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THE ROLE OF AGRICULTURAL EXTENSION OF IPM IN EUROPE

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Abstract
The purpose of this paper is to evaluate the role of agricultural extensions of IPM in Europe, based on the published literature and data available at the momen. Pest control is an important factor in agricultural extension and development, which is why the EU had to introduce several series of measures in the Eurapoean Legislation regarding pest management. The Integrated Pest Management (IPM) system has been developedpart of a more complex system of agricultural protection, namely Integrated Management of Cultures (ICM) . In corder to implement pesticide management it is important to fist reaise awareness on the risks of pesticide use. Worldwide, pest control has benefited from the attention of several institutions, with regulations in place over the years. At EU level, there are several provisions on pest control and management actions. Thus, a number of regulations and methods of pest control have emerged, a classification of these.
Keywords: agricultural extension, Integrated Pest Management, Integrated Management of Cultures

In order to cope with the pace of development, both of the needs of society and of pests, in order to limit their damage, a number of regulations on pest control and pest control have been developed. These regulations and methods for pest control are within the competence of various institutions such as the European Commission, the Food and Agriculture Organization of the European Union, the European Association for the Protection of Cultures (ECPA). With regard to pest control for crop protection, the Integrated Pest Management (IPM) system has been developed. IPM is part of a more complex system of agricultural protection, namely Integrated Management of Cultures (ICM).

European Union had to introduce in 2009 a series of measures. The European Legislation is responding to challenges for sustainable agricultures due to the fact that the most common practices in agriculture in Europe are based on pesticides use.

The Directive on the sustainable use of pesticides (2009/128/EC) requires from European MS to set up National Action Plans to define objectives and measures to achieve risk reduction during the use phase of pesticides. Moreover, according to Article 14 of the Directive (2009/128/EC)(European Commission 2009b), all professional users of pesticides have to apply the general principles of IPM, as laid down in Annex III, since 1 January 2014,[1]

[1] Regulation (EC) No 1107/2009 concerningtheplacing of plantprotectionproducts in the market, Directive 2009/128/EC establishing a framework for Communityactiontoachievethesustainableuse of pesticides, Regulation

The EU-funded C-IPMproject (Coordinated integrated pest management in Europe) contributed to research defragmentation by coordinating national IPM research and extension efforts and by pooling existing resources.

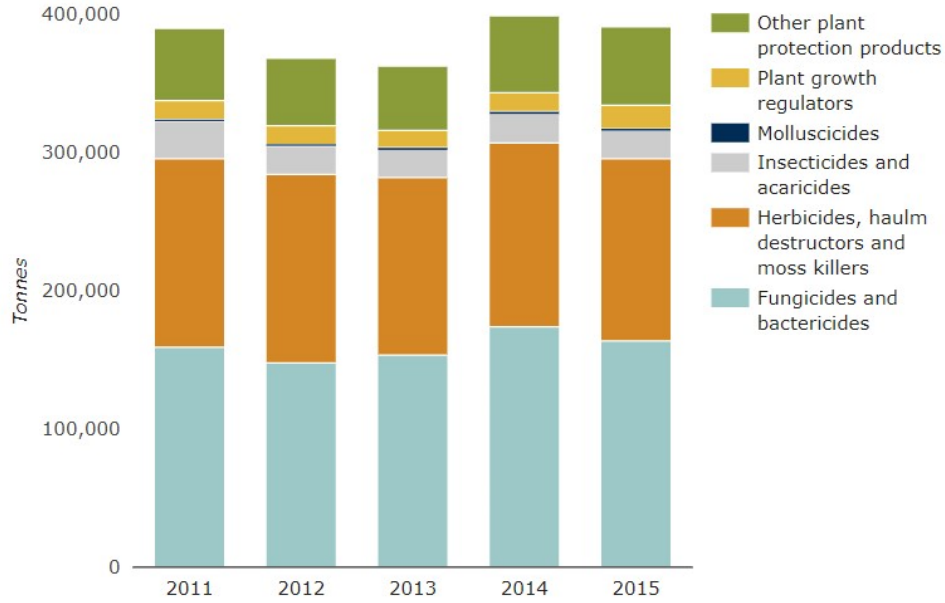

Figure 1. Total pesticides sales, EU

Source: *Eurostat, 2016*

In 2015, the countries in which the highest quantities of pesticides were sold were France, Spain, Italy, Germany and Poland, together making up 72 % of the EU's pesticide sales (Eurostat, 2017). In more than half of the EU countries as well as in Switzerland the average quantity of pesticides sold in 2014-2015 increased compared with the average quantity sold in 2011-2013. The biggest increases were in Finland, Latvia and Estonia (20-23 %). The biggest decreases were in Denmark (56 %) and Greece (43 %).

