Food and Agriculture Organization of the United Nations

SUSTAINABLE AGRICUTURAL TECHNIQUES ON EFFECTIVE AND ENVIRONMENTALLY SOUND PESTICIDE MANAGEMENT

INTEGRATED PEST MANAGEMENT (IPM) TRAINING SERIES
FOR FIELD CROPS, FRUITS AND VEGETABLE PRODUCERS IN SERBIA

GENERAL PRINCIPLES OF CROP PROTECTION

Sustainable development goals (17) proposed by United Nations by 2030. are focused on sustainable agriculture and food production, as well as environment protection, helping to:

1. No poverty; End poverty in all its forms everywhere
2. Zero hunger; End hunger, achieve food security and improve nutrition and promote sustainable agriculture
3. Good health and well-being; Ensure healthy lives and promote well-being for all, at all ages

12. Responsible consumption and production; Ensure sustainable consumtion and production patterns

15. Life on land; Protect, restore and promote sustainable use of terrestrial acosystems, sustainable manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

FAO's response to the global challenge of food security for mankind suggests that agricultural production in the future should provide sufficient amount of food for people and animal nutrition, while preserving the nature and environment. Concept of sustainable agriculture implies integration of conventional and biological methods, as well as advanced technologies based on precision farming and smart agriculture.

One of the most limiting factors in achieving food security and sustainability is the presence of weeds, plant pathogens and pests. Therefore, its successful control represents a sure way to achieve the general well-being of humanity and full sustainability. Pesticides are chemical substances which are used to control harmful biological agents (fungi, bacteria, insects, mites, rodents, etc.). In general, there are few systems of control against weeds, pests and diseases: **conventional or classic plant protection** (with use of chemical protection products), **integral plant protection system** and **organic production system** (with use of non-synthetic, biopesticides and bio active substances).

Training in sustainable agricultural techniques on effective and environmentally sound use of pesticides for agricultural producers realized by FAO – SPITS 2023/2024 is based on plant protection program according to the principles of good agricultural practices (GAP), appropriate use of pesticides and rational, safe, and healthy agricultural production.

- Optimal time for pesticide treatments and its importance for effective control of weeds, diseases and pests;

- Selection of environmentally safe and friendly pesticide products and active compounds;
- Technical quality of the treatments;
- Products and active ingredients forbidden in 2023;
- Herbicides, fungicides and insecticides which are environmentally safe for use and ensure agroecosystem protection;
- Safety measures during pesticide application: sprayers are normally air-assisted machines; many studies have demonstrated that;
- Appropriate (ecologically safe) package handling after usage.

PRINCIPLES OF FIELD CROPS PROTECTION: MAIZE, SOY AND SUNFLOWER

- Main weed species and herbicides control in different crops; pre-emergence and post-emergence treatments; importance of crop rotation, tillage systems and cultural practice to reduce weediness;
- The most common and economically important diseases and their effective control procedures and techniques;
- The most common and economically important pests and their effective control procedures and techniques.

PRINCIPLES OF PEST AND DISEASE CONTROL IN FRUIT CROPS

- Apple: main diseases and pests and their IPM protection procedure;
- Plum: main diseases and pests and their IPM protection procedure;
- Peach: main diseases and pests and their IPM protection procedure;
- Safe application techniques and technologies with self-propelled sprayers and air cabin protected operator from hazardous substances in spray application to reduce pesticides use and achieve protection of nature.

PRINCIPLES OF PEST AND DISEASE CONTROL IN MAIN VEGETABLE CROPS IN GREENHOUSES

- Importance growing hybrids of tomato, peppers, and cucumbers with full range of resistances and tolerances on climate changes;
- Induced systemic plant resistance and maintenance of soil fertility and good phytosanitary condition: importance of highly humified composted organic fertilizers, leonardite and humic acids and application of beneficial microorganisms;
- Protection against soil borne diseases: range of active chemical ingredients and beneficials;
- Above-ground plant diseases protection: main active compounds and biopesticides;
- Integrated pest management of the most important greenhouse pests;
- Basic principles of monitoring and biological protection: range pf predators;
- Integrating preventative control measures and use of predators, pheromone traps and dispensers for mating disruption, biopesticides and other bioactive compounds;
- Use of advanced technical systems for application of pesticides, and biological agents.

PRINCIPLES OF IPM IN MAIN VEGETABLE CROPS FOR OPEN FIELD PRODUCTION

- Choice of resistant hybrids and varieties in main crops: potatoes, peppers, tomatoes, pickling cucumbers and brassica crops;
- Induced systemic plant resistance and maintenance of soil fertility and good phytosanitary condition in open field conditions;
- Root and stem protection (soil borne diseases); positive roll of crop rotation and patterns;
- Above-ground plant diseases protection; safe and effective fungicides to avoid resistance of pathogens;
- Effective Integrated Pest Management; range of chemicals and biopesticides;
- Significance of pest and diseases effective monitoring and optimized time of treatments;

- Significance of biostimulants application to acquire plant resilience and tolerance towards global warming and climate changes: prevention of abiotic and biotic stress;
- Advanced techniques for use of pesticide: modern self-propelled sprayers with use of air assisted machines, use of drones and handy ULV applicators.

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