PRELIMINARY STUDIES ON THE MAIN PEST CONTROL METHODS OF PLUM PLANTATIONS

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Abstract

This paper summarizes the literature on the main pest control methods of plum orchards. The purpose of the paper is to present the state of knowledge on the main pest control methods of plum plantations existing in our country and beyond. The research was made based on comparative studies and case studies based on data from the specialized literature. Integrated pest management is a system of measures using all available methods, including biological and agrotechnical, as well as pesticides, to predict and prevent economic damage caused by pests. Pests are any organisms, including weeds, insects, disease pathogens, which are harmful to the planting, crop growth, harvesting and marketing of the fruit. Integrated pest management is a good practice in horticulture because, potentially, it can increase productivity, reduce costs and contribute to the stability of agriculture and environment. As a general conclusion, plum pests can be combated by both conventional and unconventional methods.

Key words: integrated pest management, orchards, pesticide

Plant protection in recent years developed problems because plantations are aging and difficult to manage and new ones requires large investments and specialized assistance to their establishment to avoid production losses and ensure high quality of the fruit (Ulea E., 2003).

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In our country, although long complex schemes to combat pests and diseases of crops is known and practiced, an attempt of using these programs has been developed in recent years, with the advent of chemical combat negative phenomena. The first work of its kind, "Integrated pest and crop disease", belongs to the Radulescu E., Rafailă C., Alexandri Al., Săvescu A. team. A study and systematization of the literature in the field of integrated pest management was achieved by Baicu T., Săvescu A. (1986), Hatman *et al*. (1986), etc. Concerns about integrated protection of plum culture research are relatively few compared with the results on other fruit species, although the damage caused by pests and diseases each year are quite high (Tălmaciu Nela, 2009). Worldwide, studies have been conducted regarding integrated pest control in plum orchards in Washington by Anthon and Smith, 1975. Integrated combat elements were gradually introduced in Bulgaria in 1975 by Poulev, in the fight against plum worms. In France, Touzeau, in 1975, developed a number of methods of winter forecasting and visual control of green crabs, wasps, plum worms, *Monilinia laxa* (Baicu T., Săvescu A., 1978).

To reduce them, in integrated pest control, primarily agrophytotechnical, physical-mechanical, biological methods are taken into account, and, ultimately, the chemical method.

MATERIAL AND METHOD

This paper summarizes the knowledge of the main methods of pest control in plum plantations, based on an extensive bibliography in our country and abroad. The biological material is a plum species (*Prunus domestica* L.). As working methods, comparative analysis and case study based on existing information in the literature were used, given the possible attack thresholds in ecological circumstances in our country. Integrated pest control was highlighted. This analysis takes into account the quantity and quality of the harvest, as well as its economic efficiency.

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RESULTS AND DISCUSSION

Plum tree represents a base element in any fruit tree plantation. It grows in all parts of the country, enforces well in sloping land, being cultivated since ancient times. In order to have a good yield and quality, leaf and fruit trees should not be damaged by diseases and pests. Among the mentioned diseases there are: viroses - plum pox (*Plum pox virus*), bacterioses - ulceration and bacterial screening of the leaves of the trees pips (*Pseudomonas syringae* pv. *mors-prunorum*), mycosis (*Taphrina pruni*), plum powdery mildew (*Podosphaera tridactyla*), red leaf blotch (*Polystigma rubrum*) or fruit brown rot (*Monilinia laxa*), rust leaf plum (*Transzchelia pruni-spinosae* Died.) etc. (Ulea E., 2003).

Among the pests, there are mentioned: fruit wasps should be considered in spring, namely: plums black wasp (*Hoplocampa minuta*), plums yellow wasp (*Hoplocampa flava*), kernels wasp (*Eurytoma schneideri*), aphids (the gray plum aphid - *Hyalopterus pruni*, small plum aphid- *Brachycaudus helichrysi*, large plum aphid - *Brachycaudus cardui*), which are vectors of virus diseases.

The following are the main methods of pest control in plum plantations.

Agrophytotechnical combat methods reside in the use of planting plum varieties that have proven to be resistant to plum seeds wasps attacks, deep plowing in autumn or spring, until the emergence of adult *Eurytoma schreineri* Schr., digging the soil around trees, mobilization of soil by disking, repeated hoeing during the growing season, the collection and destruction of fallen fruit. With the use of selection or genetic engineering, resistant varieties to some types of pest action are created. Using the given varieties to control certain pests may retain damage below economic injury level. However, at some point, the pests can be adapted to overcome the factors of plant protection - this phenomenon is particularly characteristic for the soil-borne pests such as fungi.

