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European Chemicals: Is the EU Market Attractive for Generic Crop Protection Chemicals? Transcript of Presentation

Ticker	Rating	CUR	21 Jun 2012 Closing Price	Target Price	TTM Rel. Perf.	EPS 2011A	EPS 2012E	EPS 2013E	P/E 2011A	P/E 2012E	P/E 2013E	Yield
BAS.GR	M	EUR	56.11	63.00	-4.5%	6.26	5.82	6.58	9.0	9.6	8.5	4.5%
BAYN.GR	O	EUR	54.07	64.00	2.9%	4.83	5.49	6.30	11.2	9.8	8.6	3.1%
SYNN.VX	M	CHF	310.00	280.00	21.5%	17.85	19.54	22.62	17.4	15.9	13.7	2.6%
SYT	M	USD	64.25	60.50	-5.8%	3.87	4.24	4.91	16.6	15.2	13.1	2.7%
MSDLE15			1020.76			96.50	99.24	111.06	10.6	10.3	9.2	4.3%
SPX			1325.51			96.04	103.98	117.03	13.8	12.7	11.3	2.1%

O – Outperform, M – Market-Perform, U – Underperform, N – Not Rated

Highlights

- On May 24th 2012, we hosted an interactive lunch symposium with Dr. Nigel Uttley, the managing director of Enigma Marketing Research, a consultancy that provides business, market and technical information services targeted at discovering new opportunities in the agrochemical industry for generic companies. For further information on Enigma, please see www.enigmamarketingresearch.com. This note is an edited transcript of Dr Uttley's presentation and the Q&A session.
- The presentation looks at the barriers for entry to the EU crop protection chemicals market for generics, or, looking at it slightly differently, answers the question, how do the crop protection companies (Syngenta, BASF and Bayer) protect their markets once patents have expired?
- The EU crop protection market is attractive for generics producers. However, market entry is harder than it appears. There are several barriers such as intellectual property rights (IPR), technology issues, registration difficulties, and market knowledge.
  - Mixtures are an important way to defend the market since a company can patent them and extend the life of an active ingredient. This dynamic is specific to the crop protection market.
  - Registration is complicated in the EU, with registration required for each country and crop making it an expensive and lengthy process. In addition, data protection laws can provide another barrier to entry since efficacy and safety data are required for the registration.
  - We discuss specific examples of active ingredients such as azoxystrobin, mesotrione, fipronil, and flonicamid.
- Chinese generics producers are starting to organize to increase their chances to overcome these barriers.
  - ChemChina has acquired Makhteshim-Agan (not covered) to improve access to Western markets. We are still awaiting signs of their strategy.
  - The Chinese Crop Protection Industry Association (CCPIA) has established "Cooperative Groups" to jointly raise funds for overseas registrations amongst other activities.
- For more information on Azoxystrobin please see our note from April 30, 2012 *Syngenta: Shooting (Ami)Star. Why the Generic Threat to Syngenta's Blockbuster Is Overdone; (It's Not Glyphosate)*.

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Investment Conclusion

Investors are concerned about generic competition for Amistar, Syngenta's $1bn selling fungicide. We believe Syngenta's post-patent strategy can defend against generic competition. We expect continued, but slower, sales growth and margin stability in the near term. However, in the long term, we expect azoxystrobin margins to fall gradually, but expect this to be offset by new and higher margin products that are added to the portfolio.

Details

Dr Jeremy Redenius, European Chemicals Analyst, Sanford C. Bernstein:

Good afternoon and welcome. Today we are delighted to introduce Dr. Nigel Uttley, the managing director Enigma Marketing Research. He is going to talk about generic competition in the crop protection chemicals industry.

Recently, we've been looking at the risks to Syngenta, Bayer CropScience, and BASF Agricultural Solutions as some of their big products as they come off patent. We found the issue was controversial and not really well understood, so we started digging deeper into it. As we developed our research, we found discussion with Dr Uttley very helpful since he is very active in the industry and part of his work has been helping generics companies indentify business opportunities.

We thought it would be helpful to have him share some of that experience with this group because we think he can offer different point of view than what we generally hear from the companies themselves. Having said that, we have found from working with him that our views have actually come in line more with what the companies are saying. For example, Syngenta's azoxystrobin is coming off patent gradually in different countries but when you dig into it it's actually more protected than we first expected, which was a bit surprising for us. We published our view on azoxystrobin please in a note on April 30, 2012 *Syngenta: Shooting (Ami)Star. Why the Generic Threat to Syngenta's Blockbuster Is Overdone; (It's Not Glyphosate)*.

Today, we'll talk through some other examples and think about the issues facing companies when a patent for an active ingredient expires. Let's turn over to Dr Nigel Uttley.

Dr Nigel Uttley, Managing Director of Enigma Marketing Research:

Thank you very much Jeremy. I have experience of being in the industry since 1986. I worked for a generics manufacturing company in the UK for about six years, and the last 20 years running Enigma Marketing Research.

