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The activity of the PDH is based on the use of natural regulators of intracellular biochemical processes. This suggests a comparatively high ecological cleanliness of preparations with photodynamic activity. Among the advantages of the PDH, one may include the high selectivity of their toxic activity based on the photodependent biological effect, achieved in plant organisms, and the impossibility of their photoactivation in the organisms of warm-blooded animals. In addition, one should note that the outcome of the effect of the PDH on the cell is the activation of radical oxidation reactions of various intercellular components and in the first place membrane components. The quantum yield of these processes can significantly exceed unity. By virtue of this feature of photodynamic processes, one may hope that it will be possible to reduce sharply the active concentrations of the preparations, which is important from the ecological and economical points of view. Furthermore, one should postulate that the non-specificity of the activity in the photodependent stage rules out the possibility of the development of plant species resistant to the PDH.

The action of propesticides (compounds which do not exhibit a pesticidal activity from the beginning) is based on the biochemical activation of the molecules by the enzyme systems of plants, as a result of which the pesticide molecules are generated in the plant cells. The species specificity of such preparations is based on the differences in the activities of enzymes in cultivated plants and weeds. For example, the difference between the activities of alcohol dehydrogenase in various plants served as a basis for the creation of selective propesticides of the chlorophenoxyethanol series (phenteracol — Hungary).

The study designed to create herbicides of this type as well as PDH necessitates the development of a biochemical base for the investigation of the principles governing the species specificity and selective toxicity. Here it is possible to distinguish three most important problems:

The study of the characteristic features of the transport of pesticides through biological membranes, the establishment of relations between their transport characteristics and their structure, and the determination of the characteristic features of the interaction of pesticides with biological membranes, including the molecular mechanisms of the influence of pesticides on the structure and function of membranes.

The study of the differences in the biochemical homeostasis of cells of useful and harmful organisms and in pathological states. The determination of the molecular mechanisms of the response reactions to the action of xenobiotics.

The study of the characteristic features and pathways in the metabolism of pesticides in the cells of living beings and in objects within the environment in order to elucidate the mechanisms of the pesticide effect and also the routes to their metabolic activation and the characteristics of the latter.

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Biologically active substances of ecological importance and methodological aspects of the estimation of the biological activity of pollutants

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The study of natural ecological chemoregulators and chemomediators is important for the development of new ecologically safe pesticides and chemical plant and crop protecting agents.

Substances of this kind include phytoalexins and other antifungal substances in plants, phage repellants, antifeedants, toxins, antiovipositants, phytoecdysones, juvenile hormone substances, and various attractants and pheromones. One of the problems associated with the chemical pollution of the biosphere is that of the estimation of the biological activity of pollutants. In order to discover the optimum methods of estimating pollutants and xenobiotics, to investigate the possibility of a correspondence between data obtained by various methods and for various objects, and also with the aim of securing new information about the biological activity of anthropogenic substances, the author carried out biotests on certain pesticides and surfactants as well as certain industrial preparations on various biological objects. The substances investigated included pesticides (DNOK and lontrel), surfactants (sulphonol, sodium dodecanesulphonate [sodium dodecyl sulphate?], Triton X-100, ethonium, and TDTMA), and surfactant-containing preparations "Kashtan" (chestnut), "Verbena" (vervain), "Vil'va" [?], and others. The seedlings of a number of plants, including macrophytes, were used as the test objects. It has been shown in the latest experiments that sulphonol (0.5 ml litre^{-1}) almost completely suppresses the growth of the roots of *Oryza sativa*. It is proposed that the adopted modifications of biotesting methods be used on a wider scale for the estimation of the biological activity and ecological danger of substances.

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Social-ecological aspects of the use of plant protecting agents in Uzbekistan

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Since the 1970s, the problem of dangerous xenobiotics among polyhalogenated polycyclic compounds capable of exhibiting mutagenic, carcinogenic, teratogenic, and embryotoxic activities and of damaging the liver and the immune and central nervous systems as well as the blood forming organs at very low concentrations has been widely discussed in the world press. One of such compounds is dioxin, which forms part of the composition of copper

trichlorophenoxide and other numerous plant protecting agents. This communication deals with the problem of dangerous xenobiotics in relation to Uzbekistan and an attempt is made to develop a strategy for the replacement of copper trichlorophenoxide by non-trivial preparations, which make plants resistant to bacterial diseases.

