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SCIENTIFIC PAPER

IMPORTANCE OF THE GENERIC SEGMENT OF THYE PLANT PROTECTION PRODUCTS – THE CASE OF THE POLISH MARKET

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Abstract: *Authors present results of the analysis of developments in the plant protection products industry, with a focus on its generic part. Authors concentrate on long-term changes of prices, volumes and values of generic pesticides launched into the market. There were two strategic groups of producers identified: research and development (R&D) and generic. The analyses conducted prove that there is a relationship between the amount of generic products on the market and their prices. It is also clear that the number of competitors significantly influences the speed and range of price erosion. Used as examples generic plant protection products were placed on the market with an average price 15% lower comparing to branded pesticides.*

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INTRODUCTION

Plant protection products belong to important land productivity factors protecting yields and ensuring efficiency of other inputs, mainly fertilizers. The use of plant protection products minimalizes a threat of a decline in efficiency of other inputs in agricultural production and increases profitability of crop production [KUCEWICZ, 2011].

Application of pesticides is regulated in the EU by the Directive 1107/2009 from the 21st October 2009 concerning the placing of plant protection products on the market [DIRECTIVE, 2009] and repealing Council Regulation No 79/117/EWG and 91/414/EWG. The regulation provides the definition of pesticides and indicates the range of their use. According to this regulation pesticides are defined as "products, in the form in which they are supplied to the user, consisting of or containing active substances, safeners or synergists, and intended for one of the following uses" :

- protecting plants or plant products against all harmful organisms or preventing the action of such organisms, unless the main purpose of these products is considered to be for reasons of hygiene rather than for the protection of plants or plant products;
- influencing the life processes of plants, such as substances influencing their growth, other than as a nutrient;
- preserving plant products, in so far as such substances or products are not subject to special Community provisions on preservatives;
- destroying undesired plants or parts of plants, except algae unless the products are applied on soil or water to protect plants;
- checking or preventing undesired growth of plants, except algae unless the products are applied on soil or water to protect plants [REGULATION (EC), 2009].

The present European plant protection market is strongly influenced by three major forces:

- increasing demand for food in the global scale and thus need to protect yields; ,
- globalization, making market transparent and open for all participants, that creates chances also for new entrants, mainly from China and India,
- regulatory activity of the EU Commission which implements complex rules, greatly because of potentially harmful impact of pesticides on human's and animal's health as well as on the abiotic environment, especially water and soil.

Strong regulations result with lasting long products development, including time needed for receiving an official approval, and high investments costs [HARTNELL, 1996]. However, despite all risks related to sales and disturbances caused by strong ecological, anti-pesticide lobbies the industry is still highly profitable.

In the pesticides industry two strategic groups of producers may be distinguished:

- producers developing new, original brand-name products based on own research and development activities;
- producers of generic pesticides that manufacture equivalents of branded products.

The first group is characterized by a wide range of research programs and high budgets for developing new active substances. They are large scale producers, active on the global scale in different market segments what allows them to maximize returns on their investments. The biggest international companies such as Bayer, BASF, Syngenta, Dow, Du Pont, Monsanto belong to this group. Producers that belong to the second group (e.g. Adama, UPL, Nufarm, Sipcam and Polish producers such as CIECH – Sarzyna, Synthos, Pestila, Chemirol, Invigo) do not conduct their own research, but simply copy technologies developed earlier by the originators.

Innovative plant protection product meets a new need or an old need with the use of new active substance (biological active), new formula or a new method of use. They bring into agricultural practice an unknown aspect. Usually they are subject to the patent protection[1].

It is more difficult to define generic products. Their description appears in the literature [THORNHILL and WHITE, 2007: p.553, BASS et al., 2005 P:556, ZAJAC and SHORTELL, 1989: p.413] mainly in relation to pharmaceuticals. In the English dictionary the following definition can be found: *generic – not protected by trademark*, *generic - applicable to an entire class or group*. The word "generic" generally appears in the context of medicines as a generic drug, imitative, imitation. Generic *drug,* is considered "a substitute for the original product with the same chemical composition and the same effect" [PETRUSEWICZ, 2010].