I wanted to give you an idea of what is involved in getting a product down to the farmer and on to the field and where we will focus our discussion today. Starting with **Exhibit 1**, we can see some of the chemical reactions needed to make the active ingredient azoxystrobin. There are several steps to get to the two key intermediates, 2-hydroxybenzonitrile and the methyl ester, which can be reacted relatively simply to make azoxystrobin.

Up to the point of the active ingredient, the crop protection chemicals industry is similar to the pharmaceutical industry; there are multi step pathways, with key intermediates, making active ingredients. However, it is at this point that the crop protection chemicals and pharmaceutical industries start to differ. For example, formulation technology can differ, with pharmaceutical products needing to be put in a form for use with the human body (for example pill or cream), whereas for crop protection chemicals, the product may be put in a sprayable liquid, or may have to have something added to aid plant application (e.g. a surfactant to help "stick" to the leaves").

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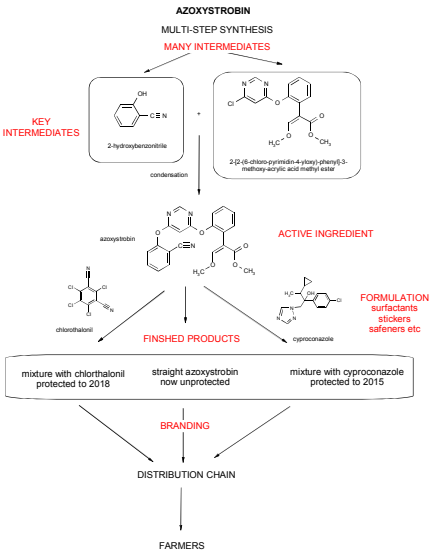
I will be talking a lot about mixture products – the crop protection chemicals industry mixes active ingredients and is a fundamental part of the industry, whereas in the pharmaceutical industry you rarely get mixtures of active ingredient. Mixtures are very important – this is probably the key message for you to take away from today!

Once you have the finished agrochemical products, that is where you see branding and marketing come into it (from the likes of Syngenta), and then we see the products go to the distribution chain and eventually to the farmers.

Exhibit 1

AZOXYSTROBIN – SUPPLY CHAIN



Source: Enigma

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To start to understand the threat from the generic manufacturers to the R&D companies like Syngenta, let's first look at the Chinese agrochemical industry, the primary source of generic completion. **Exhibit 2** shows the regional split of Chinese exports. Europe and North America account for approximately 50% of the world agrochemical market, but as you can see only a total of 25% of Chinese export of actives goes into these two regions. The export data also show that Asia and Latin America account for nearly two thirds of volumes sold. Why is this? One of the key reasons is Asia and Latin America are markets where products registrations are relatively easily obtained.

Exhibit 2

Chinese exports in 2010 by region - Chinese Ministry of Agriculture's Institute for the Control of Agrochemicals (ICAMA).

Region	Volume %	Value %
Asia	40.0	37.3
Latin America	22.4	22.2
Europe	10.4	13.4
North America	8.6	12.2
Oceania	6.5	5.8
Other	6.9	9.1

Source: Enigma

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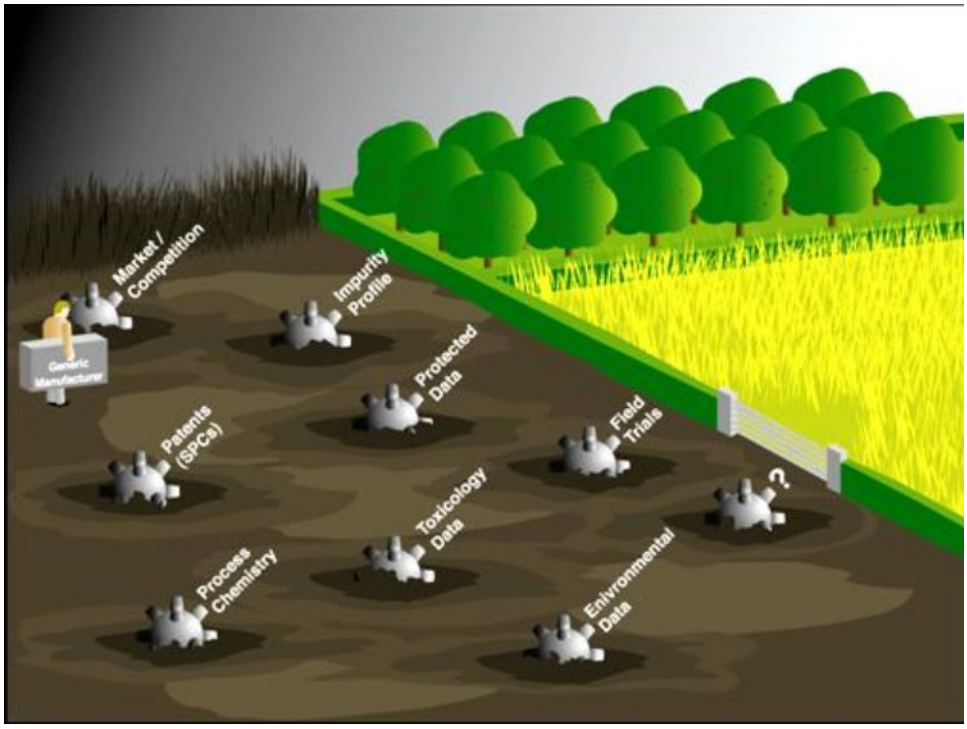
Exhibit 3 shows the minefield analogy I use to symbolize the barriers to market entry for generics. The major barriers to market entry include intellectual property rights (IPR), technology issues, registration difficulties and market knowledge. Here we have the generic manufacturer trying to tread carefully around the various barriers and enter the land of milk and honey on the other side of the farm gate. So some lucky generic manufacturers may make it through and some not – what makes the difference? Well I hope the rest of the presentation will give some insight into the answer.

