INTEGRATED PROTECTION OF CEREALS AGAINST FUSARIAUM SPECIES

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Abstract. In article, the materials characterizing a condition of grain crops agrocoenosis. The results of long-term investigation of pathogenic cjmplex content of snow mold and root rot agents in different region of Russia were presented. Immunological study stages for the development of the grain crops cultivars, resistant and tolerant to Fusarium pathogens.

1. Introduction
In recent years, crops have been cultivated without the application of the crop rotation, but with introduction of minimum tillage technology under existing agro-climatic conditions and due to it, significant changes in the development, distribution and harmfulness of genus Fusarium fungi occurred in agrobiocenosis [1-4].

Results of phytosanitary monitoring show an annual increase of the affected areas and in percentage of plants infected by Fusarium. These species causing Fusarium head blight are distributed everywhere in cereals production and processing. Sources of infection can be infected seeds, soil and plant grown on them. The disease caused by complex pathogenic fungi belongs to the genus Fusarium [5-8]. The composition of fungal species in this complex of pathogens may vary throughout the growing season, depending on the agro-climatic conditions. The same fungal species can infect the roots, stems, leaves and ears of winter and spring crops. Using only fungicides against Fusarium is not always effective. To reduce the infectious load on crops and to harvest healthy grain is possible under integrated conditions of crop rotations, and fungicide application timing of sowing, and most importantly in the cultivation of resistant and / or tolerant varieties[9-12].

2. Methods and materials
On purpose to study special and intraspecial diversity of snow mold, root rot Fusarium head blight agents phytopathological inspections of cereal crops in different regions of Russia. Pure culture of 100-150 isolates selected were obtained from each cultivar sample. Isolates were cultivated on agar medium for 14 days at 18-22°C. Fungal species were indentified by conidium morphology taking into account...
their occurrence. Species belonging strains was confirmed by genetic analysis posedovatelnosti gene fragment translation elongation factor 1 alpha. The intraspecial diversity of toxin-producing capability and of pathogenic characteristics of *Fusarium spp* was studied using the influence of cultural liquid filtrate and spore suspension on cereal crops cultivar seedlings.

Accounting defeat plants snow mold, root rot and Fusarium ear blight was conducted on natural and artificial backgrounds in different vegetative phase. Immunological evaluation of each variety on the stability and tolerance to pathogens *F. culmorum*, *F. oxysporum*, *F. heterosporum* and *M. nivale* carried out within three to five years in laboratory and field conditions on an artificial background on key indicators: the death of the plant, the intensity of lesions on the dynamics of development of the disease in different phases of the ontogeny of plants and yield losses. Immunological assessment of winter wheat, winter triticale used in the studies carried out on the natural infectious background for at least three years of each variety.

### 3. Results and discussion

Researching the special and intraspecial structure in causative agent populations of the most dangerous diseases (root rots, snow mold, *Fusarium* head blight) of cereal crops in various regions of the Russian Federations has been carried out.

The results of long-term investigation of pathogenic complex content of snow mold and root rot agents in different region of Russia were presented.

The defeat of cereal crops snow mold in Russia causes in the *Microdochium nivale* (Fries) Samuels & Hallet= (Fusarium nivale(Fr.)Ces. (90%), roots rot-a complex pathogenic. More often meet *Fusarium culmorum*(W.G.Sm.) Sacc., *F. oxysporum* (Schlecht.)Snyd.et Hans., *F. heterosporum* Nees., *F. sporotrichiella* nom.nov.Bilai., *F. gibbosum* App.et Wr.emend Bilai., *F.avenaceum* (Fr.) Sacc., In the Central region the Russian Federations prevail *F.oxysporum*, *F. heterosporum*, *F. culmorum*, in the Centralhernoem region - *F.oxysporum*, in the Povolzski region, in North- Eastern (Volgo-Vyatki)- *F. culmorum*.

The author estimated the influence of soil temperature, moisture and acidity on rate of growth, morphology, sporulation and compatibility of fungi.

With a view to determining the most favorable and critical temperatures for the development of certain types of pathogens in vitro we studied the effect of the temperature factor on the vegetative growth, morphology and sporulating the ability of the isolates. As a result of researches revealed that the types of pathogens that cause diseases of grain crops, ambiguously reacted to the same temperature conditions. Marked differences in the speed of growth, morphology and sporulating the ability colonies of each of the types of mushrooms depending on the temperature.

To find out the causes of certain pathogens prevalence in different regions we studied the influence of temperatures on the growth, morphology qualities, sporulating ability of the fungi colonies in the Petri dishes under constant tem-peratures during their growth period.

Having estimated this, we noticed fungi F culmorum and Microdochium nivale be growing better at temperatures from +5-12° C, F culmorum, F. hetero-sporum, F.gibbosum preferred higher temperatures from10- to 26°C, while F. oxysporum, F. sporotrichiella had ther better growth at the temperature from18-to 32 °C.

The joint growth of pathogene species in vitro at showed the lack of any an-tagonisms between them; temperature was the main growth limiting factor. The fungi populations had ligh abiotic factors adaptability.

With the aim of investigation of wide adaptative abilities in pathogenic complex and variability of Fusarium ssp.one studied morphological –cultural properties, toxin-forming ability and pathogenic properties of that species isolates.

