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ПРОУЧВАНЕ НА ВЛИЯНИЕТО НА БИОПРЕПАРАТА “БИОАКТИВ” ВЪРХУ КЪЛНЯЕМИТЕ КАЧЕСТВА НА СЕМЕНА ОТ ЗЕМЕДЕЛСКИ КУЛТУРИ

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Ключови думи:

*семена на културни
растения
биопрепарат
“Биоактив”
кълняемост
семенна микрофлора
„сечене”*

Резюме

Изследвано е влиянието на биопрепарата “Биоактив” върху началния темп на растеж на пшеница, сорго, фасул, домати и салатно цвекло. Семената от тези култури са обработени с разтвор на „Биоактив“ за растения и са поставени за покълнване върху агарова среда. Отчетено е количеството на развилата семенна микрофлора върху агаровата среда с добавен “Биоактив”. Установено е, че обработката на семена на фасул, сорт “Арбитос” и домати, сорт “Рила” променя състава на семенната микрофлора и увеличава тяхната кълнеема енергия, както и кълняемостта им. Обработката на семена от пшеница сорт “Енола” и сорго сорт “Янтар” изменя съдържанието на семенната микрофлора и намалява количеството на изсечените кълнове.

INVESTIGATION ON THE INFLUENCE OF THE BIO PREPARATION “BIOAKTIV” ON THE GERMINATION QUALITY OF AGRICULTURAL SEEDS

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Key words:

*seeds of crops
bio preparation “Bioaktiv”
germination
seed microflora
“damping-off”*

Abstract

It was investigated the influence of bio preparation “Bioaktiv” on the initial rate of growth of wheat, sorghum, common bean, tomato and beetroot. The seeds of these crops were treated with solution of “Bioaktiv” for plants and was placed for germination on agar medium. It was rendered an account the seed microflora on agar medium with added Bioaktiv. It was established that the treating of seeds of common bean, variety “Abritos” and tomatoes, variety “Rila” with Bioaktiv increase their germination energy as well as their germination. Treating wheat seeds, variety Enola and sorghum, variety “Yantar” with “Bioaktiv” changes the content of the seeds microflora and decreasing mostly the quantity of the damping-off seedlings.

Introduction

The basic principles of modern conventional type agriculture impose the treatment of seeds with fungicides as an essential technological activity. This aims to suppress or exterminate the colonized on the surface of the seeds harmful microflora which can cause occurrence and development of pythium rot in beet, corn, sorghum, wheat, beans and other crops (Tanova et al., 2005; Kirilov et al., 2006; Yakimov et al., 2014, Andreeva et al., 2010, Tanova et al., 2010). Pythium rot is caused by a complex set of pathogenic fungus: *Alternaria* ssp., *Phoma betae*, *Fusarium* ssp., *Rhizoctonia solanum*, *Phytium* ssp. etc., in which bacteria of genus *Pseudomonas* and *Xanthomonas* take part as well and in dominant proportion. Andreeva et al point out that this proportion in surface infection of seeds of sorghum is disbalancing in favour of bacteria 98% to 2% (Andreeva et al., 2010). It depends on the genetic origin of seeds and is relatively constant but the content of the surface microflora of sorghum seeds, independently of the origin, is greatly influenced by feeding with mineral nitrogen – an important part of the conventional technology for all crops (Tanova et al, 2010).

A prominent part in modern ecological and harmless to people plant protection systems takes the use of some plant products: essential oils, flavonoids, etc. This allows protection of crops and preserving of the natural intercourse in agrobiocenoses and the useful microflora as well. (Balashova and others, 2004, Ujvary 2002, Yakimov et al., 2014).

The factual instability of agrobiocenoses in modern agriculture requires the use of alternative methods in agricultural crops cultivation technologies. The use of biological fertilizers and biopesticides and other biological substances in plant protection is the main reserve in this respect (Gushin et al 1996).

By treating the seeds with biological fertilizers and biologically active substances, their germination capacity improves (Petrova and others 1991; Hristova and others 1994; Michno, A.N., 1997). As an alternative of the traditional agriculture, in order to comply with the requirements in ecological aspect of modern agriculture, some authors (Nega E. et al., 2002) suggest simultaneous processing of vegetable seeds (carrots, cabbage, parsley) against the pythium rot agents with biological products with fungicidal and bactericidal action or treating at high temperature (50-53°C).

Treating the seeds with some liquid fertilizers like Lactofol (with rich combination of macro and micro elements) has a very positive effect on the quality and quantity content of the fungal pathogens spread by seeds in some vegetable crops (Stancheva Y., 1998)

In the recent past the use of products in massive amounts has become widespread as an alternative to a restriction of pesticides and fertilizers, as well as to improvement of quality of seeds and productivity of

vegetable crops (Motovilova L. V., 1994; Zhuvechkov S. M., 1995; Kirilov K., 2003).

The purpose of this study is to examine the influence of the product Bioactive in *in vitro* conditions on the laboratory germination and the microflora when treating seeds and seedlings of crops.

Material and methods

The research has taken place at the Plant protection laboratory in the University of Shumen with the following seeds: beetroot variety Radost, sorghum variety Yantar, wheat variety Enola, beans variety Abritus and tomatoes variety Rila, with the product Bioaktiv in proportion Bioactive/water – 1/20. According to the producer (“Bioaktiv” – Germany) the biopreparation consist at 100% of his content activated epsomite ($MgSO_4 \times 7H_2O$) (Yakimov et al., 2013). He is prepared by innovation technology, which allows after dissolving in water to induce formation of active oxygen.

The seeds were soaked in the respective water solutions for 2 hours and for the control sample respectively in water for the same time. After drying they were put in dark place, at 25°C on filter paper for germination. The germination energy and germination were reported on the third and the seventh day after laying the seeds.