Exhibit 3



Source: Enigma

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The presentation will cover the following topics (**Exhibit 4**):

- The current market for off-patent products
- Identifying the next generation of off-patent products
- Intellectual Property Rights (IPR) barriers to market entry
- A look at some post-patent defence strategies by R&D companies
- The Chinese Agrochemical manufacturing industry
  - Government control via the 5 year plan
  - Industry initiative (e.g., The Chinese Crop Protection Industry Association or the CCPIA) has established "Cooperative Groups"
  - A look the security of supply of active ingredients or formulated products from China as a result of changes in the industry

Exhibit 4

Presentation coverage

- The current market for off-patent products
- Identifying the next generation of off-patent products
- IPR barriers to market entry
- A look at some post-patent defense strategies by R&D companies
- Chinese Agrochemical manufacturing industry
  - Government control – the 5 year plan 2011-15
  - Industry (CCPIA) initiatives – cooperative groups
  - Security of supply?

Source: Enigma

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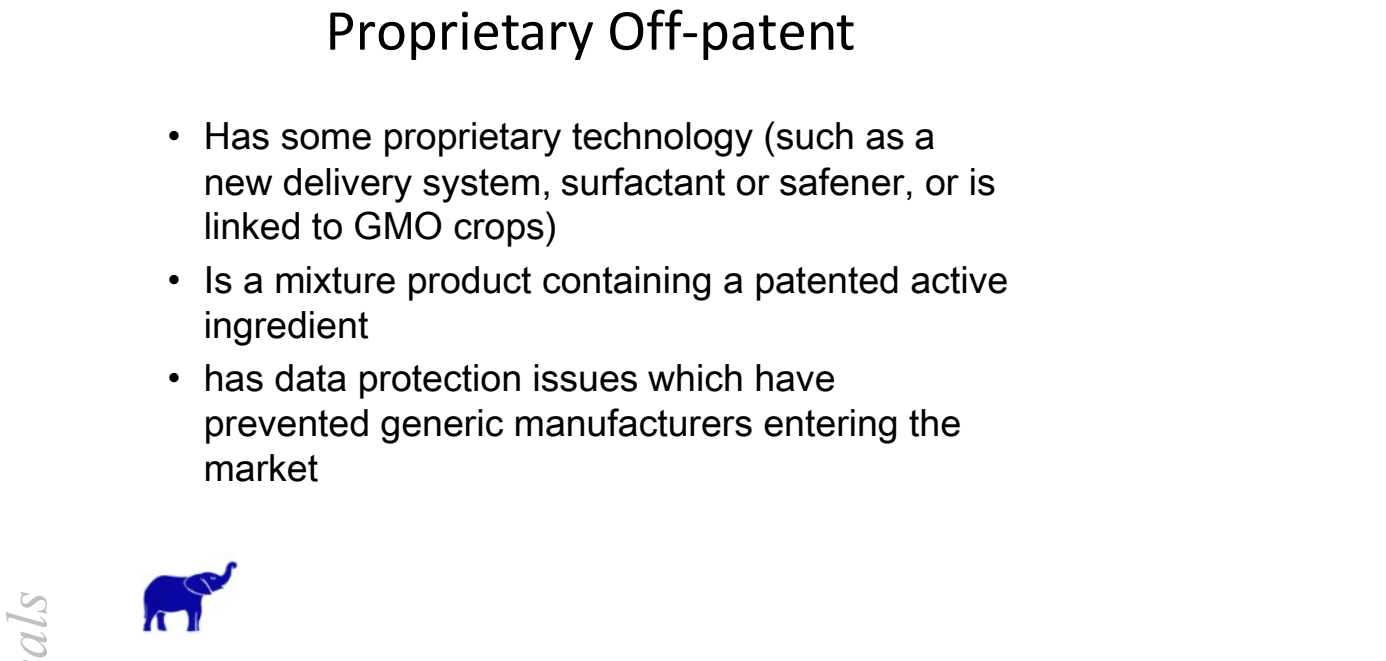
The current market for off-patent products

In agrochemicals, intellectual property rights (IPR) protect active substances (ASs). These substances are often referred to as *proprietary* products. However, once that active ingredient goes off patent you then can have two types of products: (1) a *generic* product or (2) a *proprietary off-patent* product.

