increase, which favours control of *Peronospora schleidenii* Unger parasitism on onion.

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#### ZWALCZANIE MĄCZNIAKA RZEKOMEGO (*PERONOSPORA SCHLEIDENII* UNGER) W UPRAWIE CEBULI

##### Streszczenie

Przedstawiono metody zwalczania mączniaka rzekomego w uprawie cebuli. Określono biologiczną efektywność środków chemicznych do zwalczania mączniaka rzekomego na cebuli, ogólnie dostępnych w sprzedaży na Ukrainie, t.j. Unimil MC, Previcur 607 SP, Tattu, Tanos, strobiluryna, pochodne kwasu ditiokarbaminowego oraz mieszanki fungicydowe. Wykazano wyższą skuteczność mieszanek fungicydowych w zwalczaniu mączniaka rzekomego na cebuli w porównaniu ze stosowaniem pojedynczych środków ochrony.