PATHOGENS IN EARLY STAGES OF WINTER BARLEY CROPS - PREVENTION AND CONTROL-

V. Jinga, H. Iliescu, S. Ştefan , Lucia Şandru, Ana-Maria Andrei, M. Lixandru, C. Lăzureanu*
Research and Development Institute for Plant Protection

*correspondence:
Research and Development Institute for Plant Protection
Bd. Ion Ionescu de la Brad nr. 8, CP 013813, S 1,
Bucharest, ROMANIA
Tel.: 004-021-2693231 (32, 34)
Fax.: 004-021-2693239
e-mail: vasile.jinga@icdpp.ro

ABSTRACT

The studies concerning the chemical and farm practices methods for harmful agents control are justified by the modern development of plant protection intended to a sustainable agriculture.
This study analyzes the influence of these methods on the main harmful agents of barley, which have a high frequency and negative impact during the first vegetation stages, *Erysiphe graminis* f. sp. *hordei* , Barley yelow dwarf virus, *Agriotes lineatus*, *Zabrus tenebrioides*.The results showed that the sowing time of winter barley, which usually takes place between the 15th of September and 5th of October, it should be delayed 10 days depending on the region. Earlier sowing leads to excessive growth of the plants in autumn with the high risk for foliar pests. Seed treatments and those applied during vegetation can stop the attack of the main winter barley foliar pests, and most of these chemicals have a very good efficacy.

Key words: *barley, virus, attack, seed, treatment, antifungal*

INTRODUCTION

The winter barley is a very significant crop of which production has a major interference in human and animal feeding. The barley seeds are also used in many branches of the food industry and not only.

In the agricultural condition of Romania, it was considered appropriate to perform some research of whose results are designed to have an immediate application or to provide methods for achieving a sustainable agriculture. In the research objective it was necessary to take into account the following aspects:

- Interfusion of the agro and chemical farm practices;
- Occurrence of the pathogens and pests' persistence phenomenon against different groups of active ingredients and formulated products, approved for the use in barley crop protection;
- Impact of plant protection products on human health and environment.

MATERIAL AND METHOD

The experimental farm practices (soil labours, rotation, sowing period) concerned the improvement of the technologies, thus providing the exclusion of the phytosanitary risks, and in the same time good quality and economical adequate products, considering the quality.

The selection of the plant protection products have been performed according to the agricultural good practices principles, fulfilling the efficacy requirements, in the same time providing the environment protection, and last but not least, if the crop saved value covered costs of the treatments.

The main pathogen agents studied, having a major action in the early stages of barley's vegetation, were:

- *Barley yellow dwarf virus* (barley yellow stunting);
- *Erysiphe graminis f sp. Horde* (barley powdery mildew disease);
- *Helminthosporium gramineum* (barley leaf laceration)

Considering the damage caused by the above mentioned pathogens, it has been take also into consideration the attack of some pests specific or not for the barley (*Agriotes lineatus*, *Zabrus tenebrioides* etc.).

The experiments have been performed in the experimental field of Bucharest-Baneasa RDIPP, set-up in randomized blocks, using the Orizont barley variety,. The preliminary crop was the field pea, the plot size being of 10 sqm, and the treatment being applied both to the seed, and in vegetation. In order to establish the influence of the sowing moment on the emergence of the yellow dwarf connected to the vector' presence (aphids), it has been organized an experiment where barley has been sown at different periods provided in the culture technology too:

- V 1: best time to initiate the sowing: September 10,
- V 2: optimal sowing period: September 20,
- V 3: the end of the optimal sowing period: October 1.
- V 4: the late-sowing period: October 15.

In order to study the efficacy of the used chemical for seeds treatments, and during the vegetation concerning the phytosanitary state of the crops, it was performed a different experiment having the following variants:

- V 1: seed treatment with an antifungal product based on diniconazole (Sumi-August 2 WP-1 kg/t), and with an insecticide based on imidacloprid (Gaucho 600 FS-0.6 l / t). Through the seeds chemical treatment it has been taken into consideration the attack control of the soil fungi, as well as of the yellow dwarf virus vectors, and the wireworms.
- V 2: seed treatment with an antifungal product based on diniconazole (Sumi-August 2 WP-1 kg/t), and treatments during the growing season using products based on thiacloprid (Calypso 480 SC). The treatments were performed 7 days after the emergence in order to discharge aphids or other vector insects of barley yellow dwarf virus.
- V 3: seed treatment only with an antifungal product based on diniconazole (Sumi-August 2 WP-1 kg / t).
- V 4: untreated check test.