A generic product is where there is true competition in the market place. In this case, generic companies have registered products based on their own data and are not beholden to the main or original data holder.

In contrast, a proprietary off patent product might have some additional technology, or it might be mixed with another active ingredient that is still patent protected (**Exhibit 5**). Indeed, you might also be able to mix two active ingredients which are off patent and get synergistic effects; this mixture can then be patented, getting extended rights. There may also be data protection issues which have prevented generic manufacturers entering the market. We will discuss data protection in more detail later.

Exhibit 5



Source: Enigma

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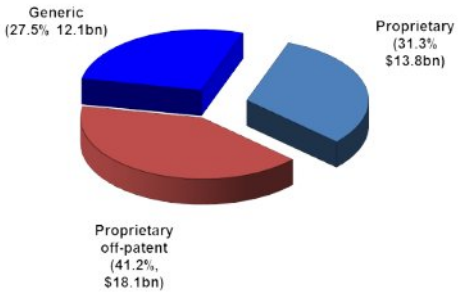
Looking at the market for these three IPR based categories, I estimate that the proprietary off patent sector is the largest, with ~40% of a $45bn market in 2011. This is where the R&D companies put in a huge amount of effort, particularly with secondary patents, to try and defend. This is a battle which the R&D companies are winning hands down when you consider that 60-70% of the market is controlled by the top 6 companies yet only about 30% of all active ingredients have patent protection (**Exhibit 6**).

Exhibit 6

Market Share by Product Type



Crop market worth approximately $45 billion 2011.

60-70% of the market is controlled by the top 6 companies yet only about 30% of all active ingredients have patent protection.

Source: Enigma

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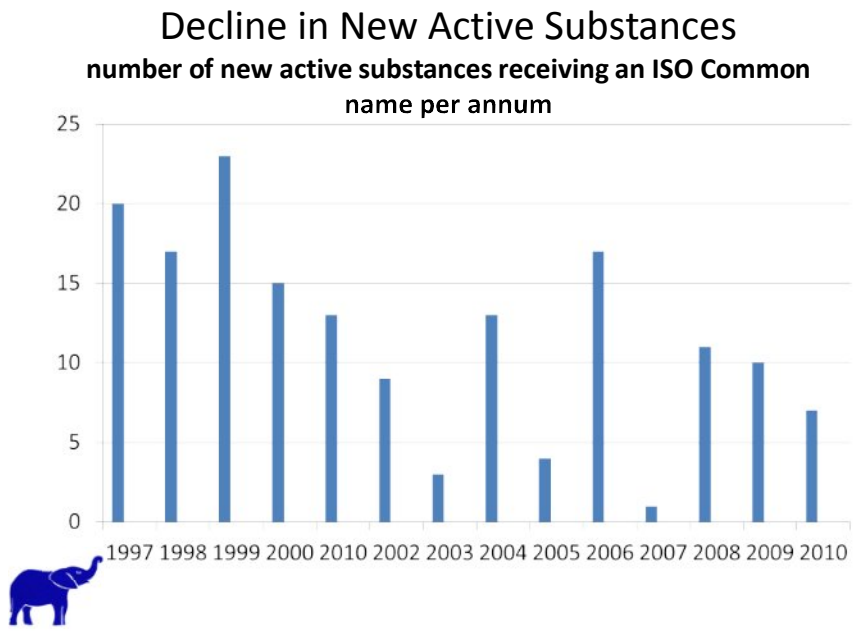
I think the R&D companies are doing a fantastic job to protect the proprietary off-patent sector because they need to – the pace of new active substance discovery is slowing.

There has been a massive decline in the number of new active ingredients that are coming through (**Exhibit 7**). In the 1980s and 1990s the number averaged about 20 per year – many of these are now off patent or coming off patent and are not being replaced by an equivalent number of new active substances. The number of active ingredients off-patent has steadily increased over the last 10 years.

In the past the R&D companies were quite happy to bring in a new patent protected active ingredient and they didn't really have to worry about the generics too much because they had new and better products coming through.

However as a result of the slower pace of discovery, the R&D companies have refocused their strategies to protect the market for their active substance post-patent expiry. We have seen some success as well. The R&D companies have maintained market share in this period.

Exhibit 7



Source: Enigma

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Identifying the next generation of off-patent products

Since 2002 Enigma Marketing Research has published five reports on the topic of new generic agrochemicals and has identified and profiled 140+ major commercial ASs which offer great potential for generic manufacturers.

Each AS profile looks at: the major EU and US patent expiry dates, use profile - major markets and crops, links to registration dossiers, chemistry and technology needed in the manufacture, any alternative synthetic pathways, which are the key intermediates. Lastly, we analyse the above data to determine whether the particular AS is likely to be a good product for generic companies to target (**Exhibit 8**).

