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The legal changes regarding chemical protection used by amateurs, available active substances and the expected impact on the development of pest resistance in Poland

Zmiany prawne w zakresie ochrony roślin przez amatorów, dostępność substancji aktywnych i przewidywany wpływ na rozwój odporności u organizmów szkodliwych w Polsce

Ewa MATYJASZCZYK*, Joanna SOBCZAK and Magdalena SZULC

Plant Protection Institute – National Research Institute, ul. Władysława Węgorka 20; 60—318 Poznań, Poland, E.Matyjaszczyk@iorpib.poznan.pl *correspondence

Abstract

Beginning from June 2015, non-professionals will be allowed to only buy and use plant protection products bearing information on the label that they are intended for use by non-professionals. Based on the current register and derogations, the following products will be available for use by amateurs: 21 fungicides, 30 insecticides and 15 herbicides with respectively 20, 14 and 9 different active substances. Over a third of the mentioned active substances of fungicides and insecticides are classified as “high risk” in terms of probability of pest resistance development. For numerous uses only a single product is available. The area of home gardens in Poland amounts to 53.5 thousand hectares. Sales of plant protection products for use by amateurs is about 7% of the market value. The very limited availability of chemical plant protection products for non-professionals can be a serious problem if seen from the perspective of pest resistance development and dissemination. Resistant pests may also affect farms with commercial production. Poland is an important producer of a variety of fruits, vegetables and ornamental plants with a very limited availability of chemical protection. Resistance development can further reduce the practical means of pest control and became a serious economic problem.

Keywords: active substances, amateurs, availability, law, legal changes, non-professionals, pesticides, plant protection, products, resistance

Abstrakt

Od czerwca 2015 użytkownicy nieprofesjonalni będą mogli zakupić i stosować jedynie środki ochrony roślin których etykieta została opatrzona informacją, że są one przeznaczone dla użytkowników nieprofesjonalnych. Biorąc pod uwagę obecny rejestr oraz derogacje przez amatorów używanych będzie 21 fungicydów, 30 insektycydów i 15 herbicydów zawierających odpowiednio 20, 14 i 9 różnych substancji aktywnych. Ponad 1/3 wspomnianych substancji aktywnych fungicydów i insektycydów jest wysokiego ryzyka z punktu widzenia możliwości rozwoju odporności organizmów szkodliwych. Dla wielu zastosowań dostępny jest tylko jeden produkt. Powierzchnia ogrodów przydomowych w Polsce wynosi 53,5 tysięcy hektarów. Sprzedaż środków ochrony roślin przeznaczonych dla amatorów to około 7% wartości rynku. Bardzo ograniczona dostępność chemicznych środków ochrony roślin dla użytkowników nieprofesjonalnych może być poważnym problemem z perspektywy rozwoju i rozpowszechniania odporności organizmów szkodliwych. Odporne organizmy szkodliwe mogą powodować szkody w uprawach towarowych. Polska jest ważnym producentem wielu owoców, warzyw i roślin ozdobnych z bardzo ograniczoną dostępnością ochrony chemicznej. Rozwój odporności może spowodować dalsze ograniczenie możliwości ochrony przed organizmami szkodliwymi i stać się poważnym problemem gospodarczym.

Słowa kluczowe: amatorzy, dostępność, odporność, ochrona roślin, pestycydy, prawo, substancje aktywne, środki, użytkownicy nieprofesjonalni, zmiany przepisów

Introduction

The Polish market of plant protection products for amateur use constitutes in terms of value about 28 million EUR or 7% of market sales (Matyjaszczyk, 2014). Its share is therefore quite substantial. Amateurs use chemical control to protect ornamental plants at home, but also for protection of ornamental and crop plants in home gardens and on allotments and weeding of paths and pavements. The crops for human consumption produced in hobby gardens are mainly potatoes and different kind of fruits and vegetables.

Legal changes as regards the availability of plant protection products for amateurs are being currently implemented into Polish law. The changes will come into force from June 2015 and their influence on the market of agrochemicals for use by non-professionals is expected.

The aim of the paper is to establish the number of active substances for use by amateurs in Poland after June 2015 and study the possible impact on the development of resistance amongst harmful organisms.

Legal background

Currently in Poland, on the basis of the Plant Protection Act of 18 December 2003, plant protection products classified as toxic or very toxic can be purchased and used only by adults who have completed specialized training required by law and are in possession of a valid certificate. All other adults can purchase and use plant protection products classified as non-toxic.

Similar legal requirements were also previously in force, on the basis of the Plant Protection Act of 12 July 1995.

The new Polish Plant Protection Act of 8th March 2013 brought more restrictive requirements: commencing June 2015, non-professionals will only be allowed to buy products bearing information on the label that they are intended for use by non-professionals. If the product packaging does not contain any information regarding the group of users it is intended for, it will be automatically assumed that the product is intended for professional users only. Given that the process of registering plant protection products, as well as making changes on the labels of already registered products is time consuming, derogation was implemented. Products with registered uses for ornamental plants at home, home gardens or allotments can be sold legally to amateurs as the result of derogation.