In 2015, the countries with the highest pesticide sale per hectare of agricultural land were Malta, the Netherlands, Cyprus, Belgium, Ireland, Italy and Portugal. These countries were above 5 kg of pesticide active ingredient/ha, with Malta at 15 kg active ingredient/ha. The EU average was 3.8 kg of pesticide active ingredient/ha. These calculations were EEA own calculations based on Eurostat data for pesticide sales (Eurostat, 2017) and for utilised agricultural area excluding grasslands (Eurostat, 2017).

(EC) No 1185/2009 concerningstatistics on pesticides, Directive 2009/127/EC amending Directive 2006/42/EC withregardtomachinery for pesticide application.

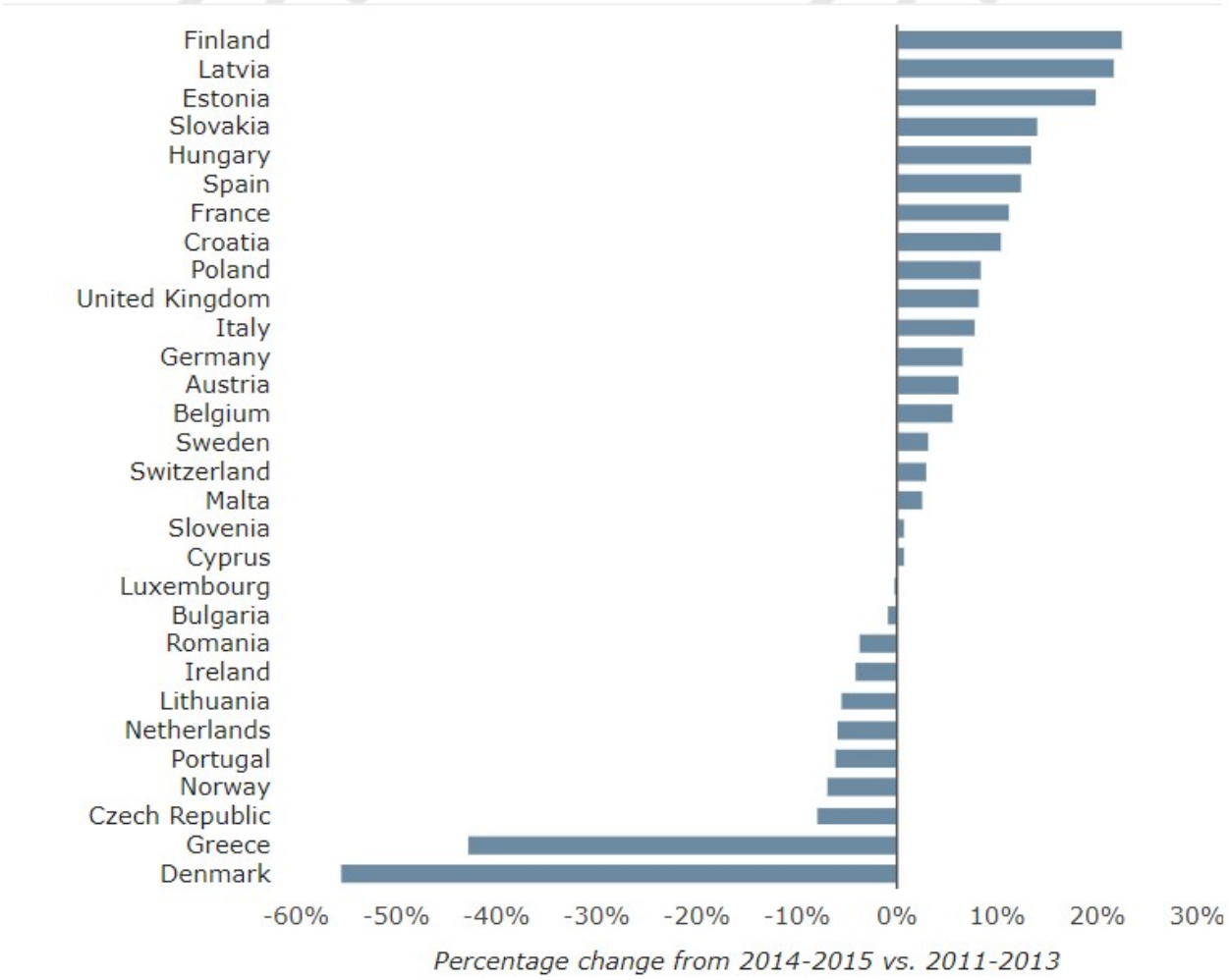

Figure 2. Percentage change in pesticide sales by country

Source: Eurostat, 2017,

Work began by mapping IPM research needs and gaps across Europe, identification of strengths and weaknesses, and future directions to tackle existing IPM challenges. Researchers identified a list of minor use needs without or insufficient solutions, and identified topics where IPM research is needed and where available IPM tools could be implemented.