Exhibit 8

Identifying the next generation of off-patent products

- Since 2002 Enigma Marketing Research has published five reports on the topic of new off-patent agrochemicals and has identified and profiled 140+ major commercial ASs which offer great potential for generic manufacturers.
- Each AS profile looks at:-

  # the major EU and US patent expiry dates
  # use profile - major markets and crops
  # links to registration dossiers including EU and US
  # chemistry and technology needed to manufacture the required technical grade AS
  # alternative synthetic pathways
  # key intermediates
  # summary

Source: Enigma

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Our latest report looks at the active ingredients which will be off patent in the next four or five years (**Exhibit 9**). Coming off patent is not the be all and end all. It's not like the pharmaceutical industry, where once a product comes off patent the price rockets down.

Jeremy Redenius: A couple of names on this list jump out. Thiamethoxam is a big product from Syngenta with ~$900 million sales per year, so one to keep an eye on. Boscalid from BASF is also sizable with ~€500m sales. There'll be a few others that have already come off patent that have issues that we'll explore through this session here today.

Exhibit 9

Our latest report "New Post-Patent/Generic Agrochemicals – post 2011" profiles the following ASs whose patents will expire in major markets between 2011 and 2015

Benthiavalicarb (Kumiai and Ihara)	Boscalid (BASF)
Chromafenozide (Nippon Nohyaku and Sankyo)	Cloransulam-methyl (Dow AgroSciences)
Cyflufenamid (Nippon Soda)	Dimoxystrobin (BASF)
Dinotefuran (Mitsui Toatsu)	Ethaboxam (Lucky Ltd)
Flonicamid (ISK Biosciences)	Florasulam (Dow AgroSciences)
Iodosulfuron-methyl-sodium (Bayer CropScience)	Isoxadifen-ethyl (Bayer CropScience)
Mesosulfuron-methyl (Bayer CropScience)	Nitenpyram (Takeda)
Oxasulfuron (Syngenta)	Oxaziclomefone (Kumiai and Ihara)
Prothioconazole (Bayer CropScience)	Pyriftalid (Syngenta)
Simeconazole (Sankyo)	Spirodiclofen (Bayer CropScience)
Spiromesifen (Bayer CropScience)	Thiamethoxam (Syngenta)
Tolfenpyrad (Mitsubishi)	Trifloxysulfuron (Syngenta)

Source: Enigma

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Dr Nigel Uttley: If you're a generic company looking to choose a product to develop, you've got five basic areas to look at – market potential, cost of market entry, the technical side of manufacturing the product, registration issues, and intellectual property rights (**Exhibit 10**).

Exhibit 10

How to Choose the Right Product to Develop

- Market potential
- Cost of market entry
- Synthesis/technology/manufacturing issues
- Registrations issues
- Intellectual Property Rights (IPR) status

Source: Enigma

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IPR barriers to market entry

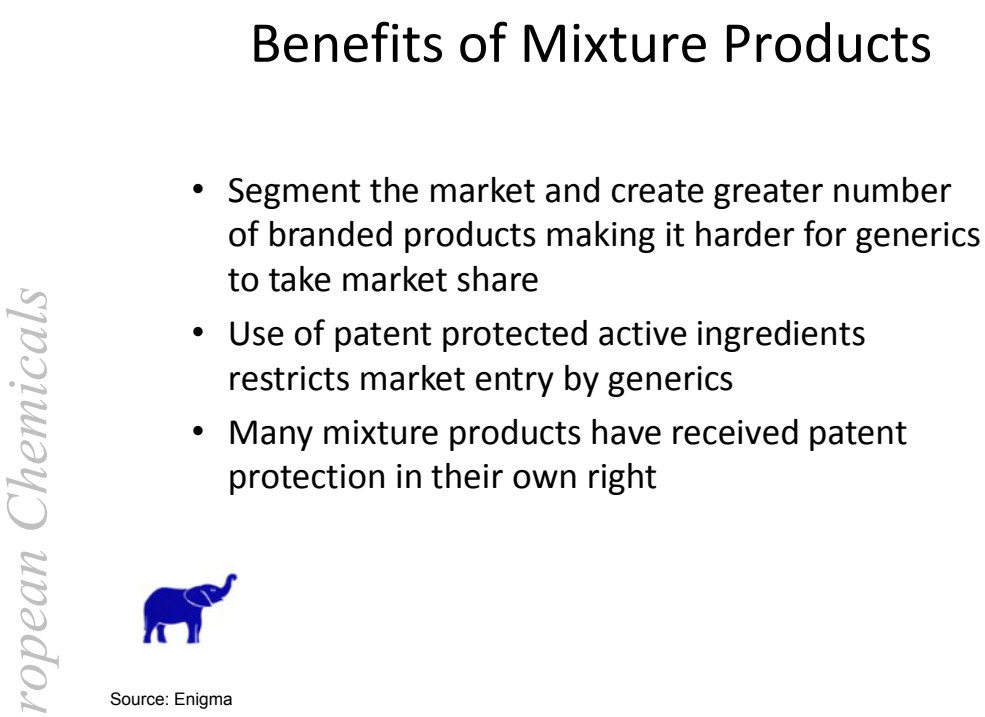
Since they are clearly related, we will discuss IPR as part of the post patent defense strategies below.

