

Evaluating generic, post-patent, off-patent & proprietary products

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Bottom line: The increasing numbers of generic (also known as post-patent or off-patent) products available in the turf market will ultimately create more flexibility and more choice for superintendents. However, the process of comparing among a growing number of products and companies is difficult. Performance is of course the most important factor, and there can be significant variation among products based on the same active ingredient, primarily due to characteristics of the product formulation such as mixing, handling, residual activity and coverage. For this reason, a review of the efficacy data and/or a test at your own location is important in the evaluation process. Review the label for information on formulation type, rates, approved crops and limitations on amounts used and/or frequency of application. And finally, take into account your personal opinions about the importance of technical and/or financial support from the manufacturer.

Q. What are “proprietary” or “patented” products?

A. The active ingredients in these products were issued patents (from the U.S. Patent and Trademark Office) based upon their novel activity. A patent confers “the right to exclude others from making, using, offering for sale, or selling the invention...”. In other words, the company that holds the patent on a certain chemical has the right to be the exclusive, or sole marketers of that chemical. If any other company wants to sell the same chemical, they must receive permission from the holder of the patent. Examples of turf products that are currently patented include Primo (Syngenta), Image (BASF), Revolver (Bayer) and Conserve (Dow). In general, proprietary (or patented) products are discovered and marketed by large multinational companies (Table 1) who can afford the research and development costs and the long wait between the time a product is first discovered and the time it is first sold.

Q. Once a product is patented, how long is it protected for?

A. The majority of products sold for use in turf (and for use in agriculture, for that matter) are not protected by a patent. The most common reason for this is that patents expire – usually 20 years after the date on which the applications were first filed. Since there can be a fairly big time lag between the time a product is discovered and the time it reaches the marketplace, the actual patented lifetime of a product may be considerably shorter than 20 years. Examples of products that once held patents which have now expired include herbicides such as: glyphosate (Roundup), pendimethalin (Pendulum, Pre-M), atrazine and 2,4-D; fungicides such as iprodione (Chipco 26GT, Iprodione-Pro), chlorothalonil (Daconil, Concorde, Echo, Manicure, etc) and propiconazole (Banner, Propiconazole-Pro); and insecticides such as carbaryl (Carbaryl, Sevin), chlorpyrifos (Dursban) and trichlorfon (Dylox, Proxol).

Table 1. A partial listing of agrichemical companies active in the turf market. Note that there are some companies that sell both generic (off-patent) and proprietary (patented) products.

Company	Proprietary	Generic
Agrilience		X
Andersons		X
BASF	X	X
Bayer	X	
Cheminova	X	X
Cleary Chemical	X	X
Crompton/Uniroyal	X	
Dow	X	
Drexel		X
DuPont	X	
FMC	X	
Griffin		X
Helena		X
Lesco		X
Micro Flo		X
Monsanto	X	
Monterey		X
NuFarm		X
Olympic		X
PBI/Gordon		X
Riverdale		X
Sipcam		X
Syngenta	X	
UHS		X
Universal Crop Protection Alliance		X
Valent	X	
Wilbur Ellis		X

Q. Is there a difference between generic, off-patent and post-patent products?

A. Not really. All three terms refer to products that were once proprietary, but whose patents have now expired, making it possible for multiple companies to produce and market them. For example, the herbicide glyphosate, once sold exclusively as Roundup by Monsanto, saw its patent expire in

September, 2000. As a result, the product is now sold under a variety of trade names by at least 12 different companies – companies that range from distributors such as UHS, Lesco and Helena, to companies that typically market generic products such as Riverdale, Nufarm, Griffin and Agrilience, to large multinational companies such as Dupont and Monsanto.

More and more companies are adding generic products to their line-up these days. To help distinguish themselves from the pack, some companies have begun to refer to their line of older products as “post-patent” rather than “generic” or “off-patent”. But this is largely a marketing distinction. All three terms refer to out-of-patent products.

Q. What kind of companies sell generic and post-patent products?

A. All types. In the past, companies such as Gowan, Riverdale, Nufarm, Griffin, Agrilience and others (Table 1) dominated the sales of generic products, and these companies still command an impressive presence in the marketplace. The majority of companies producing generics for the turf market are U.S. based, but some, such as Cheminova (Denmark), Sipcam (Italy) and others do their manufacturing overseas. Distributors such as UHS, Lesco, Helena and others are also very active in the formulation and marketing of generics. Almost none of these companies invent new pesticides for patenting.