The term *generic* applies also to pesticides. By analogy to the pharmaceutical market, it relates to products, which:

do not have the patent protection,

are produced without a licence and other exclusive rights by firms, which did not patent them, did not elaborate them and did not invent them,

contain the same biological active substance like original products, however, from a different source,

have the same or very similar chemical composition (similar auxiliary substances and solvents),

may be used alternatively with the original product.

RYAN [2002, p.35] is quoting HICKS (1994), who probably in the simplest way defines generic pesticide "as one which is manufactured by a company other than the original manufacturer", whilst a generic manufacturer is, "a company, or division of a company, whose major activity consists of manufacturing the active substances of pesticides, the patents for which have expired, and for which it did not hold the original patents". Generic products are often described as non-branded, generics, imitations or equivalents. The number of equivalents of original plant protection product ranges from one to eight. It depends on the time elapsed since the expiry of patent protection and other protected data, margin of the product, biological efficiency of an active substance, size of the segment, the crop and level of intensity of its cultivation [STAJSZCZAK, 2015].

The most important differences between original products and generics are presented in *Table 1.* The consequence of the differences is the perception of products by marketers and farmers.

Table 1. Comparison of an original product (from the company that patented it) with a generic product

Characteristics	Original product	Generic product
Producer	Company with R&D activities that develop new substance	One of many generic companies
Biological active substance	Research team's results	Reproduced on the basis of the original product
Patent	Declared to the patenting process	Product is developed after the expiry of patent protection
Production period	Produced in the period of patent protection and then terminated	Produced after the expiry of patent protection of the original product
Price strategy	Depends on the stage of life cycle of the product, all price strategies applicable	Lower prices
Distribution strategy	Push and pull	Push
Expenses on adver-tisement and promotion	High	Limited or none
Name of the product	Different strategies, usually developing the brand	Often called "umbrella" e.g. Rathiopharm

Source: Stajszczak A., (2012).

Sometimes generic pesticides are treated as "counterfeit" products, which is, however, not appropriate. The most important differences between generics and counterfeits are presented in *Table 2*.

1 The patent protection is valid 20 years for the revealed molecule and after that period "the invention is free to be exploited by the public" [Timmermann 2015].. In the EU the Supplementary Protection Certificate (SPC) was introduced that "in effect extends the period of protection initially conferred by a patent to compensate for some of the patent life lost while obtaining marketing approval" [Hartnell 1996, p. 391].

Table 2. Comparison of generic products with counterfeits

Characteristics	Generics	Counterfeits
Place of production	Well-known and registered	Unknown
Compliance with the period of patent protection	Company obeys the patent rights	Company breaks the patent rights regarding technology of production, product itself, packages, logo
Main countries of origin	China, India, Israel and others	China
Quality and norms	Obeyed and controlled	No control
Trade mark	Their own	Falsified
Placing to the market	Legally through general selling network	Illegally, often without invoices or with falsified invoices
Distribution	Like in the case of branded products	Often through legally operating distribution firms
Similarity of labelling to the brand	Depends on strategy. Often attempted to make it similar to the name and logo of the branded product	As close as possible, making an exact copy of an etiquette, packages
Publicity measures	Limited or none	None
Price in the comparison with the brand product	5-35% lower	10-80% lower

Source: Stajszczak A., (2012).

The distinctions above gets a special meaning because of the protection from the Intellectual Property Rights. The Europol estimates, however, scale of trade with falsified pesticides for a 10% of the value of the European market [www.farmer.pl 03-12-2012].

The basic aim of this article is to show relations between the number of generic companies, which bring in the same technical products and the speed and depth of the erosion of prices of pesticides. Moreover, the authors analyze differences between prices of generic products and prices of original, branded pesticides as well as the change in the value of the market in a specific period due to the reduced prices.

The research hypotheses formulated by authors are: (1). There is a relationship between the amount of generic products on the market and their prices. (2) The number of competitors influences the speed and range of price erosion.