IPM takes into account all available pest control methods and techniques as well as measures to discourage the spread of their population. Also, through IPM, disposal and control methods are maintained at an economically justified level, the environment, population health, and efficiency.

Most economic studies assessing the benefits of pesticides are based on a comparison of two scenarios: current use versus complete zero. These ask how much reduced pesticide use would cost farmers and the agricultural industry (Knuston, 1998)

Damage costs	China	Germany	UK	USA
1. Drinking water treatment costs	nd	104	215	1059
2. Health costs to humans (farmers, farm workers, rural residents, food consumers)	500–1300	17	2 [2]	157

3. Pollution incidents in watercourses, fish deaths, monitoring costs and revenue losses in aquaculture and fishing industries	nd	60	7	153
4. Negative effects on on- and off-farm biodiversity (fish, beneficial insects, wildlife, bees, domestic pets)	200–500	10	75	331
5. Negative effects on climate from energy costs of manufacture of pesticides	148	4	3	55
TOTALS	848–1948	195	302	1755

Table 1. Cost category framework for assessing full costs of pesticide use (million US $ per year, 2000).

The EU benefits from the world's most rigorous pesticide authorization and control system. Despite this, in our society there is a strong desire to move to production of sustainable food and to reduce or even prohibit the use of pesticides. In this context, as part of modern production systems, sustainable agriculture is one of the UN's development goals, and the promotion of sustainable use of pesticides is one of the important actions taken by the EU to support the achievement of the 2030 Agenda sustainable development of the UN.

Agricultural intensification has been possible and has evolved from the contributions of all branches of agricultural science, including crop protection. The developments in crop protection have been driven by the changing pest problems faced by the farmers, the options available to them, and their changing cash and labour requirements (Norton, 1993).

However, these developments have created other issues, like pesticide resistance, pest outbreaks and hostplant resistance breakdown. The environmental pollution and hazards have led scientists to seek more sustainable alternatives (Chadwick and Marsh, 1993). The solution proposed by modern crop protection scientists was that of integrated pest management (Zadoks, 1993).

Integrated pest management means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. 'Integrated pest management' emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms. For the control and elimination of pests one or more of the following methods are used:

1. Biological methods (natural)
2. Mechanical and physical methods
3. Chemical methods

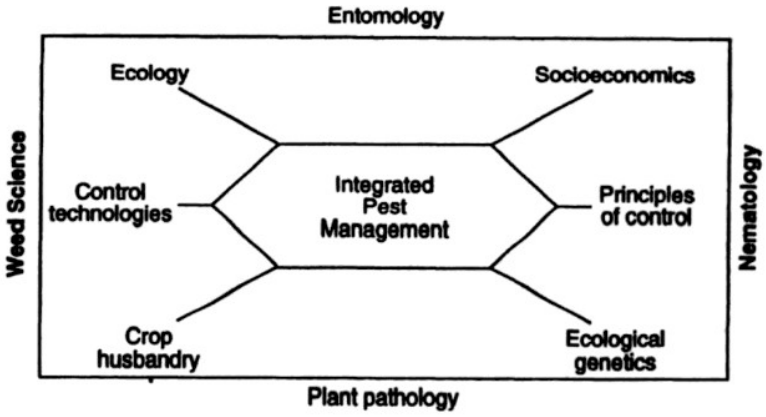

Figure 3. Plant pathology
Source: David Dent, 1995

Sustainablephysical, biologicalandother non-chemicalmethodsshouldbepreferredtochemicalonesespeciallyiftheycanalsoprovidesatisfactorypest control. As chemicalpesticides are designedtobe toxic to living organisms, are dispersed in theenvironmentand are appliedtofoodcrops, theiruseshouldonlybe a last resort; usedonlyifthere are noadequate non-chemicalalternativesandif it iseconomicallyjustified. Iftheapplication of pesticidesisforeseen, a pest management plan needstobeprepared (Fao.2017).