In contrast, the research-based multinationals, whose products account for about 80% of global sales, have in the past rarely been involved in production of generic pesticides. The new development in the last few years is that even large multinational companies who have their own proprietary product portfolios are now marketing generic products as well (see Table 1). In addition to the phenomenon of seeing glyphosate marketed by several multinationals, propiconazole, once sold exclusively by Syngenta as Banner, is now also sold by another multinational company, BASF, as Propiconazole Pro. This fungicide active ingredient is also sold by distributors and conventional generic companies such as Lesco (Spectator) and Sipcam (Echo Propiconazole EC Co Pack). Similarly, the fungicide iprodione, formerly sold only by Bayer as Chipco 26GT, is now also sold by BASF (Iprodione-Pro), as well as Lesco (Lesco 18 Plus).

In other words, the lines between manufacturers of strictly generic products vs. research and development-based multinationals are becoming blurred. Contributing to the confusion is the fact that some multinationals are purchasing smaller, generic companies (for example, BASF recently purchased Micro Flo), while others are forming partnerships with generic companies (for example, in 1998, DuPont

formed a joint venture with Griffin – the leading US generic company).

Q. How are generic products regulated?

A. The same way as all other pesticide products. Generic products – whether they are produced in the U.S. or overseas, and whether they are produced by a major multinational corporation or a small, new company – must all comply with the same EPA guidelines before they can be sold in the U.S. Since generic products have already been extensively tested by the company that originally marketed them, the EPA allows new generic producers to submit the health and safety toxicology data generated by the original producer. This prevents duplication of effort, needless animal testing, and the long waiting period associated with completion of toxicological data packages. Generic producers pay a fee to the original manufacturers for the ability to use their toxicology data packages in the registration process.

Q. How can you tell the difference among generic products?

A. All of the uproar over generic products may ultimately be healthy (only time will tell), but unfortunately leaves the consumer in a bit of a quandary. With several companies selling what appears to be the same product – or at least the same active ingredient – how do you decide which one to use? Since the pressure on the consumer to make educated decisions is definitely increasing, we have provided suggestions below on some of the factors that we feel should be considered when choosing among several similar products.

Select a standard – a product that you have used (and been satisfied with) in the past. Examine the label for this product, and identify the active ingredient, the amount present and the type of formulation.

Verify active ingredient identity, amounts and formulation type of new generic products: The product label is a great source of information for evaluating and comparing products. At the top of the label, look for the name of the active ingredient (AI). This is the pesticidal part of the product (in contrast, the inert or “other” ingredients, which are listed right below the AI, are comprised of the carriers, surfactants and other formulation ingredients that help keep the AI stable, mixable and easy to handle). Keep in mind that some pesticidal materials can take a number of different forms – as salts, or acids, or in mixtures with other products -- and that each of these forms of the AI will perform differently. Ideally, you want to be comparing identical active ingredients with one another – apples vs. apples, in other words.

While you are looking at the active ingredient information, note the percent active ingredient present in each product. Is it the same as that listed for your standard product? If it isn't, are the label's

recommended rates adjusted properly to deliver the same amount of active ingredient as the standard product?

Finally, take a look at the formulation type. This is usually designated in the product name, using abbreviations to represent the nature of the formulation (alternatively, the formulation type is sometimes listed either above or below the statement of active ingredients and “other” ingredients). The abbreviations for some common formulations are listed below.

Abbreviation	Formulation type
DF	Dry flowable: a wettable powder formulated into small pellets or granules; usually less dusty than WPs
EC	Emulsifiable concentrate: clear liquid with emulsifiers to aid in mixing with water
F	Flowable: a liquid formulation
G	Granular: dry, relatively large particles for use without dilution in water
RTU	Ready to use: ready to spray without dilution in water
WDG	Water dispersible granule: dry granules formulated to dissolve easily in water
WP	Wettable powder: dry powder that uses clay, talc or other dry carrier

Assess the company that is selling the product:

Products sold by generic companies are usually less expensive than those sold by the original manufacturers. This is partly because the companies have not had to bear the brunt of the cost of research and development for each product. In addition, generic companies may advertise less, conduct less university research, or provide less product service and support, though there is great variance among generic companies in these areas. You will need to evaluate what type of support each company has to offer, and how important that support is to you. Have you or anyone you know worked with this company in the past? Are they being represented by reputable distributors? Are the sales and/or technical people knowledgeable, and can they supply efficacy data for their products? Will the company back you up in the event of a problem such as unexpected phytotoxicity, run-off into sensitive areas or lack of performance?