It should be emphasized that the picture of the pesticide industry is more complex than it is possible to describe in this short paper. That is why authors make consciously some simplifications in presenting processes and phenomena that characterize developments in the industry.

MATERIALS AND METHODS

The analyses are based on the primary and secondary data collected by the authors. The basic source of data were price lists of the companies. In addition, analyses were supported by information received from interviews with traders of pesticides.

In the paper four original products for which the period of patent protection has expired and which have equivalents registered as generics have been analyzed.

Prices of analyzed pesticides were collected from price lists of selected companies which have a permission to sell their products to the Polish market: Adama, Barclay, Ciech-Sarzyna, Chemirol, Globachem, Helm, Nufarm, Rotam, Sharda. The price lists for each year contain February-May prices from 8 wholesalers.

The following products were considered in the analysis: *tebuconazol, tribenuron, fluroxypyr, nicosulfuron and trinexapac*. Their possible use and importance in crop protection is presented in *Table 1.*

Table 1. Pesticides considered in the analysis

Product	Group	Use in crops	Importance in crop protection
Tebuconazol 250 EW	Fungicide	rapeseed, cereals, apple trees, cherry trees	utmost
Tribenuron 75 WG	Herbicide	winter and spring cereals	medium
Fluroxypyr 200 EC	Herbicide	winter cereals	medium
Nicosulfuron 40 S.C.	Herbicide	corn	great
Trinexapac 250 EC	Growth regulator	winter and spring cereals	utmost

Source: Own analysis based on Oliver R.P., Hewitt H.G. (2012)

The size of the market was determined every year on the basis of 15 face-to-face interviews with representatives of the key players on the pesticides market and the use of available secondary data.

RESULTS AND DISCUSSION

From the marketing point of view, original producers and generic companies offer the same basic product and the same basic benefits for the users. They satisfy the same needs on the level of a physical product (functional), but referring to motivations and values, they provide different psychophysical (symbolic) properties of the product. Many users believe that innovative products are more efficient. From generic products buyers expect a lower price. The original products give the farmers a sense of security and generics give them the feeling of a maximum thrift [STAJSZCZAK, 2011].

This phenomenon should be taken into account in the generic product management. Existing specialized literature provides analyses of marketing activities in the pharmaceutical industry, from which generic products originated. There is much less publications on marketing pesticides. Most of the information about strategies and marketing activities of the agrochemical companies may found in not public, own internal documents or reports of consulting companies.

From the perspective of strategic analysis pesticides

industry is in the stage of maturity. However, in recent years still the evident growth of the global pesticides market may be observed, also in the regions of relatively intensive agriculture such as Europe and North America (*Table 3).*

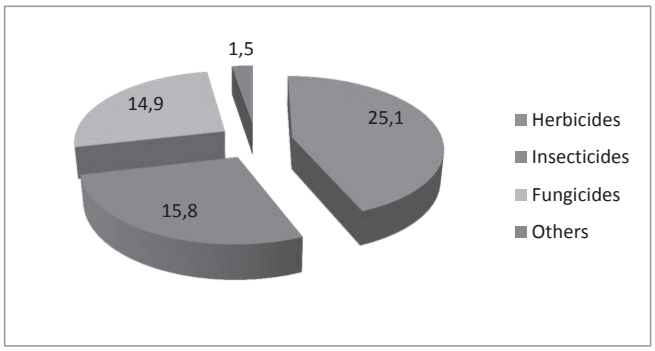
Table 3. Development of global pesticides market divided by regions in billion USD (value in nominal producers prices)

Region	2010	2011	2012	2013
Asia	12,8	14,8	15,2	16,4
Latin America	9,7	11,4	12,6	14,1
Europe	11,2	12,7	13,1	14,1
North America	7,4	7,9	8,5	9,7
Others	2,0	2,4	2,5	2,6
Total	43,5	49,4	52,2	57,2

Source: http://www.slideshare.net/prkonceptanalytics/global-crop-protection-pesticides-market-report-2013-edition-concept-analytics. read day: 22.04.2016.

