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## EFFICIENCY OF THE PROTECTANT CELEST TOP 312.5 FS IN IRRIGATED WINTER WHEAT TREATMENT AGAINST CEREAL FLIES IN VARIOUS SOWING PERIODS

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**Statement of the problem.** Harmful insects are considered to be a major factor limiting the potential winter wheat productivity in the steppe and forest-steppe zones of Ukraine, in particular cereal flies belonging to the group of pests hidden on stems, the number of which is exceeding economic limits of harmfulness in the recent years [1-3]

Literary sources affirm that in the recent years global warming optimizes the conditions for the mass reproduction of most species of insect pests, especially cereal flies, which significantly degrades the phytosanitary state of spiked grain crops [4,5]. In addition, the spreading and harmfulness of cereal flies in the farms are affected not only by climate changes but also by the violations of scientifically based crop rotations and agrotechnical requirements for growing grain crops [6-8].

**Status of the problem.** The most common types of flies in the southern Steppe of Ukraine are the wheat bulb flies, winter wheat flies, Hessian flies and frit flies, which can develop in 2-4 generations during a year. The dominant one is frit fly. Its larvae harm in the autumn and spring, they feed on inside the stems of cereal crops destroying them. In the spring the larvae damage shoots of winter crops, reducing the amount of productive stems and causing the loss of young plants [3,4,16].

The autumn generation of cereal flies has the greatest harmfulness, the number of their larvae was ranging from 1.7 to 30 per 1 m<sup>2</sup> of acreage under winter crops. The damage of plants is 2.0-2.5 times increased, especially during the long autumn and spring drought. Thus, the improved protection system of winter wheat crops is required [4,11,16].

The monitoring data of researchers and the experience of collective and private farms in the southern Steppe of Ukraine convincingly prove that the

adherence to the scientifically based crop rotations, differentiated system of the basic soil tillage, optimum modes of nutrition and irrigation, application of insecticides for seed and crop treatment are of great importance for optimizing the phytosanitary state of spiked grain crops [1,8-14].

The cultivation of resistant varieties significantly reduce the use of chemicals for grain crops' protection from harmful insects [11,15]. However, the experience shows that under conditions of irrigating the southern Steppe of Ukraine all varieties of winter wheat are damaged by cereal flies differently.

**The research objective** is to optimize the phytosanitary state of the irrigated winter wheat crops under different seeding dates and chemical protection means.

**The research methods.** The research was done in the experimental field of the Institute of Irrigated Farming of NAAS using the winter wheat variety Ovidii under irrigation in 2010-2012.

The soil in the experimental field is dark chestnut, medium loamy with the contents of humus of 2.38%. The predecessor is soya. The cultivation method for winter wheat is generally recognized for spiked cereals on the irrigated lands of the southern Steppe in Ukraine. Irrigation is performed by sprinkling machine DDA-100 MA according to the indicators of hydrometer when determining soil moisture during the main phases of the crop's development.

When conducting research, we made use of generally accepted methods of entomological study [7]. The insecticides' efficiency was studied according to the guidelines of the Institute of Plant Protection [6].

**The research results.** The data of the previous study confirm conclusions of many scientists about the vital role of scientifically based crop rotations in reducing the number and harmfulness of cereal flies

[1,3,4,7,8,13]. Thus, winter wheat in the second crops is damaged by the larvae of flies 1.6-2.5 times higher in comparison with such predecessors as soya, winter and spring rape, especially while early sowing.

According to our observations the significant decrease of pests is possible due to peeling stubble after harvesting cereals and deep plowing. These agricultural methods provide the elimination of windfall

shoots which are the reserve for many phytophagan species and accelerate the death of larvae and eggs of cereal flies.

The research has found that in the autumn the greatest number and harmfulness of wheat, Hessian and frit flies were observed in winter wheat crops of early seeding dates (Table1).

**Table 1. – Number and harmfulness of cereal flies under different seeding dates (variety Ovidii, IIF NAAS, on the average during 2010-2012)**

Seeding dates	Autumn tillering		Entering the phase of tubing		Yielding capacity, t/ha
	Number of larvae and eggs per m <sup>2</sup>	Stem damage, %	Number of larvae and eggs per m <sup>2</sup>	Stem damage, %	
September, 5	30,2	8,3	22,5	7,0	4,9
September, 15	18,9	5,2	16,7	4,3	5,5
September, 25	7,4	3,0	7,0	2,9	5,7
October, 5	3,9	1,8	3,2	1,5	5,2

The table shows that transfer of seeding dates of winter wheat from the first days of September to the end of the month has contributed to a significant reduction of plants damaged by larvae of wheat, Hessian and frit flies and crop protection from losses.

Early seeding (early September) are optimum for the development of autumn generation of cereal flies, as one can see the greatest number of larvae and eggs, and as a result – the increase of plants damaged. The reduced number of pests in the spring compared to the autumn numbers is associated with their loss in the winter.