Ask for efficacy data: There can be fairly large differences in performance of products that are based on the same active ingredient. These differences are primarily related to the way the products are formulated by each manufacturer (see Table 2). For this reason, research trials that compare similar product, tested at comparable rates and by reputable university or private researchers are critical to your decision making process. Company representatives should be willing to provide the data itself, and/or the

names of the researchers who have conducted trials for them. We also want to encourage you to contact your regional turf extension researchers for efficacy data. If you are uncertain of the researchers' names or contact information, they can usually be found by using a search engine such as google (www.google.com) on the web; typing “turf extension research” and the name of your state or region usually works.

Review efficacy data carefully: This is probably the most difficult of the steps in evaluating products, since the data from replicated research trials can be hard to understand. As an example we have reprinted data generated through the Rutgers University turf research program (Table 2) that evaluates several different formulations of the fungicide chlorothalonil. You can see that there is a great deal of data there – six products were evaluated on 8 different dates, at three different application volumes. Overwhelming, isn't it? But since this format is typical of almost all research trials, it is worthwhile spending some time learning how to decipher it.

One relatively easy way to organize the data is to look at the number of times during the trial that each product was a top performer. In the case of the Rutgers chlorothalonil data, the top performers were those products that had the lowest numbers of dollar spot infections on each evaluation date. The values associated with the top performance are followed by the letter “a” in Table 2 (to see what the “a” means, read the paragraph below), and are highlighted in yellow. The last column in Table 2, “Top Perf.”, represents the number of times that each product was a top performer. For example, Concorde 82.5 DF, sprayed at 0.5 ga/1000 sq ft, was a top performer on 3 out of the 8 dates that evaluations took place. In contrast, Concorde 6F, a different formulation of chlorothalonil manufactured by the same company, was a top performer on 7 out of 8 dates.

Understand a bit about statistics and experimental design: Like most good scientific reports, the data in Table 2 is presented by printing a letter, or letters (ranging from a – z) after each one of the dollar spot infection values. These letters are a way of illustrating the results of a statistical analysis that is conducted to determine how closely grouped these values are. For example, let's take a look at the data from 6/18. Note that there are several products (highlighted in yellow) that are followed by the letter “a”. These products all performed roughly equally to one another on 6/18, and all had the lowest number of dollar spot infections. Now, let's take a look at the letters that follow the untreated treatment on 6/18 (these plots were not treated with any products). Note that these letters (“k” and “l”) are the highest in the alphabet that appear for 6/18, and that they are not shared by any of the other products. This

indicates that the number of dollar spot infections in the untreated plots was higher and statistically different than for any of the products tested. In other words, all of the products performed better than no treatment on 6/18. Treatments that share one or more of the same letters are considered to behave statistically the same. Some other trends that are illustrated in this data set include:

- In general, when products were applied at higher volumes (2 gallons/1000 sq ft) they performed better than when applied at lower volumes (0.5 gallons/1000 sq ft).
- Dry flowable (DF) formulations did not perform as well as the liquid flowable (F) or water dispersible granules (WDG). The reasons for the differences among formulations are not known, however.
- The best performing products (those that were top performers on 7 out of 8 dates) included Daconil Ultrex, Daconil Weather Stik, Concorde 6F and Echo 720 6F.

- The most consistent of the top performers was Daconil Ultrex, which showed very good efficacy at all three application volumes tested – 0.5, 1.0 and 2.0 gallons/1000 sq ft. Echo 720 and Daconil Weatherstik were nearly as consistent.

Test the product yourself: Even when you can find published research data, a comparison of products at your own location is always valuable (for detailed descriptions on how to design your own field testing program, see PACE Insights from October, November and December of 2000). Remember to conduct the test at a time when the pest or problem of interest is active so that you can evaluate efficacy as well as phytotoxicity risks. Keep your plot sizes large enough for a fair evaluation – 5 feet by 10 feet is about as small as you should go. Take good notes, and always, always, always leave an untreated area for purposes of comparison.

Table 2. Efficacy of chlorothalonil formulations for control of dollar spot on creeping bentgrass. This trial was conducted in 2002 in North Brunswick, NJ at the Rutgers Turf Research Farm. The rates of all products were adjusted so that the same amount of active ingredient per 1000 sq ft (2.6 oz chlorothalonil active ingredient) was applied. Each treatment was replicated four times in a randomized complete block design. Each of the replicated plots was treated every 14 days with the designated product, beginning on June 4, 2002. Data was analyzed using analysis of variance and means separation by the Waller-Duncan k ration t test (k=100). Data courtesy of Dr. Bruce Clarke, Rutgers University.