In the production structure herbicides have a dominant share, followed by almost equal shares of insecticides and fungicides *(Figure 1).*

Figure 1. Share of different categories of pesticides in the global market of plant protection products in 2013 (billion USD)



Source: http://www.marketsandmarkets.com/PressReleases/crop-protection.asp, read on April 22, 2016.

The industry is characterized by a high level of concentration. In the global market there is about 20 global active companies in the product developing and registration process as presented in Table 4.

Table 4. Global sales of main companies in 2010

	Company	Country	Segment	Sales 2010 in bln USD	Market share %
1	Syngenta	Switzer-land	R & D	8,5	19,5%
2	Bayer	Germany	R & D	8,3	19,1%
3	BASF	Germany	R & D	5,1	11,7%
4	Dow	USA	R & D	3,9	9,0%
5	Monsanto	USA	R & D	3,5	8,0%
6	DuPont	USA	R & D	2,9	6,7%
7	Makhteshim - Agan	Israel	Generic	2,0	4,6%
8	Nufarm	Australia	Generic	1,8	4,1%
9	Sumitomo Chem.	Japan	R & D	1,4	3,2%
10	Arysta	Japan	Generic	1,1	2,5%
11	FMC	USA	R & D	1,1	2,5%
12		Others		3,9	9,1%

Source: www.phillipsmcdougall, Agrow World Crop Protection News, August 2010

The four largest companies have a 60% market share and the eight largest hold 82% of the market. There is still, however a space for likely mergers and acquisitions. The largest R&D companies are registered in Europe, and next three, considering their market share, are registered in the United States. The latest news inform, however, about an agreed all stock merger of equals of Du Pont with Dow[2] and expected to be finalized by the end of 2016 the ChemChina's $44bn takeover of the Syngenta. [3]

The largest generic company is Makhteshim - Agan from Israel, for some years controlled by the Chinese capital.

In the effect, the pesticides industry meets criteria of an oligopolistic structure, because:

- there are strong entry barriers, mainly due to a long period of product's development and its registration;
- products are mostly homogeneous, that means they are based on the same or very similar active substances, formulations and the way of use,
- distribution channels and competitors have a good knowledge about prices and terms offered by producers. Therefore, any significant decision taken by one of the players causes reactions of the other competitors.

Importance of generics in the pesticides market

The limited financial resources of farmers should be spent as efficiently as possible. One of the solutions might be the use of generic (imitative) preparations for protecting crops. However, in many discussions problem of quality of generic products and their efficiency in the comparison with the original products is brought up. It is a common view among farmers that generic products are worse that the original ones [CASE, 2010]. However, there is a lack of awareness that the registration requirements impose on the generic products the requirement of the active substance identity with the substance of the original product, thus quality of the generic cannot be worse than quality of the branded product. Generic products should have the quality, efficiency and safety of use of original pesticides.

2 http://www.dow.com/en-us/news/press-releases/dupont-and-dow-to-combine-in-merger-of-equals

3 https://www.syngenta-growth.com/en/home/

Due to lower prices, however, generic products become more and more popular in the global scale. Over past twenty years the share of generic products in the whole agrochemical market has increased from 20% in 2000 to 30% in 2012. Estimates on the share of generic pesticides in the market of plant protection products in selected countries are presented in table 5.

Table 5. Estimated share of generic pesticides in selected countries in 2012 – 2014

Market	% of the generic segment
USA	32%
France	30%
Germany	20%
Poland	35%-40%
Brazil	40%
China	72 %
India	60%
Great Britain	40%
Average	35%

Source: Author's own analysis on the basis of interviews with traders of the Helm Company in various countries

The share of generic pesticides in less developed countries (e.g. China, India, Brazil) is noticeably higher, although significant also in other countries (e.g. Great Britain, Poland, USA). Generic products may be an important factor in lowering costs of agricultural production and thus, becoming more accessible, contributing to an increase of productivity of agricultural land [NORWOOD et al., 2015].

The importance of generics is growing in the whole industry largely due to the increasing number of products without the patent protection, slower pace of introducing new active ingredients because of limited investments in research and development, as well as due to a pressure from buyers on reducing costs of pesticides.