A look at some post-patent defence strategies by R&D companies

The first aspect we look at is market potential. It is important to look at how many mixture products exist in the market, and also to look at the IPR associated with these mixture products, as well as the market price, competition from other products, the geographic spread and any market segmentation. Here a straight product is one where an active ingredient is not mixed with any other active ingredient, and, perhaps rather obviously, a mixture of two or more active ingredients is called a mixture.

So what are the benefits of mixing products? There are some commercial benefits as well as technical. Mixtures can segment the market by creating a greater number of branded products and, therefore, making it harder for generics to take market share. In addition the use of patent protected active ingredients restricts market entry by generics – if one of the mixture active ingredients is patent protected generic companies will not have access to this active ingredient and therefore cannot enter this segment of the market until all intellectual property rights have lapsed. In addition, many mixture products have received patent protection in their own right (**Exhibit 11**).

Exhibit 11



Source: Enigma

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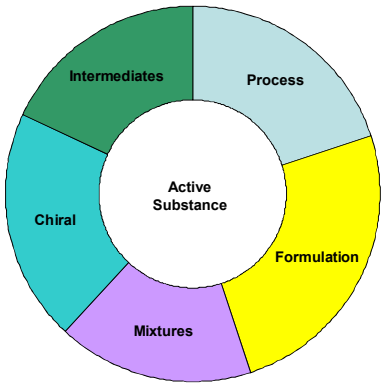
Exhibit 12 shows diagrammatically how in addition to the basic active ingredient patent, the R&D companies build up a portfolio of patents to try and protect the market when the basic active ingredient patent expires. These include process patents, formulation patents and of course mixture patents, which are by far the major secondary patent that Syngenta, Bayer and BASF companies will go for.

Exhibit 12

Patents Portfolios (secondary patents)



Source: Enigma

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The risk from generics for every product and region (or even country) can be a unique case. In 2011 we profiled azoxystrobin, indoxacarb, picolinafen, picoxystrobin, spiroxamine and mesotrione for Farm Chemicals International[1]. In these profiles we assessed how easy or difficult it will be for generic companies to enter the market, in particular the EU. For each AS we looked at: AS patent (primary) expiry, supplementary protection certificates (SPCs), data protection, secondary patents and the Bolar provision. We next look at what is meant by SPCs and the Bolar provision.

SPCs are supplementary protection certificates. These were introduced in the EU, as it was recognised that a significant erosion in effective patent term existed for pharmaceuticals, resulting in an insufficient market exclusivity period to recoup the substantial R&D costs. This was particularly problematic for pharmaceutical products, as the point an active ingredient is discovered through to it actually getting into the market can be eight or ten years, effectively losing nearly 50% of the 20 year patent term. In 1992 SPCs were introduced for pharmaceuticals, giving an additional 5 years patent protection, and in 1996, after extensive lobbying by the agrochemicals R&D sector, SPCs were granted for agrochemicals (**Exhibit 13**).

Exhibit 13

Supplementary Protection Certificates (SPCs) – EU only

- The EU recognised that a significant erosion in effective patent term existed for pharmaceuticals resulting in insufficient market exclusivity period in order to recoup the substantial R&D costs
- SPCs were introduced in 1992 for pharmaceuticals
- SPCs give up to 5 years additional patent protection to the normal 20 year term.
- In 1996 as a result of extensive lobbying by the agrochemical R&D sector SPCs were granted for agrochemicals
- Bolar provision for pharmaceuticals but not for agrochemicals in all countries

Source: Enigma

[1] http://www.farmchemicalsinternational.com/cropprotection/productfocus/?storyid=2973

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In addition the Bolar provision exists for pharmaceuticals but not for agrochemicals, which helps protect agrochemicals longer. The Bolar provision essentially allows generic pharmaceutical manufacturers to use the technology of a patented product in order to perform work that would assist in gaining marketing or regulatory approval whilst the patent is in force. In the EU pharmaceuticals and veterinary products have a Bolar provision. However, in the EU, the situation is complicated with some countries allowing a Bolar Provision and others not which effectively means a further 1-2 years minimum is required post patent expiry before a dossier can be generated and presented (**Exhibit 14**).

Exhibit 14

Bolar Provision

- The Bolar provision essentially allows generic manufacturers to use the technology of a patented product in order to perform work that would assist in gaining marketing or regulatory approval whilst the patent is in force
- In the EU pharmaceuticals and veterinary products have a Bolar provision
- Not for all EU countries for agrochemicals – thus a further 1-2 years minimum is required post patent expiry for dossier preparation
- Bolar Provisions apply for agrochemicals in many non-EU countries – Canada, South Africa, Australia

Source: Enigma

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We turn now to registrations and data protection issues, which create a barrier to entry. It is expensive to get an active ingredient approved in the EU, as it requires a large amount of supporting data, which need to be created, or bought. The active ingredient is registered in its formulated form in all the individual countries. For new active substances, a 10 year data protection period exists (**Exhibit 15**).