To ensure the reliable winter field protection from sectorial, biting and hidden on the stems phytophagans in the autumn one should add chemicals to the above mentioned complex of agricultural practices.

Presowing seed intoxication with the systemic insecticides is considered to be the promising and environmentally friendly method for winter wheat protection from cereal flies, grain beetles, caterpillars, cereal aphides, cicadas and other phytophagans in the autumn. The range of protectants is annually replenished with new preparations that are still little known to farmers.

When treating the seeding fund with insecticidal protectants the preparation gets into the place the pest is feeding on, it makes it possible to reduce the consumption of active ingredient per 1 ha by ten times and to ensure the environment protection from pesticides pollution.

The scheme of the experiment is the following:

1. Control – Kinto Duo, s.c. (2 l per ton of seeds)
2. Celest Top 312.5 FS, f. s.c. (2 l per ton of seeds)
3. Rubizh, c.e.+ Kinto Duo, s.c. (2.0+2.0 l per ton of seeds)
4. Kinto Duo, s.c. (2.0 l per ton of seeds) + Rubizh, c.e., 1.5 l per hectare (spraying when tillering starts)

The new generation protectant Celest Top has a highly effective systemic and contact action against a wide range of insect pests and fungal diseases of cereals and other crops. It contains three active ingredients (thiamethoxam, 262.5 g/l; fludioxonil, 25 g/l and difenoconazole, 25 g/l). In addition to the protective action it stimulates the development of shoots and root system of cereals.

Rubizh is a concentrated emulsion containing phosphorus-organic compound dimethoate (400 g/l), it also has systemic and contact action. It protects grain crops from the complex of leaf-eating and sectorial pests by means of presowing seed treatment and spraying the crops during the growing season.

Kinto Duo is a systemic and contact treatment for seed disinfection from pathogens of the most common diseases, it protects the root system of plants and facilitates the number of productive stems. It combines two complementary active ingredients such as triticonazole (20 g/l) and prochloraz (60 g/l) and can be available as a suspension concentrate.

Monitoring the field germination of seeds has shown that when applying the protectant Celest Top, winter wheat shoots appeared two days earlier. Field germination of seeds in this option is (94 %), 2.3% higher than at the control. Thus, it indicates the lack of the protectant's phytotoxic action. The beginning of tillering phase is observed a day earlier in comparison with control. The root system of plants is developed more intensively, which confirms the stimulating action on seedlings and young plants of winter wheat.

When using the protectant Rubizh for pre-sowing seed treatment, the field germination was 3.5% lower (90.5 %) in comparison with the Celest Top application. The results of the protectants' efficiency compared to the ground insecticide spraying of winter wheat are given in the Table 2.

According to the research results (Table 2) presowing winter wheat's seed treatment with the protectants of insecticide action makes it possible to control the number of flies in the autumn, i.e. during the most critical period in the development of plants. The highest protection efficiency is obtained when applying the protectant Celest Top 312.5 F S. In this case the number of pests hidden on stems is decreased by 87.8% and stem damage amounts to 2.9%.

The same efficiency indicators have been obtained when applying ground spraying of winter crops with the insecticide Rubizh, c.e. with the consumption rate of 1.5 l per ha in the early phase of the autumn tillering. The efficiency of protective action of this insecticide on reducing the number of flies and plants' damage of winter wheat by means of pre-sowing seed

treatment is lower in comparison with the Celest Top 312.5 FS use. In addition, this protectant has a phyto-

toxic effect on the growth and development of young plants.

**Table 2. – The efficiency of chemical winter wheat protection from cereal flies in the IIF NAAS (variety Ovidii, IIF NAAS, on the average during 2010-2012)**

Option	Number of larvae and eggs of cereal flies per m <sup>2</sup>	Reduced number of pests, %	Stem damage, %	Reduced number of damaged plants, %	Yielding capacity, t/ha
Control-Kinto Duo, s.c. (2 l per ton of seeds)	23,8	0	11,8	0	5,75
Celest Top 312.5 FS, f. s.c. (2 l per ton of seeds)	2,9	87,8	2,9	8,9	6,0
Rubizh, c.e.+ Kinto Duo, s.c. (2.0+2.0 l per ton of seeds)	4,5	81,0	3,2	8,6	5,85
Kinto Duo, s.c. (2.0 l per ton of seeds) + Rubizh, c.e., 1.5 l per hectare (spraying when tillering starts)	2,5	89,4	1,8	10,0	6,05
HIP <sub>05</sub>					0,52

**Conclusions.** The effective methods of reducing the number and harmfulness of cereal flies on irrigated winter wheat crops in the southern Steppe of Ukraine include the rational application of complex agrotechnical and chemical measures, including adherence to scientifically based rotation, deep plowing, optimum seeding dates and intoxication of shoots by means of presowing seed treatment with the protectant of complex action Celest Top 312.5 FS with the consumption rate of 2.0 l per ton of seeds. This protection system optimizes phytosanitary condition of winter wheat in the autumn and preserves the environment from pesticide pollution.

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