These methods give the plants vigor and, correctly applied, will help prevent diseases, insect damage and weed competition. The soil should be tested at least once every two to three years. The analysis showed the pH of the soil, the nutrient concentrations and the advice data based on the application of fertilizers and organic material of healthy and vigorous plant growth. (www.aced. md/publication/download.php?id=107 (accessed at 26.08.2014)

Physico-mechanical methods to combat pests consist in belt traps around the trunks of trees to capture the larvae of *Grapholitha funebrana* Tr. During migration, collecting insects is made by shaking trees, collecting and burning larvae nests or branches with pests, grating thicker stems and branches peeling bark, moss, lichen and burning them, etc. (Tălmaciu Nela, 2009).

Biological combat methods refer to the use of predators or parasites that can effectively reduce pest populations. Although these methods can be widely applied, they operate more efficiently on small surfaces such as orchards, where it is necessary to combat a single species of pests. Using predators or parasites that prey or parasitize several biological species can reduce the methods' efficiency.

In Western European countries, environmental pollution and toxicity of chemicals on human health have generated the development of biological struggle both in the field and in protected areas. Advances in biological control of key pests have made the biological combat a very safe method, effective and environmentally friendly, at the reach of all farmers. Among the factors that require the development of biological control methods, there are mentioned:

- emergence of resistance phenomena of main pests to pesticides;
- difficult to use highly toxic products, as a result of which the production is consumed mostly fresh;
- environmental impact of air, water, soil and ultimately production for human consumption;
- regulations becoming stricter on use of pesticide (http://www.revista-ferma.ro/articole-horticultura/combaterea-daunatorilor-prin-metode-biologice.html (accessed at 08.26.2014).

Chemical control methods. Integrated pest control does not preclude the use of chemical methods. If used correctly, the pesticides are very effective in reducing pest populations and damage potential.

The need for more harmless preparations with shorter decay favored the creation of new pesticides that are generally harmless to workers and consumers, with lower doses of active ingredient per unit area, which affects less on the environment. In addition, it is possible to use insecticides of biological origin consisting of bacteria, viruses, nematodes, or produced from plants.

Often, integrated pest management program can reduce the need for pesticides, although this does not happen in all cases. Rather, such a program allows more rational and effective use of pesticides. For example, controlling the evolution of a pest, we can apply pesticides when it passes through the most sensitive stage of its development. Farmers will use the most harmless

and effective pesticide available in the pest combat. Localized treatment usually is environmentally sound and, economically, more effective than treating the whole orchard. The type and amount of preparation are extremely important, because the wrong pesticide may damage useful biological control organisms, harm plants or reduce sellable crop yields.

Integrated control summarizes all methods of prevention and fights against diseases and pests, with obvious ecological character as it promotes biological and agrophytotechnical measures rather than chemical ones. Integrated battle strategy is based on the maximum use of natural factors and uses especially combat tactics which disrupt agricultural environment as little as possible; resort to chemicals is made only if there is a threat of crop damage.

The use of natural enemies, as well as genetic resistance, are fully compatible methods that support integrated mutual fight. Control of cultures is also used to expose pests to adverse weather conditions to interrupt their natural development, to increase the action of natural enemies and crop resistance (*figure 1*). The purpose of the integrated management programs consists of reducing pests and, also, significant crop damage (*figure 2*).

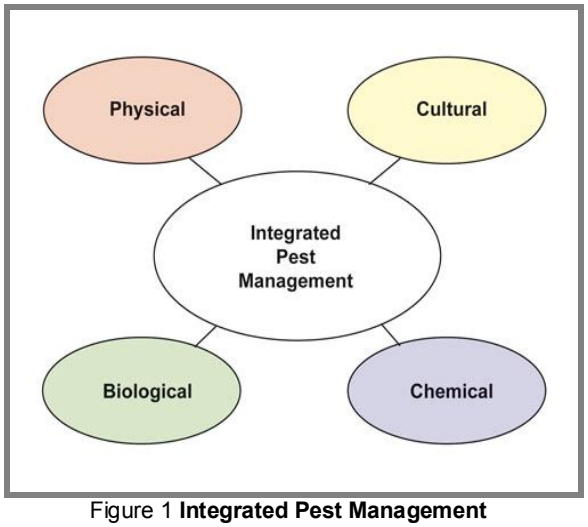

Figure 1 **Integrated Pest Management** (http://www.amalpest.com.au/LearningCentre/PestControlStrategies (03.10.2014))

