

## PLANT PROTECTION IN ECOLOGICAL AGRICULTURE

Рассматриваются различные способы охраны растений и увеличения производства сельхозпродукции без использования синтетических средств защиты растений и удобрений: агротехнический метод, механический метод, метод биологической защиты, использование ионизирующего излучения и растительных экстрактов и селекционный метод.

Different ways to increase plant protection and agricultural production without application of synthetic plant protection means and fertilizers are studied such as: the agro-technical method, the mechanical method, the biological plant protection method, use of ionizing radiation and plant extracts as well as the breeding method.

As a result of intensification of agricultural production after the Second World War, and a big involvement with state funds in agriculture, an overproduction of foods and problems with their sale occur, and above all the natural environment has been strongly degraded through using of.

From a point of view of natural environment protection, an ideal solution is to deviate from using of synthetic plant protection means, which can contribute to its notably improvement.

It is enforced the prohibition of using the synthetic means in producing with ecological methods. A legal basis of ecological agriculture is Act on ecological agriculture from 20th April 2004, Regulation on ecological production of agricultural products, and groceries from 20th April 2004, Regulation of the EEC Council 2092/91 on ecological production of agricultural products and marking of agricultural products and groceries. In ecological agriculture, plants are protected by the way of methods: agro-technical, mechanical, biological, physical, bio-technical and breeding.

The agro-technical method is a method, in which all cultivating treatments create possibly the best conditions for plant growing, and unfavorable for agrophags. A Basic treatment is correct changing, which does not allow an exhaustion of soil, and excessive reproducing of harmful organisms. Another treatment in this method is adequate spacing of plants. If it is possible, the plants should be planted in coor-

dated planting. By means of this treatment, pests have difficulties with finding a parasitifer, for example planting of carrot with onion. The onion makes difficult to find a carrot for *Hylemya brassicae*. Another planting is *Brassica oleracea L.var botrytis* with *Phaseolus vulgaris* as a masking plant, *Hylemya brassicae* has difficulties with finding *Brassica oleracea L.var botrytis*.

To the mechanical method, the following treatment belong: hand crop, pests crushing, and cutting of injured sprouts, using of shields (nettings on trees protect against birds), using catching bands. Such bands, attached to a trunk, stopped caterpillars *Grapholita funebrana*, *Laspeyresia pomonella* which gather for wintering. These insects cause verminating of fruits in orchards. Pick-down mammy from trees allows to liquidate sources of a fungal attack *Monilina fructigena i Monilina laxa*.

The biological plant protection lies on employing pathogenic microorganisms, predatory, and parasitic insects, predatory birds, and other animals for fighting off pests, pathogens, and weeds. We distinguish three ways of biological fighting off, introducing, that is lasting settling, on new areas, natural enemies, brought from other continents, for example, against *Eriosoma lanigerum*, which has been trailed to Poland from North America, a parasite *Aphelinus mali* has been brought. A next way of biological protection is a periodical colonization, that is periodical introducing of natural enemies of a given pest, to an environment, in which is occurring

in a small quantity, for example, against *Pieris brassicae*, *Pieris rapae* it is introducing of *Trihogramma* spp. which is a parasite in butterfly eggs. The last way of this method is protecting, that is a protection of useful organisms through making changes, which are good for them, in their environment, for example, creating places for preying (sowing with mustard, facelią on edge strips) One of the most known way of fighting off pests by biological methods is applying of *Bacillus thuringiensis* bacteria against insects of *Lepidoptera*, *Diptera*, *Colleoptera* rows.

Applying of ionizing radiation for disinfection of corns against such insects as *Sitophilus granarius*, *Sitophilus oryzae*, is an element of the physical plant protection. Treatment like burning injured leaves down, or applying low temperature, also belong to this method.

Using plant extracts in agricultural production, in order to protect plants against pests, is an element of the bio-technical method. For getting an extract, such plants are used, as *Psylliodes atra*, *Psylliodes nigripes*, *Psylliodes nemorum*. An extract from *Azadirachta indica* stops preying of insects.

The last plant protecting method, in ecological agriculture, is the breeding method, resulting in getting plants which have their natural protection against pathogens, or pests. It is applied in orcharding through planting apple trees which are immune to *Venturia inaequalis*.

The above mentioned methods, which are applied in ecological agriculture, provide a possibility of agricultural plant protection without using chemical means. It is a good direction of agricultural developing, because it does not affect negatively on the natural environment. But by these days there are still few effective non-chemical methods of plant protection, which can lead to decreasing of quality of agricultural products. Fungi, occurring on the agricultural products not protected chemically, create micotoxins (*Fuzarium spp*), which can cause a cancer of people and animals. These methods often prove to be not so effective in fighting off many diseases and pests. Taking these, there is a big demand for researches in a range of non-chemical methods of agricultural plant protection, that, in future, would lead to reduce using the chemical means of plant protection in agriculture, and through this it would improve a condition of the environment, in which we are live.