According to the definition taken from Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides, the term “professional user” means any person who uses pesticides in the course of their professional activities, including operators, technicians, employers and self-employed people, both in the farming and other sectors. All other users are regarded as non-professionals or amateurs.

Material and Methods

The register of plant protection products placed on the Polish market in January 2014 was analyzed. The labels of all registered product were considered and reviewed in accordance with new legal requirements as regards the intended group of users (professional or non-professional). During the analysis of labels, all registered uses which afford amateurs the right to purchase the given product, as well as their active substances and protected crops were listed.

The results are presented in the tables 1-3. As in the resistance prevention strategy the trade name of the formulation is not relevant, only active substances along with the number of registered products were considered. The possibility of protection against the most important harmful organisms was also analyzed, although not presented in the tables.

The authors are aware that some changes on the list of plant protection products placed on the Polish market will take place before June 2015. Earlier changes in labels are also a possibility. However being familiar with the pace of the registration procedure of plant protection products, we are convinced that any radical changes as to the availability of plant protection products for use by amateurs are unlikely.

Results

Table 1. Active substances of fungicides registered for use by amateurs in Poland (January 2014)

Active substance	Chemical group	Number of registered formulations	Risk of resistance*
Aureobasidium pullulans	-	1	-
Azoxystrobin	Strobilurin	3	High risk
Chlorothalonil	Chloronitriles	1	Low risk
Boscalid	Pyridine- carboxamides	1	Medium to high risk
Cyprodinil	Anilino-pyrimidines	1	Medium risk
Dimethomorph	Cinnamic acid amides	1	Low to medium risk
Fenhexamid	Hydroxyanilides	1	Low to medium risk
Fludioxonil	Phenylpyrroles	1	Low to medium risk
Iprodione	Dicarboximides	1	Medium to high risk
Mancozeb	Dithio-carbamates	3	Low risk
Mandipropamid	Mandelic acid amides	1	Low to medium risk
Metalaxyl-M	Acylalanines	1	High risk
Metiram	Dithio-carbamates	1	Low risk
Pyraclostrobin	Metoxy-carbamates (strobilurin)	1	High risk
Pyrimethanil	Anilino-pyrimidines	1	Medium risk
Tebuconazole	Triazoles	1	Medium risk
Thiophanate-methyl	Thiophanates	2	High risk
Thiram	Dithio-carbamates	1	Low risk
Trifloxystrobin	Oximino acetates (strobilurin)	1	High risk
Triticonazole	Triazoles	2	Medium risk

Source: Personal elaboration
*Assessment of resistance risk according to:
Fungicide Resistance Action Committee 2013. FRAC list of plant pathogenic organisms resistant to disease control agents. http://www.frac.info/publication/anhang/List%20of%20resistant%20plant%20pathogenic%20organisms_February%202013%20updated.pdf (date of access: 04.04.2014)
Fungicide Resistance Action Committee 2013. FRAC Code List 2013. Fungicides sorted by mode of action. http://www.frac.info/publication/anhang/FRAC%20Code%20List%202013-update%20April-2013.pdf (date of access: 04.04.2014)

Among 1168 plant protection products placed on the Polish market in January 2014, 66 fulfill the new requirements, which means that amateurs will be allowed to purchase and use them commencing June 2015. The group consists of 21 fungicides, 30 insecticides and 15 herbicides. Each group of plant protection products was analyzed separately.

Table 1 presents the active substances of 21 fungicides that are used by amateurs. There are 20 different active substances, some of them available in more than one product. Six products contain two active substances, whereas the remaining 15 contain one active substance. An analysis of Table 1 shows that more than one third of active substances in this group was classified as “high risk” or “medium to high risk” in terms of the probability of resistance development. Moreover, (this is not shown in the table) in very many cases protection was possible with only one registered product and therefore one active substance, which makes the possibility of rotation impossible. For example, in the cases of apple protection against apple powdery mildew (trifloxystrobin), or leek against leek rust, or celery against septoria blight of celery (azoxystrobin), protection was only possible with one registered product.

Table 2. Active substances of insecticides registered for use by amateurs in Poland (January 2014)

Active substance	Chemical group	Number of registered formulations	Risk of resistance*
Acetamiprid	Neonicotinoids	5	medium
Alpha-cypermethrin	Pyrethroids	4	high
Bifenazate	Hydrazine carboxylate	1	low
Cydia Pomonella Granulosis Virus	-	1	-
Cypermethrin	Pyrethroids	1	high
Deltamethrin	Pyrethroids	2	high
Dimethoate	Organophosphates	1	high
Fenpyroximate	Phenoxypyrazoles	1	medium
Lambda-cyhalothrin	Pyrethroids	2	high
Paraffin oil	oil	1	-
Pyrethrins	Natural pyrethrins	7	medium
Spinosad	Spinosyns	1	medium
Spirodiclofen	Tetronic acid derivatives	1	low
Tiacloprid	Neonicotinoids	2	medium

Source: Personal elaboration
*Assessment of resistance risk according to:
Arthropod Pesticide Resistance Database 2014. http://www.pesticideresistance.org/search.php?page=ai (date of access: 04.04.2014)