Product	oz/1000 sq ft	Volume (ga/1000) ¹	% AI ²	Company	Mean (average) number of dollar spot infection centers								Top Perf. ³
					6/18	6/27	7/9	7/19	8/5	8/15	8/26	9/6	
Untreated	-	-	-		165.0 kl	128.8 j	200.0 j	54.0 h	10.2 e	14.0 h	20.8 ij	55.0 bc	0
Concorde 82.5DF	3.2	0.5	82.5	Griffin	75.0 e-g	9.8 b-e	141.2 h	5.8 a-e	2.0 a-c	7.3 c-g	3.0 a-c	78.8 d-h	3
Echo 90DF	3.0	1	90	Sipcam	131.3 ij	11.3 de	150.0 hi	2.0 ab	0.3 ab	3.0 a-e	5.0 a-e	71.3 c-f	4
Concorde 82.5DF	3.2	1	82.5	Griffin	93.8 gh	13.0 e	155.0 hi	2.5 a-c	0.3 ab	2.8 a-e	1.0 a	71.3 c-f	4
Concorde 6F	3.6	0.5	54	Griffin	22.0 ab	3.0 a-d	26.3 cd	2.5 a-c	3.0 a-c	6.5 b-f	11.0 d-g	96.3 i-l	4
Concorde 82.5DF	3.2	2	82.5	Griffin	58.0 d-f	4.8 a-e	35.0 de	2.3 a-c	0.8 a-c	3.5 a-e	2.0 a-c	83.8 e-i	5
Echo 90DF	3.0	0.5	90	Sipcam	44.5 b-d	3.8 a-d	119.0 g	1.5 ab	1.3 a-c	4.8 a-e	8.0 a-g	100.0 i-m	5
Echo 90DF	3.0	2	90	Sipcam	81.8 fg	4.0 a-d	47.5 ef	1.0 ab	0.8 a-c	2.0 a-d	4.8 a-e	95.0 h-k	5
Daconil WeatherStik 6F	3.6	1	54	Syngenta	50.5 c-e	3.8 a-d	36.2 de	1.0 ab	1.0 a-c	3.8 a-e	3.0 a-c	84.3 e-i	5
Concorde 6F	3.6	1	54	Griffin	58.8 d-f	4.3 a-d	53.8 f	0.3 a	0.8 a-c	2.5 a-e	6.5 a-f	52.5 b	5
Daconil WeatherStik 6F	3.6	0.5	54	Syngenta	9.5 a	1.3 ab	18.0 a-c	1.0 ab	1.5 a-c	5.0 a-e	9.3 b-g	88.8 g-i	6
Echo 720 6F	3.6	1	54	Sipcam	85.5 gh	6.3 a-e	12.3 a-c	3.5 a-d	0.5 a-c	2.3 a-e	4.0 a-d	65.0 b-d	6
Echo 720 6F	3.6	2	54	Sipcam	41.3 b-d	2.8 a-d	7.5 ab	0.5 a	0.0 a	0.5 a	2.3 a-c	52.5 b	6
Daconil Ultrex 82.5WDG	3.2	0.5	82.5	Syngenta	11.0 a	1.0 a	5.2 ab	1.0 ab	0.5 a-c	2.8 a-e	2.3 a-c	68.8 b-e	7
Daconil Ultrex 82.5WDG	3.2	1	82.5	Syngenta	92.5 gh	5.8 a-e	7.0 ab	0.5 a	0.5 a-c	0.5 a	1.3 a	36.8 a	7
Daconil Ultrex 82.5WDG	3.2	2	54	Syngenta	26.8 a-c	3.0 a-d	3.5 a	0.0 a	0.0 a	0.8 ab	1.8 ab	56.3 bc	7
Daconil WeatherStik 6F	3.6	2	54	Syngenta	22.3 a-c	1.3 ab	3.8a	0.5 a	0.0 a	1.5 a-c	3.5 a-c	75.0 d-g	7
Concorde 6F	3.6	2	54	Griffin	30.0 a-c	2.8 a-d	8.3 ab	0.8 ab	1.5 a-c	0.8 ab	2.8 a-c	63.8 b-d	7
Echo 720 6F	3.6	0.5	54	Sipcam	11.8 a	2.5 a-c	12.8 a-c	2.0 ab	0.8 a-c	3.0 a-e	8.5 a-g	90.0 g-i	7

¹Volume refers to the amount of water used/1000 sq ft to deliver each product; ²% AI refers to the percent active ingredient (chlorothalonil) in each formulation; ³“Top Perf.” refers to the number of dates on which each product scored as a top performer. The higher the number of top scores, the better the product performed. Yellow shading is used to indicate the dates on which each product was scored as a top performer, based on the assignment of an “a” to the mean number of dollar spot infection centers when a statistical analysis was performed.