Research the biological activity of chitosan in compositions of herbicides with rise seeds capsulation

N.L. Voropaeva, M.D. Sharipov, I.N. Ruban, K. Yusupov
Plant Protection Institute of the Republic of Uzbekistan,
4, Babur St., Tashkent region, 700140, Uzbekistan
E-mail: lametash@bcc.com.uz

Introduction

The role of chitosan (HZ) in metabolic process of the cells and in the productivity of the agricultural cultures have been shown in the lot of different researchers (Runner 1994, Skryabin 2002, Skryabin 2006, Iliina 2003, Maksimov 2006, Osuji 1992, Notsu 1994, Hirano 1990).

Is it revealled that molecular mass (the MM), a degree deacetylation (SDA) differently influence to the physiological processes and biometric factors of the plants. The important influence to these processes and factors render the different modified forms of chitin though correlations "structure of chitosan " - "biological activity"is only under in installation. The absence of the clear regularities of the influence of chitosans and their derived on growing, development, protection and productivity of the plants, what suppose many authors, is explained by difficulty of the process of the reception of natural polymers with strictly determined physic-chemical reproducible parameters.

On our opinion, except this it is necessary must allow the influence the dynamic factors of the encirclement (the fluctuations of the temperature, moisture, ion composition of the soil solution, resistance of microorganism and others), accompanying plants on length whole period of vegetation from seeds sowing to the harvest. So it is important determination of their period of the development, when using the chitosans and their derived can bring the maximum effects. Besides, probably, it is important to study the mechanism of actions of the different molecular masses derived of chitins to the metabolism of the cells, growing and development of the plants.

The molecules of low molecule's chitosan can enter into the plants and induce on the different hierarchical levels of different processes. There are lot of such works and their results do'not disagree the general biological principles of the action physiological active materials. High molecules chitosan can form the slick on surfaces of different organs of the plants, and, infusing into the energy-, transfer the mass of the plants with surrounding ambience, adjust the physiological processes in the concrete stage of the development of the plants (Rashidova 1996).

Material and methods

We tried to integrate into united polyfunctional system the slick polymer- the natrium carbonate of methyl cellulose salt (KMC), low molecules chitosan and herbicides Gulliver in flake capsulation technology of rise seeds.

The chitosan with KMC is added in the first flake and Gulliver with KMC into the second. It was studed the influence of this polyfunction system to growing, development of the plants, suppression the rubbish vegetation and grain harvest.

Results and Discussion

The treatment before sowing of rise seeds by polymeric system on base of the sodium-vapor of carbon salt, including only chitosan, promoted increase field germination rate in contrast with checking (the seeds is not treated) - on 11,1%. When the seeds were treated with Gulliver jointly polymer KMC without chitosan the field germination increase on 2,2 %.

The capsulation of the seeds with only one polymer KMC led to the growing of this factor on 5,6 % in contrast with checking importances. The infiltration treatment of rise seeds polyfunction system on base KMC with chitosan and Gulliver the field germination was on a rate of checking factors.

Use designed laminated covering of rise seeds with herbicide before sowing treatment brought to suppression the growing and development rubbish vegetation from 79,6 % till 94,7 % depending on molecular mass and a degree deacetylation of chitosan.

The growing and development of the plants in early stage are bound, as is well known, with level of the suppression a rubbish vegetation in sowing fields. It was revealled that in variant of the experience with treatment of the seeds by polymeric system, consisting of KMC, chitosan and Gulliver, the height of the culms (the phase of emerging) overtook checking importances on 11,3 % at the average and did not depend of MM and SDA of chitosan.

In the late phases of plant development (the bush phase) the treatment seeds with polymeric system, including KMC, chitosan, and Gulliver rendered also positive influence for the plants growing factors. Increase the height of the main culm of the rice formed at the average on 11,2% in contrast with checking factor.

The density standing of the plants is very important result of efficiency in the use different technologies. It was installed that after infiltration treatment of the seeds with polymeric system with cut in chitosan and herbicide was expressed in increase amount of plants of the rice on unit area and formed at the average on 12,0 % more in contrast with checking. The amount of rubbish vegetation before the harvest of the culture of the rice formed 3,2 - 5,8 % depending on MM and SDA of chitosan, used in polymeric polyfunction system.

The important biometric factor is a length of the main whisk brooms of the rise, mass of grain and empty grain. Increase the length main whisk brooms was noted in variant of the experience on 11,7 - 21,8 % in contrast with checking depending on MM and SDA of hitozan. The mass of the grain in the main whisk broom increased on 29,5 - 38,8 %, but in lateral - on 95,0 - 145,0 % depending on features used in polymeric system of chitosan. The factor of empty grain whisk brooms of the rice greatly decreased - on 21,5 - 30,6 % depending on MM and SDA of chitosan in composition designed polymeric systems aplying at befor sowing treatment of the seeds.

The integrated factor of efficiency of the using the new polymeric systems for seeds treatment is a harvest. We are studied that this factor increased in contrast with checking on 48,3 - 51,2 % depending on features used in composition of the polymeric system of chitosan.

Conclusions

In conclusion we would like pay attention to positive trend in the field of use derived of chitin in plant growing, as well as systematic searching for correlation between the structure and biological activity of chitosans and their derived, about than witnesses the big experimental material, received multiple researcher, working in this direction. In our experiment we received results, being indicative of efficient influence of polyfunction polymeric systems on productivity of the rice.

It is shown the possibility of the use the ecological safe technology of the fixing herbicide on surface of the seeds in external layer of the polymeric covering that excludes phitotoxicity of herbicide to agricultural culture (in particular, plants of the rice) at conservation of efficiency in the action of the preparation in fight with contamination thesowing by rubbish vegetation. Also we brought out the role of chitosan in essential improvement of the biometric factors of the plants in stage of the shaping and maturations grain rice. And, finally, it is shown essential increase of productivities given cultures with use the system of polyfunction systems in infiltration technologies of rise treatment.

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