Table 3. Active substances of herbicides registered for use by amateurs in Poland (January 2014)

Active substance	Chemical group	Number of registered formulations	Risk of resistance (own assessment*)
2,4-D	Phenoxy-carboxylic-acid	4	medium
Clopyralid	Pyridine carboxylic acid	2	medium
Dicamba	Benzoic acid	7	medium
Fluroxypyr	Pyridine carboxylic acid	2	medium
Glyphosate	Glycine	5	low
Iron sulphate (II)	inorganic	2	medium
MCPA	Phenoxy-carboxylic-acid	8	medium
mecoprop-P	Phenoxy-carboxylic-acid	2	medium
mecoprop	Phenoxy-carboxylic-acid	3	medium

Source: Personal elaboration
*Assessment of resistance risk according to:
WeedScience 2014. International Survey of Herbicide Resistant Weeds.
http://www.weedscience.org/summary/SOASummary.aspx (date of access: 04.04.2014)

In spite of the fact that insecticides are the most numerous group of plant protection products for amateur use (30 products) there are fewer active substances than in the case of fungicides – only 14 (Table 2). This follows a comparatively low diversity of insecticides in the European Union. All of the analyzed products contained 1 active substance. Similarly, as in the case of fungicides, more than one third of active substances in this group was classified as “high risk” in terms of probability of resistance development. Likewise, for many uses there is only one chemical product available and therefore no possibility of rotation to reduce the risk of resistance development. Prominent examples which illustrate the situation where only one registered insecticide containing a high risk active substance is available, is the protection of apple against aphids (lambda-cyhalotrin) and tomato against colorado beetle (delhametrin).

Table 3 presents the active substances of 15 herbicides used by amateurs. Herbicides are the least numerous group of plant protection products for amateur use and the number of active substances – 9 – is also lower than in case of insecticides and fungicides. Only 5 herbicides for amateur use contain 1 active substance, there are also 2 products with 2 active substances, 6 with 3 active substances and 2 with 4 active substances. The average number of active substances per product is therefore much higher than in case fungicides and insecticides. None of the active substances listed in Table 3 is very prone for resistance induction. It is worth pointing out that the combining of active substances with different modes of action in one product is a resistance prevention tool in itself. Therefore, in the case of herbicides for amateur

use, there is the least probability of resistance induction in comparison to other products for amateurs.

Discussion

The problem of comparatively low availability and diversity of plant protection products for ornamental and crop plants protection to be used in Poland by non-professionals can be regarded as minor. Indeed, damage of ornamental plants or insufficient quantity or quality of yield of apple or carrot can be a source of disappointment for the owner of the garden, but is unlikely to have a significant effect on the economic situation of their family.

However, seen from the perspective of resistance management, in the authors' opinion, this issue is far from minor. Resistance of harmful organisms for chemical plant protection products is a growing problem in agriculture (Clarke at al., 1997, Metcalf, 1989, Zamojska and Malinowski, 2012, Renton at al., 2014). International orgnisations, such as European and Medditeranean Plant Protection Organisation recognize this problem and carry out multiple activities on resistance to plant protection products (EPPO 2014). The very limited availability of insecticides is a definite concern (Węgorek at al., 2011), but in Polish conditions the resistance against herbicides is the major economic problem, following the scale of use (Adamczewski, 2014).

When the crop in a kitchen garden is damaged and no chemical protection was used, it is usually only the private concern of the garden's owner. This situation takes on another dynamic when the chemical products available for amateurs are used regularly, and after some time of using such protection there appears a sudden resistance and lack of efficacy. In this scenario the effect may also be felt by neighboring farms with commercial production. The active substances for amateur protection are also used in professional production even if the products bear different trade names. All organisms tend to propagate and migrate, and the ones which managed to develop resistance against some agrochemicals can be more competitive and spread easier than the others and consequently can contribute to the increase of crop damages (Węgorek, 2007).

Poland is an important producer of many fruits, vegetables, potatoes and ornamental plants (Statistical Yearbook of Agriculture, 2013) but the chemical means of protection of these crops are very limited (Matyjaszczyk, 2012, Sobczak, 2013). The development of resistance, even against the partial percentage of available active substances can seriously affect profitability and possibility of commercial production, and therefore influence the economic situations of numerous small farms for which this production is either the only or an important source of income (Matyjaszczyk, 2013).

The area of home gardens in Poland amounts to 53,5 thousand hectares (Statistical Yearbook of the Republic of Poland, 2013) distributed more or less evenly over the

area of the whole country. It may be rationally expected that many of these gardens are located in proximity of the commercial orchards and vegetable or ornamental plants growing areas and migration of different living organisms – amongst them resistant types of crop pests – in different directions is likely to take place.

The very limited, availability of chemical plant protection products registered for use by non-professionals can be a serious problem if seen from the perspective of pest resistance development and dissemination. Analysis performed in this paper shows that upon consideration the properties of active substances, rotation possibilities and known cases of resistance occurrence it is likely that resistance of insect pests and disease agents could be induced in amateur gardens.

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