Fig. 1
Location of the experiments at RDIPP Bucharest, Baneasa, Romania (2009)

RESULTS AND DISCUSSIONS

The analyze of the influence of the sowing period as a farm practice action against the attack of the yellow Barley dwarf virus (Table 1) it shows that a maximum value of this attack has been registered at the variant sown on September 10. The phenomenon can be owed to the fact that in this moment it has been registered a maximum flight of the vectors.

Table 1

Influence of sowing period in prevention of the virus attack that causes the Barley Yellow Dwarf

Experimental variants (date of sowing)	Attack Frequency (%)	Attack Intensity (%)	Attack Level (%)
V1: September 10	99.01	21.12	20.78
V2: September 20	96.12	18.11	17.28
V3: October 1	71.08	14.71	9.94
V4: October 15	45.31	9.01	4.05

In culture the attack of the virus is in hearths shape, of different shapes and sizes. The infected plants showed a golden yellowing at the leaf tip with an orange shade that extends towards the base of the leaf, beginning from the edges and gradually covering the whole leaf. The coloured leaves are erect with a high rigidity. The attacked plants are dwarfed, emphasizing a poor development of the root system, they also have a strong twinning, and generally don't develop ears. Finally they necrosed and died. The initial yellowing and dwarfing level of the necrosed plants depends on the infection period. The infected plants in the seedling stage, turn yellow at the ripening stage, and show a strong dwarfing, being 30-50% smaller than the healthy plants. If the infection occurred after the twinning phase, the yellowing occurs in the case of the young leaves, and the plants dwarfing is less visible.

The highest attack level has been registered in V 1 (Fig. 1). Similar results were obtained also in V 2 (Fig. 2). The sowing of barley towards the end of the sowing period (V 3) has led to a culture with a low attack level (Fig. 3), this phenomenon being considered owed to the fact that the flight time the vectors were very weak. The data of the variant 4, (Fig. 4), prove the late sowing period was the moment when the attack level of the Barley yellow dwarf virus was of only 4.05%, accordingly without a significant economic negative impact.

Plants obtained from the experimental plots shown on:

Fig. 2
September 10th

Fig. 3
September 20th

Fig. 4: October 1

Fig. 5: October 15

The data are shown in Table 2 concerning the efficacy of some plant protection products of whose active ingredients are listed in Annex 1 of the European Community Directive EC Directive 91/414, also homologated in Romania for the prevention and control of the main pathogen agents, for the seeds treatments, as well as for the treatments applied in early development stage,.

Table 2

Efficacy of the barley seeds' treatment with plant protection products in order to prevent the attack of the main pathogen agents in early development stages

Pesticide	Efficacy %		
	Mycosis	Virosis	Pests
V1: Sumi-8 2 WP+ Gaucho 600 FS	96	99	96
V2: Sumi-8 2 WP+ Calypso 480 SC	95	90	94
V3: Sumi-8 2 WP	94	-	-
V4: Untreated check test	-	-	-

Thus, it is found that if it is considered the effectiveness in preventing the attacks of viruses of treatments from different types of experimental variants, fungi, and pest, satisfactory results were obtained from all the used insecticide mixture.
It is proved that the fungicide Sumy 8 2 WP reduced the attack of the main fungal nature pathogens agents, attack that occurred in the first vegetative periods, being observed an efficiency of over 95%. The observations pointed out that the insecticide Gaucho 600 FS used in the seed treatments it has a 96% efficacy in preventing and controlling the vectors. Sporadic observations regarding the occurrence of *Agriotes lineatus* and *Zabrus tenebrioides* attack led to the conclusion that both the seed treatment, and early vegetation stage applied treatments, cause the attenuation of the attack level.

CONCLUSIONS

- The farm practice actions, featured especially through the sowing period, are the first factors that strongly influence the attack frequency and intensity of yellow dwarf Barley virus. In conclusion, the optimal sowing period for barley in the south area is between September 25th and October 10th.
- The sowing before this period lead to a higher than normal vegetative mass of the plants, increasing the attack risks of viruses, fungi, and insects.
- Seeds treatment using a mixture of fungicide and insecticide can stop the attack of the major barley's diseases with particular emphasis on yellowing, because it has also a negative influence on population density for the vector insects of the virus beside the attack of the pathogen agents having a fungal nature.

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