The intraspecific variability in different species of genus Fusarium (*F.oxysporum*, *F. heterosporum*, *F. culmorum*, Microdochium nivale) was studied on morphologo-cultural and pathogenic characteristic and also on toxin producing ability.
The analysis results of PCR and determination of nucleotide sequences of the amplified DNA fragments and construction of phylogenetic trees. STRAINS common species were chosen as typical representatives of their groups and to characterize the molecular-GENEOTICHESKIMI methods including PCR primers C ARBITRANNYM (ISSR b AP-PCR) and sequence analysis of a fragment of the gene translation elongation factor 1 alpha.

Species belonging strains was confirmed by genetic analysis posedovatelnosti gene fragment translation elongation factor 1 alpha.

Comparison of the results by grouping strains sequence of the gene fragment translation elongation factor 1 alpha and similarity of strains by PCR fingerprint data shows that for some species there is a high intraspecific variability is probably associated with the processes of genetic adaptation to changing environmental conditions and the change of the host plant.

Long-term experience of screening and immunological assessment of cereals cultivars resistant to snow mold, root rot enabled us to work out and recommend a scheme and criteria of such screening and assessment at all stages of breeding process.

Immunological evaluation and selection of accessions resistant and tolerant to Fusarium pathogens suggest spending as follows:

1- Preliminary evaluation of accessions in the laboratory on seedlings using a culture filtrate or spore suspension.

2- Evaluation of accessions on the hard infectious background in the field to a mixture of the most common types. Estimate the intensity of defeat winter grain snow mold conduct in tillering stage before and after overwintering plants; winter and spring crops root rot - in the flowering stage; Fusarium ear infection at harvest.

3- Sredneporazhaemye Fusarium pathogens samples evaluated to separate the most malicious types of infectious conditions in the nursery and determine the type of host-pathogen interactions. The criterion for selection is the dynamics of the disease and reduce the percentage of the crop.

4- Integrated assessment of the most dangerous pathogens and selection of resistant accessions with the group.

Varieties having resistance to pink snow mold (Microdochium nivale)

winter rye (Secale cereale L.): Domestic: Kirov 89, Vyatka 2, Haze, Falen 4, Snowstorm, CHULPAN 3, shortness 69, Tatar 1 Bezenchukskaya 88 Volkov Talovskaya 29 Shatilovskaya tetra, the taiga, Dewdrop, Ilim, Siberian coarse.

Accessions from VIR world collection: LAD-287 SLAD-287 St-2614, Antonnisnie, Leelondzkie Kartowe Niel, Leelondzkie Krotnoslomix x Baltycnie- (Poland), Epos, Rerus- (GDR), Inzucht 74/2, Inzucht 108/8, (Sweden), 10953 (Finland), Feniks (Belgium), 11385 (Yugoslavia), 11510, 11389 (Portugal), 11306 (Argentina), 11179, 11180 - (USA), 11388 (Georgia), 11131 (Azerbaijan), Beve, Kharkov 88, (Ukraine);

winter wheat (Triticum aestivum L.): Galina, Zarya, Moscow 39 Moscow 56 Nemchinovskaya 57 Memory Fedin;

soft spring wheat (Triticum aestivum L.): Tribune.

As a result of years of research selected variety specimens of cereals with group resistance to root rot and characterized by economic-valuable attributes.

In the process of immunological studies, a methodology of evaluation and selection of crops with resistance and tolerance to Fusarium pathogens. On evidence-based hard infectious background selected, recommended and used in breeding varieties with resistance to fusarium and endurance:

winter rye (Secale cereale L.): Falen 4, 89 Kirov, Vyatka 2 Bezenchukskaya 87, Haze, Volkov Talovskaya15 , Talovskaya 29 Talovskaya 33 Talovskaya 41, Tatar 1 CHULPAN 7, 69 short stature, Snowstorm, Snezana, P., Alpha, Volkov;

winter wheat (Triticum aestivum L.): Galina, Nemchinovskaya 57, Zarya, Moscow 39 Moscow 56 Nemchinovskaya 57, Suzdal 2 Mironovskaya 808; winter triticale (X Triticosecale Wittm. ex A. Camus) Cornet, Legion, Tribune;
soft spring wheat (Triticum aestivum L.): Daria, Zlata, Irene, Krasnoufimsk 100, Lada, Mies, Priokskaya, Amir;
spring barley (Hordeum vulgare L.): Andrew Dean, ecology, Russ, Tselinograd 91, Heather, Russ, Gonar, Jean, Zazerskiy-85;
spring oats (Avena sativa L.): Argamak, Fighter, Friend, Hello, Catch, Fakir, Hero of the day;
spring triticale (X Triticosecale Wittm. ex A. Camus): Lotas, Amigo, Scallop.

These varieties and accessions are recommended for breeding programs to create stable and tolerant varieties of crops.

The studies showed no immune cereal varieties to Fusarium species. Tolerance of varieties to these species varies depending on agro-climatic conditions. Tolerance of crops to Fusarium species is nonspecific, that is why estimated penetration of the pathogen, the speed of its spread and harmfulness, endurance and the ability to plant not to accumulate toxins are important. Affect the stability of the morphological traits of crops and varieties: the structure of the root system, the plant height, length of internodes, the structure and position of the ear.

4. Conclusion
Phytosanitary monitoring allows you to explore and assess the phytosanitary situation, identify protective measures to obtain safe and stable yields of high quality. Agricultural activities should be aimed at reducing Fusarium pathogens in agrobiocenoses and the accumulation of infection in plants.

Programme of events ecologized protection of cereal Fusarium fungi:
Phytosanitary monitoring; Agricultural practices affecting Fusarium strain; Tillage systems affecting Fusarium strain; Fertilizers; Methods of biological protection; Methods for chemical protection; Use tolerant (genetically protected) varieties.

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