In order to solve the problem of the replacement of copper trichlorophenoxide by non-toxic preparations, it is essential in our view to develop the following measures: to eliminate the use of waste from cotton fields as fuel; to rethink the solution to problems concerning the preparation of the soil in regions where subterranean water is in close proximity; to eliminate the ploughing in of the stems, branches, and other parts of the cotton plant after raw cotton has been harvested; to develop measures for the stabilisation of light soils; to develop methods for the attachment of preparations to the surfaces of seeds during their treatment, which will make it possible to reduce the dispersion of the preparations and their accumulation within the preserving areas in cotton cleaning workshops; to go over to an improved automated technology for the pre-sowing preparation of seeds; to replace phenthiurams and copper trichlorophenoxide by highly effective preserving agents which are non-toxic to warm-blooded animals; to carry out preserving only under stationary conditions, during periods which do not coincide with the flowering of fruit trees; to abandon procedures involving the enzymic treatment of the waste from cotton fields (cotton stems and branches after harvesting raw cotton) in order to obtain additives to the main diet of cattle.

All this can be achieved with the aid of polymer systems for the stabilisation of sand and soil, which makes it possible to prevent the migration of sand and light soils and this in turn will tend to reduce the horizontal migration of preparations incorporating dioxin and other toxic admixtures, with the aid of polymer compositions for the encapsulation of cotton seeds whereby one can eliminate the friability of the preserving agent in the treatment of seeds, storage, transport, and sowing, and by discovering the physicochemical properties of polymer systems and the biological principles on the basis of which it is possible to achieve the specific synthesis of fungicides and bactericides and to create polymer compositions with a high adhesive strength.

In order to solve the social problem, it is desirable to reconstruct the technological process of the presowing preparation of seeds by the following measures: to devise systems for the remote control of the preserving-encapsulation process which would eliminate contact between man and toxic preparations; to develop machines for the encapsulation of cotton seeds and the seeds of other agricultural cultures, which would differ from the existing analogous devices by social advantages combined with a comparatively high productivity; to develop measures for the replacement of traditional preserving agents by compounds of both chemical and biological origin which are non-toxic to warm-blooded animals.

For the solution of the problems formulated, an experimental-industrial specimen of an ecologically closed device "Kapsula-1" was created. It rules out, on the one hand, contact between man and preserving agents and, on the other hand, their tendency to slide off the surfaces of seeds after the additional introduction of water-soluble polymers into the suspension of preserving agents. A satisfactory social effect is achieved by constructing a device for the high-quality coating of seeds by virtue of the high strength of the adhesion of polymer coatings to the surfaces of seeds.

We have now developed together with the VNIIKhSZR polymeric forms of a series of seed preserving agents based on polyvinylpyrrolidinone, the sodium salt of carboxymethylcellulose, methylcellulose, and their mixtures manufactured both in the Soviet Union and abroad. The choice of the polymer matrices is dictated by the characteristic features of the dissolution in the temperature range coinciding with the temperatures at which the seeds of various agricultural cultures germinate. Familiar preparations with systemic and contact activities are used as preserving agents—bronocot, sandopan, alett, tigan, ridomil, and their combinations. However, the majority of these preparations exhibit a definite toxicity to warm-blooded animals and we shall therefore consider in greater detail the alett + polymer binder system.

The treatment of cotton seeds by this system does not exert a significant influence on the capacity of the seeds to germinate in the field compared with the control (phenthiuram) and does not affect the crop of raw cotton. Bearing in mind that alett is based on aluminium and the aluminium compound of triethyl phosphate, whose toxicity is low, and that the toxicity indices are not comparable with those of copper trichlorophenoxide, the data obtained in the field experiments can satisfy the high requirements of the agroindustrial complex of the region. However, the high norms for the consumption of the preparation undoubtedly cannot fail to influence the ecological system in the case of its universal use for a long time. This is why we have devoted much attention to the search for alternative plant protecting agents, which fully rule out a negative effect on the environment and which subsequently determine the ecological strategy concerning the important problem of the protection of agricultural cultures against pathogens and pests.

The complex preparation biopolan, consisting of green microalgae, an antibiotic of the polyene series, and polyvinylpyrrolidinone and systems based on chitin-chitosan derivatives are in our view most promising. Without exerting a negative influence on the capacity of the cotton plant to germinate in the field, grow, and develop as well as the cotton crop, biopolan restores the balance between various species of microorganisms in the soil, creating ultimately highly fertile ecological areas. The introduction of the antibiotic into the composition of biopolan significantly expands the methods for combating the pathogenic fungal species inducing root rot in agricultural plants. The mechanism of the action of systems of this kind has been fairly thoroughly investigated. The role of the chitin-chitosan derivatives in the plant protecting system and in the disinfection of soils has not been investigated thoroughly enough to be able to infer with a high degree of probability their effectiveness let alone recommend their introduction into agriculture. In the study of these systems, it is necessary to investigate the mechanisms of the action of such preparations and to carry out screening and field tests against different backgrounds of infection of soils by pathogenic forms of microorganisms and of pollution by dioxin and its decomposition products.

Thus the solution of problems associated with the use of plant protecting agents at the present time and in the future should follow the route involving the creation and application of a very precise and ecologically closed technology, careful selection of plant protecting agents, and the selection of the method of application, taking into account the ecological crisis situation in the region.