Influence of generics on prices of pesticides with the use of selected examples.

Responding to the intensity of competition and constant changes in the macroeconomic environment and market conditions companies forming the pesticide industry show different market behaviours, e.g. regarding investments to improve market position, development of innovations, strengthening cooperation or choosing specific pricing strategies. The strongest reaction of the competitors usually takes place when competition is weak, products are similar and all buyers are well orientated in the market situation. This is the case of the pesticides industry, which can be characterized as an oligopolistic structure strongly protected by high entry barriers associated with legislation. Products are very similar or even identical chemical-wise and use-wise, the buyers, namely distributors and farmers are professionals and know characteristics of, not only products, but also their specific ingredients (active substances). Companies in this industry can pursue different pricing policies. Usually there are homogenous in the strategic groups and they differ from each other among the groups [STAJSZCZAK, 2015].

The existence of companies offering generic products at relatively low prices has a significant influence on pricing policies of all producers and, in a consequence on the levels and trends of price changes of specific pesticides in a longer period.

Table 7. Price and value changes of the tebuconazol's products market in the formulation of 250 EW in 2003-2015.

Tebuconazol 250 EW	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Number of generic producers	1	1	2	4	5	5	6	7	7	7	7	8	8
Price of the R&D product in PLN	106,0	106,0	95,0	87,0	82,4	67,5	61,6	59,8	56,7	54,1	54,1	50,3	50,3
Average price of the generic product in PLN	80,0	80,0	70,0	60,0	58,0	45,0	46,0	43,0	42,0	41,0	41,0	39,0	39,0
Difference in prices of generic and R&D products	-33%	-33%	-36%	-45%	-42%	-50%	-34%	-39%	-35%	-32%	-32%	-29%	-29%
Value of R&D segment in mln PLN	14,4	14,4	6,6	6,6	6,0	4,5	3,1	3,1	2,9	2,4	2,4	2,2	1,6
Value of ge-neric segment in mln PLN	2,4	4,8	7,0	12,0	20,9	25,2	36,8	43,0	50,4	57,4	63,6	60,5	60,5
Total value of tebuconazol 250 EW in mln PLN	17	19	14	19	27	30	40	46	53	60	66	63	62
Changes of the market's value of Tebuconazol 250 EW 2003=100%	100%	114%	81%	111%	160%	177%	238%	274%	317%	356%	393%	373%	370%
Share of gene-ric product in the total value of sales [%]	15,3	24,2	52,9	65,3	77,8	85,0	92,3	93,3	94,5	96,0	96,4	96,5	97,4

Source: Own analysis

Table 8. Price and value changes of the market of tribenuron's market in the formulation of 75 WG in 2006 – 2015

Tribenuron 75 WG	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of generic producers	1	1	1	1	1	1	1	2	3	3
Price of the product R&D in PLN	1887	1612	1612	1612	1656	1621	1575	1330	1254	1233
Average price of the generic product in PLN	1700	1300	1300	1300	1440	1340	1250	1000	950	920
Percentage difference of prices between generic to the R&D product	-11%	-24%	-24%	-24%	-15%	-21%	-26%	-33%	-32%	-34%
Value of the R&D segment in mln PLN	28,5	23,8	23,8	23,8	20,4	17,0	17,0	13,5	11,2	4,2
Value of the generic segment in mln PLN	3,4	4,1	4,1	4,1	4,6	6,0	6,9	6,9	7,6	11,9
Total value of tebukonazol 250 EW in mln PLN	31,9	27,9	27,9	27,9	25,0	23,0	23,9	20,4	18,8	16,1
Change of the value of the Tribenuron 75WG market 2006=100%	100%	87%	87%	87%	78 %	72%	75%	64%	59%	50%
Change of the price of the generic product 2006=100%	100%	76%	76%	76%	85%	79%	74%	59%	56%	54%