The system acts in a way as to keep many generic companies out of the market as they can't afford the cost of registrations in certain regions such as the EU.

Annex I is the status required for an active ingredient before a company can apply for a registration to sell a crop protection chemical product based on that active ingredient to the various member states. To attain Annex I status, a data package is submitted for the active ingredient. Once fully assessed and accepted the AI can be included in Annex I. This process is directed by EU Directive 1107/09.

Exhibit 15

Data Protection - registration of new active substances (NAS) under 91/414

- 10 year data protection period
- Delays in time from dossier being declared complete to inclusion on Annex I (the date when the data protection clock starts ticking)
- The rapporteur Member State and other Member States can give National Provisional Approvals prior to Annex I inclusion (under Provision 1107/2009 this has changed)
- No urgency for applicant to progress to Annex I as in most cases the market is protected by patents – now there is urgency

Source: Enigma

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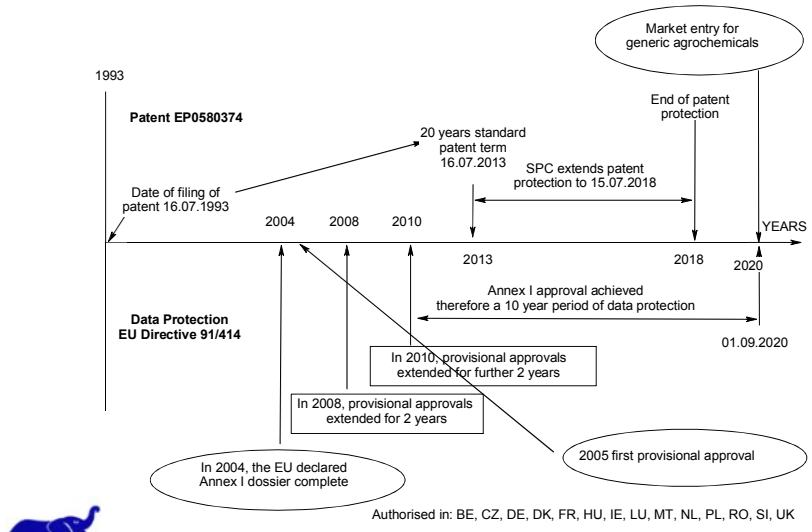
For example, we show the timeline in **Exhibit 16** for the active ingredient Flonicamid ($40m sales in 2010, manufactured by ISK (not covered)), and it looks like a complex situation. The patent issues are shown above the line and the registration issues below the line.

From the date of discovery there is a 20 year patent term to 2013, with a SPC extending the patent 5 years to 2018. However, looking at the data protection issue, it wasn't until 2004 that the EU Commission declared the data package application complete, and the first provisional registration was approved in 2005. Due to delays in the registrations system it was necessary to extend these provisional approvals until 2010 when the full Annex I approval was granted – it is at this point that the 10 year data protection period kicks in – taking you right out to 2020 beyond the SPC expiry date. Thus ISK had products on the market from 2005 during the patent protection period through to 2010 and then has a further 10 year protection period giving market exclusivity well beyond the patent expiry date. As you can imagine, the R&D companies absolutely loved this delay because it gives them the extra protection. If a generic company wants to get into the market at this point, they have to generate all the registration data themselves, which is very expensive, or they can negotiate with the inventor company but by and large the inventor company is going to effectively say "Go away." Unless it's for mammalian toxicology for which the company must, by law, share data at a fair price.

Exhibit 16

Flonicamid EU Patent and EU Directive 91/414 time line



Source: Enigma

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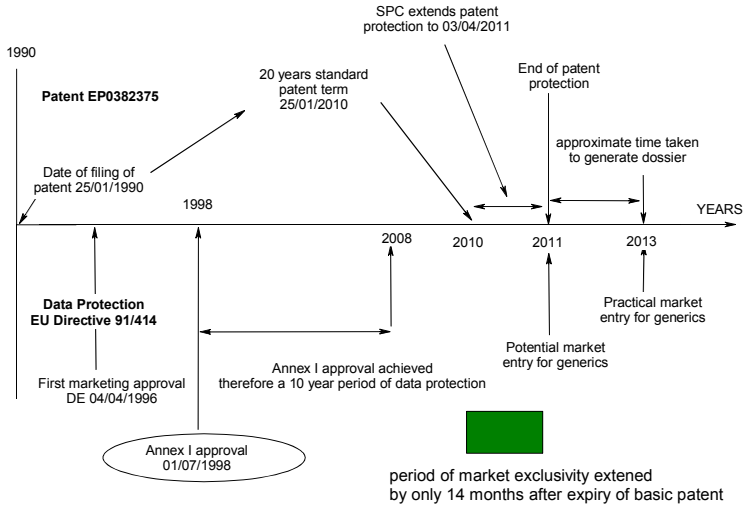
We look at an example for azoxystrobin in **Exhibit 17.** There is a similar situation where patents have expired, but with an extra period added due to the SPC. Syngenta realised that they had a fantastic product and really moved their research very rapidly – to get the first marketing approval only six years after it was discovered is remarkable. However, the data protection expired before the active ingredient patent did, so the only "extra" period of market exclusivity is from the SPC, this was 14 months in total. If we add the time required for the dossier preparation, the practical market entry point in 2013.

