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Zakład Ekspertyz i Opinii o Środkach Ochrony Roślin  
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**Placing plant protection products on the Polish market  
with regard to the registration of individual formulations**

Dopuszczanie środków ochrony roślin do obrotu i stosowania w Polsce  
w aspekcie rejestracji poszczególnych form użytkowych

**Summary.** The aim of the work was the analysis of formulation of plant protection products placed on the Polish market and withdrawn from use in the period 1.05.2004–30.04.2007, i.e. during the first three years of EU accession.

As a result of the review it was found that in the analyzed period a radical withdrawal of products introduced on the market of a particular formulation did not take place. However, a tendency to limit the number of formulations regarded as less safe and an increase in the number of formulations regarded as more environmentally friendly or facilitating application was noticeable.

**Key words:** plant protection products; registration of formulations in Poland

INTRODUCTION

The regulations of the European Union concerning agriculture and plant protection aim to ensure the safety of both people and the environment. The EU law concerning environmental protection consists of about 70 directives, which have been changed and supplemented many times, as well as 21 regulations [Herma 2004]. The rules of the European Union regarding plant protection should ensure that in agriculture only the agrochemicals, which are thoroughly studied and fulfil the high EU requirements regarding safety, are used.

The main EU legal act regarding placing plant protection products on the market is the Directive 91/414 [Council Directive 1991]. On the basis of the requirements of the Directive 91/414 EU carries out a review of active substances used in plant protection products to ensure that they are safe for people, animals and the environment. Active substances can be withdrawn from use in plant protection in the territory of the European Union for two reasons:

- 1) the producer is not able to prove that it is safe for the environment

2) the producer has not supported the substance through the review process.

To perform the review the active substances of plant protection products used in EU were divided into four groups and are reviewed in turn. Until October 2007 the review of two first groups had been finished: in the first group 59 (out of 90) active substances were allowed for use in plant protection and in the second, 31 (out of 148). It means that 148 out of 238 active substances were withdrawn from use in plant protection as a result of the review of two first groups. It also means that as a result of the review numerous plant protection products are withdrawn from use in EU countries and that in most member states the number of plant protection products placed on the market is gradually decreasing.

## RESULTS AND DISCUSSION

The influence of agrochemicals on the environment depends not only on their chemical composition, but also on crop protection techniques and physical forms (so called formulations). The main component of the plant protection products used in agriculture is the active substance. The active substance is the main factor which eliminates harmful organisms. Apart from this, plant protection products also contain other components (liquid or solid). Their aim is to give the active substance desirable physicochemical features, to increase safety of application, to facilitate application, and in some cases also to increase the toxic effect on agrophages. The mixture of the active substance with the other components of plant protection products is called the formulation [Pruszyński and Podgórska 1994].

According to Polish law, it is obligatory that the trade name of the plant protection product must contain the formulation code. The list of formulations of plant protection products used in Poland with codes and short descriptions is given in the Ministry of Agriculture and Rural Development's regulation of the 8th of June 2004 [Rozporządzenie... 2004].

The following formulations of plant protection products are used most frequently in Poland [Wachowiak 2006]:

- powders for dry seed treatment – DS,
- water dispersible powders for slurry seed treatment – WS,
- suspension concentrate for seed treatment – FS,
- solutions for seed treatment – LS,
- emulsions for seed treatment – ES,
- emulsifiable concentrate – EC,
- aqueous suspension concentrates – SC,
- soluble concentrates – SL,
- emulsions: water in oil – EO,
- oil in water – EW,
- capsule suspension – CS,
- suspo-emulsion – SE,
- water dispersible granules – WG,
- soluble granules – SG,
- wettable powders – WP,
- water soluble powders – SP,
- granules – GR.

The formulation of a given plant protection product is closely connected with the method of its application and it influences not only the efficacy but also the effect on the environment. For example, free-flowing powdered forms of plant protection products to apply by dusting (dustable powders – DP) which were commonly used some time ago are prone to drifting due to the wind, settling on objects and crops that are not the target of application – in this way they may pose a hazard. Therefore, at present this formulation has been almost completely withdrawn from use. The formulations regarded as modern are microcapsules, microemulsions and suspoemulsions, concentrated suspensions, different forms of granulates and forms facilitating preparation of spraying liquid such as water soluble bags. Using granules limits wind-drift during the preparation of spraying liquids when compared to traditional forms of suspensions. There are opinions that a tendency to eliminate solvents from the group of aromatic hydrocarbons (formulation EC) and replacing them with biodegradable products of plant origin (EO, EW) is noticeable [Siłowiecki 2007]. At present, in proposed changes to the European Union regulations regarding plant protection products, there is a tendency to reduce the number of air applications where possible – the main reason is also the wind-drift of plant protection products.