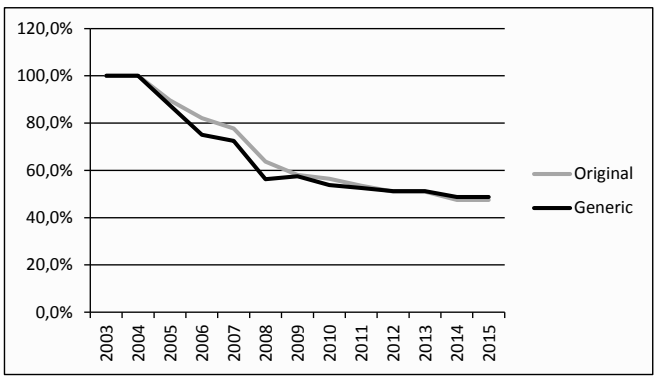
Source: Own analysis

The results of the analysis of price formation of specific products are presented in Tables 7-10. The first year of the analysis is a season, in which the first generic product, of each pesticides was offered.

Table 7 shows changes in prices and relations between values of the original (R&D) and generic equivalents of Tebuconazol 250 EW's in the period 2003-2015 in Poland. In that period the number of generic producers has increased from one to eight. The value of sales of the branded pesticide has significantly decreased for the advantage of the generic. The share of the generic equivalent of the original Tebuconazol 250 EW grew up from about 15% in the initial year, to over 97% in the year 2015. It should be emphasized that the value of the whole market of Tebuconazol 250 EW has increased in the analyzed period by about 370%. At the same time prices of both, the original products (e.g. Horizon 350 EW from Bayer) and generics have been systematically falling down by more than 50% of the initial price. In all years prices of the generic pesticide were lower, comparing with the price of the branded product, by 29-50%.

The trend of the price change of Tebuconazol 250 EW is illustrated in the Figure 2.

Figure 2. Trend of price change of Tebuconazol 250 EW in the period 2003-2015



Source: Own analysis

The diagram clearly suggests that producers of both, the original and generic product apply the skimming pricing strategy in the first years after introducing pesticide to the market and later, lowering significantly the original price, shift to the penetration strategy.

Changes of prices and structure of sales of other pesticides considered in the analysis show the same pattern (tables 8-10).

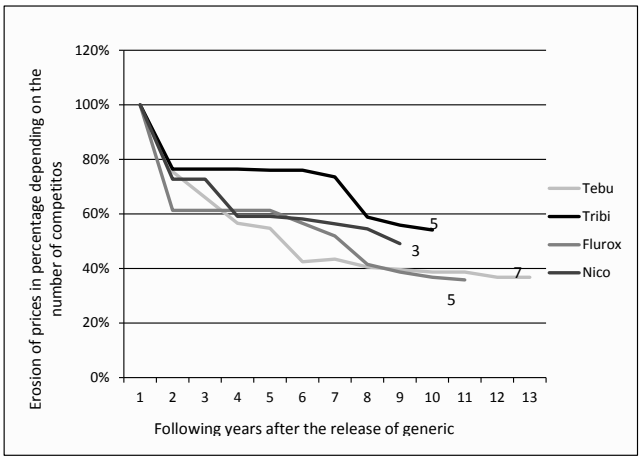
The results compiled in *Tables 8-12* are presented in a synthetic way in the *Figure 3* that shows the influence of the number of competitors on the range and the speed of the price erosion.

Table 9. Price and value changes of the fluroxypyr market in the formulation of 200 EC in 2005 – 2015.

Fluroxypyr 200 EC	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of generic producers	1	1	1	1	1	1	2	4	5	7	7
Price of the product R&D in PLN	80,0	80,0	75,0	75,0	75,0	75,0	65,0	65,0	65,0	60,0	59,0
Average price of the generic product in PLN	65,0	65,0	65,0	65,0	65,0	60,0	55,0	44,0	41,0	39,0	38,0
Percentage difference of prices between generic to the R&D product	-23%	-23%	-15%	-15%	-15%	-25%	-18%	-48%	-59%	-54%	-55%
Value of the R&D segment in mln PLN	2,0	1,8	1,9	1,9	1,9	1,9	1,6	1,6	1,6	1,5	1,5
Value of the generic segment in mln PLN	0,5	0,7	1,0	1,3	1,4	1,5	4,1	7,0	8,2	11,7	11,4
Total value of Fluroxypyr 200 EC in mln PLN	2,5	2,5	2,9	3,2	3,3	3,4	5,8	8,7	9,8	13,2	12,9
Change of the market's value 2005=100%	100%	99%	113%	126%	131%	134%	228%	344%	390%	524%	512%
Price change 2005=100%	81%	81%	81%	81%	81%	75%	69%	55%	51%	49%	48%