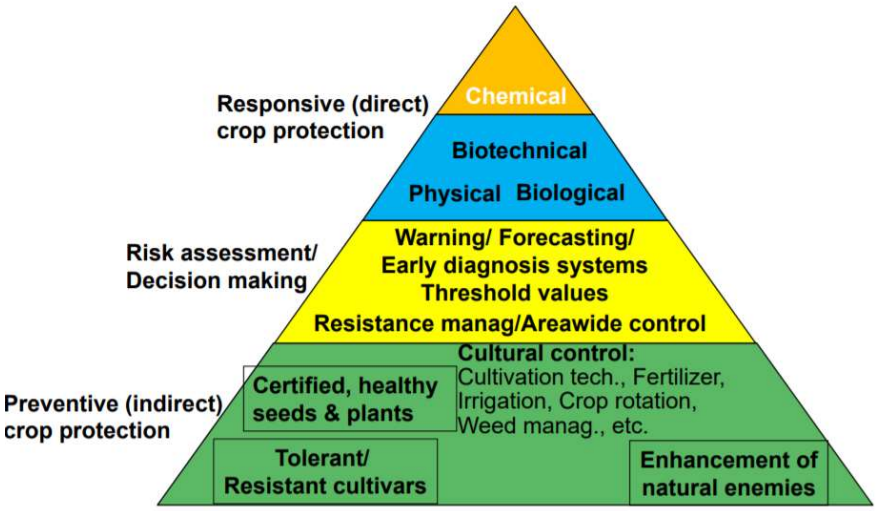

Figure 4. The visualised IPM concept
Source: Meissle et al. 2011.Pest Manag. Science,67

Significant progress in the fight against diseases, pests and weeds has been recorded over the last 50 years with the emergence of synthetic plant protection products: insecticides, fungicides and herbicides. However, shortly after these advances in the control of harmful organisms were recorded, a decrease in the effectiveness of the new control methods was observed.

Product application rates have been increased to provide the degree of initial control, but also this time product efficacy continued to decline. It was further found that the decrease in the effectiveness of plant protection products is due to the occurrence of disease and pest resistance to these chemicals. (Meissle et al. 2011)

For this reason, at the industry level, a necessity was imposed, precisely to prevent the development of resistance to plant protection products, compliance with a resistance management program. This program should also include the use of different combating methods. Thus, the integrated management program should include the use of synthetic plant protection products, biological methods, agro-technical methods, use of transgenic plants, crop rotation, and the use of resistant varieties.Since the introduction of the concept in 1959, many studies have suggested that adoption of IPM principles provides environmental, economic and health benefits (Stern et al. 1959)

Several activities to raise awareness on IPM in Europe have been organized, such as workshops to discuss the Integrated Pest Management concept, to promote regional cooperation in sustainable agricultural production and to identify the gaps in the mentioned fields in each country.The Food and Agricultural Organization of the United Nations Regional Office of for Europe and Central Asia (FAO REU) in cooperation with the SzentIstván University Gödöllő, Hungary organized the "Regional awareness rising workshop on Integrated Pest Management (IPM) in Eastern Europe" 3-5 September 2013.

Other methods for raising awareness on PMI are Farmer Field School programmes which includes an understanding of ecological pest management. Also, to assists pesticide registrars with the evaluation of pesticides, FAO developed the FAO Pesticide Registration Toolkit, a web-based decision support system for pesticide registrars in developing countries.In collaboration with the WHO, FAO sets food safety standards -Maximum Residue Limits (MRLs) in food and pesticide quality standards (specifications) to protect consumers' health and environment.

Bibliography

Chadwick, D. J., and Marsh, J. Crop protection and sustainable agriculture. New York: Wiley Interscience. 1993.

Knutson R., Penn J., Flinchbaugh B. Agricultural and Food Policy. 4th ed. Prentice Hall; Upper Saddle River, NJ, USA: 1998.

Schmitz P.M. Overview of cost-benefit assessment; Proceedings of the OECD workshop on the Economics of Pesticide Risk Reduction in Agriculture; Copenhagen, Denmark. 28–30 November 2001; Paris, France: OECD; 2001

Dent, D. *Integrated Pest Mangement,* Chapman and Hall, London, 1995.

EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1–73).

EU, 2002, Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed (OJ L 140, 30.5.2002, p. 10–22).

EU, 2005, Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC (OJ L 70, 16.3.2005, p. 1–16).

Norton, G.A. Philosophy, concepts and techniques. In: Norton, G.A. and Mumford, J.D. (eds) Decision Tools for Pest Management. CAB International, Wallingford, UK,, 1993, pp. 1–22.

Zadoks, J.C. Crop Protection: Why and how, in crop protection and sustainable agriculture, John Wiley &Sons, Chichester, 1993, p.48-60.

EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1–73).

EU, 2002, Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed (OJ L 140, 30.5.2002, p. 10–22).

EU, 2005, Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC (OJ L 70, 16.3.2005, p. 1–16).

Eurostat, 2017a, 'Pesticide sales', aei_fm_salpest09 (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=aei_fm_salpest09&lang=en)

Stern, V.M., Smith RF. *The integration of chemicalandbiological control of thespottedalfalfaaphid.*Hilgardia 29(2):81– 101, 1959.

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