The analysis of data regarding the placement and withdrawal of plant protection products on the Polish market in the first three years of our EU membership (1.05.2004 – 30.04.2007) can provide us with information about current trends in registration formulations of plant protection products in Poland.

Prior to performing an analysis of registered and withdrawn formulations, the most important facts regarding registration of plant protection products in Poland after accession should be presented. The main act which implements the requirements of the Directive 91/414 to the Polish law is the Plant Protection Act of 18<sup>th</sup> of December 2003 [Ustawa 2003]. Because of high requirements regarding safety of the environment, numerous active substances as a result of the above mentioned review of active substances are being withdrawn from the EU market, as well as the active substances for which the necessary studies have not been performed (so their safety has not been proven). Therefore, in the European Union the number of active substances allowed for use in plant protection is decreasing. This is accompanied by a decrease in the number of registered plant protection products in most member states (including Poland).

In Poland, the withdrawal of plant protection products from the market as an effect of the continuous reduction in the number of approved active substances is accompanied by delays in registration. The main reason for delays is probably the fact that new procedures introduced in Poland after EU accession are still not working efficiently enough. As an effect, a decrease in the number of plant protection products placed on the market can be observed in Poland. During the first three years of EU membership this decrease came to 8.5% and at the end of the analyzed period – the 30th of April 2007 – the number of products placed on the market amounted to 821 [Wykaz... 2007].

It should be stressed that for the analysis performed in this paper, only plant protection products with a formulation code were considered. According to the legal requirements in Poland, all trade names of plant protection products should include the formulation code. However, there are a few rare cases when it is not possible – for example when the registered product is a packet containing two different plant protection products with different formulation codes.

Table 1 shows the formulations and number of products placed on the Polish market or withdrawn from the Polish market during the first three years of EU membership.

Before performing a more indepth analysis of the data in Table 1 it should be emphasized that because of the fact that in recent years the products withdrawn outnumbered those newly registered, the higher number of withdrawn products with a given formulation code in comparison with the products newly registered does not always show the tendency of withdrawing these formulations from the market. Moreover, some formulations are used more often than others. This is also reflected in Table 1 (as well as among the products registered and those withdrawn).

Table 1. Formulations of plant protection products placed on the Polish market\* and withdrawn in the period 1.05.2004 – 30.04.2007

Tabela 1. Formy użytkowe środków ochrony roślin dopuszczonych\* i wycofanych z obrotu i stosowania w Polsce w okresie 1.05.2004 – 30.04.2007

| Formulation code<br>Kod formy użytkowej | Formulation<br>Forma użytkowa  | Number of plant protection products withdrawn<br>Liczba środków ochrony roślin wycofanych | Number of plant protection products placed on the market*<br>Liczba środków ochrony roślin dopuszczonych do obrotu* |
|---|--|---|---|
| 1                                       | 2  | 3   | 4   |
| AE                                      | aerosol dispenser<br>dyspenser aerozolowy                                    | 4   | -   |
| AL                                      | liquid to be applied undiluted<br>ciecz w stanie nierozcieńczonym            | 7   | 4   |
| CG                                      | capsulated granules<br>granulaty w kapsułkach                                | 1   | -   |
| CS                                      | aqueous capsule suspension<br>wodna zawiesina w kapsułkach                   | 1   | 4   |
| DC                                      | dispersible concentrate<br>koncentrat dyspergujący                           | 1   | -   |
| DS                                      | powder for dry seed treatment<br>proszek do stosowania w stanie suchym       | 2   | 1   |
| EC                                      | emulsifiable concentrate<br>koncentrat do sporządzania emulsji wodnej        | 36  | 27  |
| EO                                      | emulsion: water in oil<br>emulsja: woda w oleju                              | -   | 1   |
| EW                                      | emulsion: oil in water<br>emulsja: olej w wodzie                             | 4   | 4   |
| ES                                      | emulsion for seed treatment<br>emulsja do zaprawiania nasion                 | 1   | -   |
| FK                                      | smoke candle<br>świeca dymna   | 2   | -   |
| FS                                      | suspension concentrate for seed treatment<br>zawiesina do zaprawiania nasion | 1   | 9   |