Source: Own analysis

Figure 3. The number of competitors and the erosion of prices in particular years after they were released on the market



Source: Own analysis

The crucial question is: are those tendencies the same in other countries? Author's observations indicate that yes. The generic segment is shaped by the period of patent protection and other exclusive rights for specific products. In Europe they are the same or very similar in all the countries.

CONCLUSIONS

Pesticides may be differentiated due to different characteristics. As physical products they may be distinguished from each other by physical and chemical proprieties and their biological activity. As marketed products they are subject to different marketing strategies.

On the basis of the analyses the following conclusions may be drawn:

- Each of the analysed generic products is registered by minimum 3 companies. Usually this number ranges from 4 to 7. Generic products are released to the market with a price discount, usually 15% on average.
- The number of competitors influences a magnitude of price reductions of generic products. In the case of five competitors, the price erosion is between 50% to 60% against the price of the original product in the year of releasing the first equivalent.
- Price reduction makes plant protection products more attractive, which generally leads to the increase of their sales.
- Most of the farmers is keen to purchase a new, generic product with similar characteristics and functions like the one they used to buy before, however under the condition of getting a discount, because of the risk they think is associated with the use of the generic.

The trials of forecasting tendencies of the prices of the generic plant protection products for longer time shows clear trend to reduce the prices as long as the margin on the product exist and the pay back from investment in approval (sell allowance) is possible.

The plant protection products industry is strongly concentrated. The companies can be divided into two strategic groups:

- the originators, conducting research and development activities that result with releasing active ingredients;
- the imitators, producing generic pesticides, that are introduced to the market after the patent protection of original substances expires.

Table 10. Price changes and value of the market of nicosulfuron in the formulation of 040 SC in 2007 – 2015.

Nicosulfuron 40 SC	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of generic producers	1	2	2	5	5	5	6	7	8
Price of the product R&D in PLN	120	120	120	105	100	95	80	80	80
Average price of the generic product in PLN	110	80	80	65	65	64	62	60	54
Percentage difference of prices between generic to the R&D product	-9%	-50%	-50%	-62%	-54%	-48%	-29%	-33%	-48%
Value of the R&D segment in mln PLN	12	12	14	12	12	9	5	4	4
Value of the generic segment in mln PLN	1	1	4	5	10	13	15	18	16
Total value of Nicosulfuron 40 SC in mln PLN	13	13	18	17	22	22	20	22	20
Change of the market's value Nicosulfuron 40 SC 2007=100%	100%	105%	146%	137%	174%	175%	159%	175%	160%
Price change of the generic product 2007=100%	100%	73%	73%	59%	59%	58%	56%	55%	49%

Source: Own analysis

This creates a specific "duo-oligopolistic" structure of the industry. Despite oligopolistic characteristics (e.g. relatively low number of producers and a large number of buyers, homogenous products in terms of specific active substances and use, high entry barriers) producers compete on prices. The existence of generic pesticides, but probably also increasing volume of sales after a new product is released to the market, have a visible impact on pricing strategies and price trends in a long period. Typically, producers of both, the original and generic products apply the skimming pricing strategy introducing pesticide to the market and later shift to penetration strategy that results with a downward shift of prices accompanied by the increase of sales.

Analyses presented in the paper are limited to four products and restricted to the specific, Polish market. However, because of the common European registration, patent and data protection laws identified trends are very likely applicable on other European markets. Broadening the scope of the research would give more light to an interesting issue of the generic segment of the pesticide industry and behavior of firms that operate in this industry.

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