Principles of developing general rules of integrated - ecological control system, on groups of cultures and on each culture can be summarized as follows:

- limitation of primary consumers (phytopathogens and insects) and weeds as antagonists of basic primary producer;
- stimulation of secondary consumers (entomophagous) antagonists of primary consumers;
-entomophages' possibility to maintain balance in different cultures;
- genetic diversity in order to prevent or delay the emergence of virulent races of pathogens and pests, the cultivation of varieties with complex or group resistance;
- systemic analysis of ecological factors which determine the emergence and evolution of pests and cultivated plants;
- use of forecasting methods and harmful economic threshold warning and the correlations between entomophagous and pests;
- increase of the priority of agro and biological methods of control;
- gradual reduction of synthetic chemical pesticides.

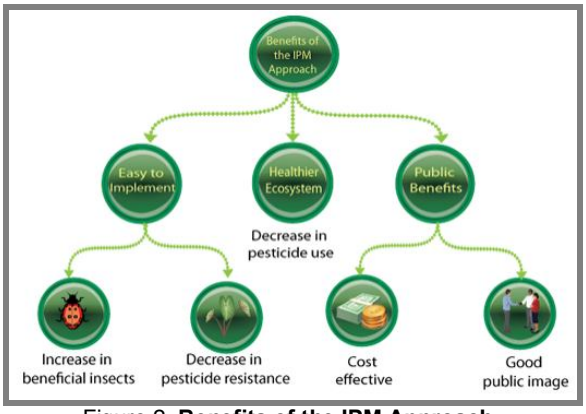

Figure 2. **Benefits of the IPM Approach** (http://sccoastalpesticides.org/knowledgebase/ipm_advantages.php (03.10.2014))

The concept of "economic damage threshold" is based on the knowledge that the numerically pest populations fluctuate naturally. Therefore, control measures should be used only to prevent the pest population growth from producing economic damage.

Plant quarantine refers to certain rules and conventions that provide control of all shipments of agricultural products and the prohibition of export, import or transit batches containing certain pest species (weed seeds, pathogens, eggs and insects, larvae or adults) considered as hazardous.

The technology measures that have an important role in combating pests and harmful insects first mention the following methods: crop rotation, tillage, fertilizer application, land selection, sowing and planting, crop maintenance, harvesting the crop for cultural and hygiene measures (http://biblioteca.regielive.ro/ cribs / ecology / anti-integrated-312066.html (accesed at 26/08/2014).

Combating insect pests of plum plantations before the second world war was done with a

limited range of inorganic chemicals, as well as some vegetable products.

To combat plum wasps, there may be applied: Actara 25 WG at a dose of 0.01% (only after flowering); Calypso 480 SC dose of 0.02%, combat and aphids; 25 WG Decis at a dose of 0.003%, combat and aphids; 50 EW Mega Decis at a dose of 0.015%; Fastac 10 EC at a dose of 0.004% for wasp plum seeds and 0.015% for Hoplocampa spp. Moreover, Faster 10 EC can be used at a dose of 0.025%, Karate Zeon, a dose of 0.015%, Laser 240 EC, dose of 0.06%; Mavrik 2 F, at a dose of 0.05% only of plum aphid gray; Movento 100 SC at a dose of 1,875 l / ha; Nurelle D 50/500 EC at a dose of 0.075% Pyrinex 25 CS at a dose of 0.3% Quick Pyrinex a dose of 0.1% etc. To combat the gray plum aphid,treatments Teppeki can be applied at a dose from 0.012 to 0.014%.

However, to combat mites, treatments in the first part of vegetation may be applied, with insecticides such Vantex 60 CS at a dose of 0.015%, against red acarian, acaricide t Nissorun 10 WP, at 0.03% (http://www.sanatateaplantelor.ro/recomandari/348-no-pest-combating neglected-to-plum).

However, pest control treatments for plum plantations may vary, combat schemes are diverse and can vary as amount, depending on the financial possibilities of farmers.

CONCLUSIONS

Plum pests can be contained both by conventional and unconventional methods. Integrated combat is a system based on integrated pest populations control, taking into account the environment and the dynamics of the considered particular species, using all appropriate methods in a compatible manner, to keep pests to a level that does not produce economic damage.

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