Table 1 continued – cd. tab. 1

| 1               | 2  | 3   | 4   |
|-----------------|--|-----|-----|
| FU              | smoke generator<br>generator dymu  | -   | 1   |
| GB              | granulated bait<br>przynęta granulowana                                    | -   | 1   |
| HN              | hot fogging concentrate<br>koncentrat do zamgławiania na<br>gorąco         | 1   | -   |
| LA              | lacquer – lakier   | -   | 1   |
| OD              | oil suspension<br>zawiesina oleju  | -   | 2   |
| PA              | paste<br>pasta   | 2   | 4   |
| PC              | gel or paste concentrate<br>żel lub koncentrat pasty                       | 1   | 1   |
| PR              | plant rodlet<br>pręt roślinny  | 1   | -   |
| PS              | seed coated with a pesticide<br>nasiona pokryte środkiem ochrony<br>roślin | -   | 1   |
| SC              | aqueous suspension concentrate<br>koncentrat wodnej zawiesiny              | 31  | 28  |
| SE              | aqueous suspo-emulsions<br>zawiesinoemulsja                                | 1   | 2   |
| SG              | soluble granules<br>granule rozpuszczalne w wodzie                         | 3   | -   |
| SL              | soluble concentrate<br>koncentrat rozpuszczalny w wodzie                   | 27  | 11  |
| SP              | water soluble powder<br>proszek rozpuszczalny w wodzie                     | 3   | -   |
| WG              | water dispersible granules<br>granulat do sporządzania zawiesiny<br>wodnej | 7   | 13  |
| WP              | wettable powders<br>proszek do sporządzania zawiesiny<br>wodnej            | 28  | 6   |
| XX              | Others – Inne  | -   | 7   |
| Total – Łącznie |  | 165 | 128 |

\* Including the products re-registered/ Wraz ze środkami ponownie zarejestrowanymi  
Source: Personal elaboration of data from the Ministry of Agriculture and Rural Development

While analyzing Table 1 we can observe that among both products withdrawn and registered, there is a clear domination of some types of formulations. There are also a number of formulations for which only a few products were registered or withdrawn. The most common formulations are intended to produce spraying liquid. Therefore, their popularity follows the fact that spraying is the most often used method of plant protection products application.

Among the products withdrawn, emulsifiable concentrates, aqueous suspension concentrates, wettable powders and soluble concentrates dominated. Less numerous was the withdrawal of formulations of water dispersible granules, liquids to be applied undiluted, aerosol dispensers, emulsions: oil in water, soluble granules and water soluble powders. For the other formulations one or two products at the most were withdrawn.

Among the products registered (or re-registered) the formulations of aqueous suspension concentrate and emulsifiable concentrate dominated – similar results were also noted among products withdrawn. Significantly less numerous than among products withdrawn were formulations of wettable powders and soluble concentrates. Significantly more numerous were suspension concentrates for seed treatment, water dispersible granules, aqueous capsule suspensions and preparations with the formulation code XX – others.

The data given above confirm the tendency to register plant protection products in the formulations considered to be safe like granulates and capsules. Likewise, the data confirm the tendency to withdraw powders (like wettable powders or water soluble powders) which due to drifting (e.g. while preparing the mixture with water) can negatively influence the health of persons preparing the spraying liquid. We should call attention to the fact that the most significant cause of cases of professional poisoning in agriculture is the drift of powder during preparation of a spraying liquid [Ilnicki 2004].

The tendency mentioned in literature to eliminate the products in the form of emulsifiable concentrate (EC) and replacing them with emulsions of water in oil (EO) and oil in water (EW) was, however, in last three years not strong in Poland. The number of products with the EC formulation withdrawn was higher than those newly registered. However, the main reason was probably the fact that the products withdrawn outnumbered those newly registered. There was the same number of products with the EO formulation registered as withdrawn (4 products), while in the case of products with the EW formulation, there was only one product registered (0 withdrawn). Therefore, among the formulations registered, emulsifiable concentrates (27) significantly outnumbered EO and EW formulations (5).

#### CONCLUSIONS

In this article, on the basis of a review of formulations placed on the market and withdrawn from use in Poland during the first three years of EU membership, it may be stated that in the analyzed period a radical withdrawal or placement on the market of products of a particular formulation did not take place. However, the tendency to limit the number of formulations regarded as less safe (e.g. powders) and increase in the number of formulations regarded as more environmentally friendly or facilitating application (e.g. granulates or capsules) was noticeable. This tendency is positive.

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**Streszczenie.** Celem pracy było przeprowadzenie analizy form użytkowych środków ochrony roślin dopuszczonych do obrotu i stosowania w Polsce i wycofanych ze stosowania w okresie 1.05.2004–30.04.2007, to jest w okresie pierwszych trzech lat po przystąpieniu do Unii Europejskiej. W rezultacie przeglądu stwierdzono, że w analizowanym okresie nie zaobserwowano gwałtownego wycofywania ani dopuszczania do obrotu dużych grup środków o poszczególnych formach użytkowych. Jednakże zauważalna była tendencja polegająca na zmniejszaniu liczby zarejestrowanych środków o formach użytkowych uznawanych za mniej bezpieczne i wzroście liczby form użytkowych uznawanych za bardziej przyjazne środowisku lub ułatwiające aplikację.

**Słowa kluczowe:** środki ochrony roślin, rejestracja form użytkowych w Polsce