The microflora of the seeds was examined in *in vitro* conditions and the seeds were planted on agar culture medium (water agar). The sprouted colonies on the medium were defined by light microscope following the standard phytopathological methods.

The percentage of damping-off was reported on the 7th day after laying the seeds on the culture medium.

The results of the influence of the product Bioaktiv on the laboratory germination of seeds are presented in Table 1.

The results show that Bioaktiv influences the germination capacity of the tested crops seeds and increases their germination energy and their laboratory germination. This increase is highest in the beans seeds. The germination energy of these seeds, treated with Bioaktiv is 90.75%, or 8.4% compared to the control sample and the laboratory germination is 92% - 7.6% compared to the control variant. The increase in germination energy and laboratory germination of tomato seeds treated with Bioaktiv is proven. For the treated seeds the reported germination energy is 87.5% and it is 83.75% for untreated tomato seeds. The reported laboratory germination of the untreated and treated with Bioaktiv tomato seeds also shows increase in treated seeds. The increase in the laboratory germination of the treated seeds compared to the untreated is 5%. The influence of Bioaktiv is weaker on beetroot seeds. The germination energy of the treated seeds has increased by 1.15% and the laboratory germination has decreased by 0.28%. With wheat, the treated seeds show increase in the reported germination

energy by 0.74% and decrease of the laboratory germination by 0.1%. Treatment of Sorghum seeds

with Bioaktiv increases the germination energy by 0.89% and the laboratory germination by 1.64%.

Table 1. Results of the influence of the product Bioaktiv on germination of seeds

Variant	Germination energy, %, day 3				Germination, %, day 7			
	%	Proportion%	Rank	Row	%	Proportion%	Rank	Row
Beetroot seeds with Bioaktiv	89.50	101.15	-	-	91.75	99.72	-	-
Control sample	88.48	100	-	-	92.00	100	-	-
Sorghum seeds with Bioaktiv	90.75	100.89	-	-	91.00	101.64	-	-
Control sample	89.95	100	-	-	92.50	100	-	-
Wheat seeds with Bioaktiv	83.75	100.26	-	-	85.50	99.9	-	-
Control sample	83.53	100	-	-	85.90	100	-	-
Beans seeds with Bioaktiv	90.75	108.4	+++	1	92.00	107.6	+++	1
Control sample	83.72	100	-	2	85.50	100	-	2
Tomato seeds with Bioaktiv	87.5	104.8	++	1	89.75	105.0	+++	1
Control sample	83.75	100	-	2	85.50	100	-	2
GD - 5 %	2.07				2.13			
GD - 1%	2.87				2.98			
GD - 0.5%	4.06				3.22			
P %	0.76				0.78			

Table 2. Results of analysis of the seeds microflora

Variant	Seeds microflora					Damping-off	
	Alternaria	Mucor	Penicillium	Fusarium	Others	%	Proportion %
Beetroot seeds with Bioaktiv	+++	+	++	+++	-	55.0	105.36
Control sample	+++	+	++	+++	+	52.2	100.0
Sorghum seeds with Bioaktiv	+++	++	++	++	+	32.5	92.85
Control sample	++	+++	+++	++	-	35.0	100
Wheat seeds with Bioaktiv	+++	-	++	++	-	42.5	80.5
Control sample	+++	-	+++	+++	+	52.8	100
Beans seeds with Bioaktiv	-	-	+	-	+	65.2	100.3
Control sample	-	-	++	-	+	65.0	100
Tomato seeds with Bioaktiv	+++	+	++	+	+	48.8	99.6
Control sample	+++	++	-	+	+	49.0	100

Key: +++ - presence in 50 – 100%; ++ - presence in 25 – 50% of the samples; + - presence in up to 25% of the samples; -/- not found in the samples

The results of analysis of the seeds microflora and the influence of the product Bioaktiv on the development damping-off seedlings are represented in Table 2. The treatment of different crops seeds with Bioaktiv influences differently the quantitative and qualitative structure of the seeds microflora. Treating of beetroot seeds with Bioaktiv changes the microflora

unidentified by the analysis and the increased by 5.36% damping-off are probably due to it.

In treated sorghum seeds presence of unidentified by this analysis microorganisms is observed which probably leads to decrease of the damping-off with 7.15%.

Treating of seeds with Bioactive reduces infection of seeds with species of Penicillium and Fusarium as well

as with those unidentified by the analysis (probably bacteria), which reduce the quantity if damping-off by 19.40%.

The product Bioaktiv influences the infecting of beans seeds with species of genus *Penicillium*, mostly storage fungi, which do not influence much the quantity of damping-off (Table 2). Treating of tomato seeds with Bioaktiv leads to infecting of seeds with storage fungi of genus *Penicillium*, but this does not affect considerably the quantity of damping-off.

Conclusion

Treating of beans seeds, variety Abritos and tomatoes, variety Rila with the product Bioaktiv improves their germination energy as well as their laboratory germination. Treating beetroot seeds, variety Radost, changes the seeds microflora, increasing the quantity of unidentified microorganism species and the quantity of the damping-off. Treating wheat seeds, variety Enola and sorghum, variety Yantar with Bioaktiv changes the content of the seeds microflora and decreasing mostly the quantity of the damping-off seedlings. The increased quantity of *Penicillium* species in the seeds microflora of treated with Bioaktiv seeds of beans, variety Abritus and tomatoes, variety Rila does not influence the percentage of the damping-off. It was established that Bioaktiv have influence on the examined crops by reducing the damping-off seedlings of crops of family *Poaceae* and do not have significant influence on the other examined crops.

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