Exhibit 17

Azoxystrobin EU Patent and EU Directive 91/414 time line



Source: Enigma

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If we look at the six compounds in **Exhibit 18**, we can see the total number of months of additional market monopoly after the expiry of the basic AS patent, which SPCs and data protection have given the inventor company – this does not include the additional time taken that a generic company would need to generate the dossier post patent expiry – so we have a highly protected market. For example, mesotrione has 8 years of additional protection.

Jeremy Redenius: Mesotrione is a Syngenta product called Callisto with ~$500m sales per annum. If you were to look at reporting you might see the 2005 date and think "it's probably already been impacted," but in fact it is still protected for many more years, at least in Europe which probably accounts for half its sales. Generic companies will only have the data they need to enter the market in a couple of years, so mesotrione has actually been remarkably well protected, despite a much earlier patent expiry date.

Exhibit 18

Additional months of market exclusivity gained through SPCs and data protection – excluding time for dossier preparation

Active ingredient	EU expiry date	Additional monopoly by SPC (months)	Additional monopoly by data protection (months)	Total additional monopoly (months)
azoxystrobin	25/01/2010	14	0	14
indoxacarb	16/12/2011	36	16	52
spiroxamine	23/02/2008	48	0	48
picoxystrobin	13/01/2008	60	12	72
picolinafen	11/03/2011	60	0	60
mesotrione	18/12/2005	60	36	96

Source: Enigma

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Dr Nigel Uttley: Looking in more detail at the active ingredient azoxystrobin, we see there was only a limited amount of additional protection for the active ingredient from patent term extension and data protection. However, this is where segmenting the market into mixture products makes life difficult for the potential generic manufacturer.

Azoxystrobin is mixed with quite a considerable number of other active ingredients and some of these mixtures have patent protection and associated SPCs. The significant ones are mentioned in **Exhibit 19** and you can see how the patent expiry dates for SPCs are from 2015 to 2018. So whilst this azoxystrobin itself is off patent and therefore available to generic competition, these mixture products and markets are not.

So when assessing the dangers to patents expiring, you have to look at every individual product and see what effect all these secondary patents and data protection situations have. It's very difficult to compare Syngenta vs. Bayer vs. BASF and look at those patent ingredients coming off patent. It's a huge exercise and extremely complex.

Exhibit 19

Mixture patents for azoxystrobin

- Patent and data protection period expired in EU 3rd April 2011 for the active ingredient
- Mixtures
  + chlorothalonil – SPCs expire 2015
  + cyproconazole – SPCs expire 2018
  + difenoconazole – SPCs expire 2015
  + folpet – SPCs expire 2015
  + hexaconazole – SPCs expire 2015

Source: Enigma

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So what are the opportunities for generic azoxystrobin manufacturers? We have over 20 Chinese companies on our database which claim to manufacture azoxystrobin, and from a chemistry viewpoint it's not that difficult. So, why would generic companies manufacture azoxystrobin? Well, it's a very important product with sales of >$1bn per year. However, not all of this would be available to generics post expiry of the basic patent. How many Chinese companies will have established what the market split between straight azoxystrobin and azoxystrobin mixture products is? And how many Chinese companies will have established whether the SPCs apply to all European countries. It is very difficult for them to figure these out since SPCs are obtained on a country by country basis. (**Exhibit 20**).

In other words was the development of generic azoxystrobin by Chinese companies market led or technology driven – I think you probably know the answer. The Chinese companies don't analyse the market split between straight and mixture products. All they see is this wonderful, large European market, azoxystrobin sales are globally >$1bn now and EU sales are probably around half of that, the Chinese companies don't analyse this. They are technology driven and not market led.

Exhibit 20

Opportunities for generic azoxystrobin in EU

- 20+ Chinese companies claim to manufacture azoxystrobin
- **Market split – straight vs mixture products?**
- Check that all countries are covered by SPCs
- Market led or technology driven

Source: Enigma

Jeremy Redenius: One thing I found really interesting was with these secondary patents on these mixtures then Syngenta and peers can take those mixtures as reformulations to the farmers and say, "this is the latest and greatest." They can show them some data showing a little bit more yield, and since crop prices are high, the farmers pay for it and it's really the marketing arm of Syngenta that goes to work here.

I think it's a little bit more difficult selling in some emerging markets. Farmers maybe a little bit more price sensitive and if Syngenta tries to market a mixture, farmers may be more resistant. So I think it works very well in the developed markets, a little less so in the emerging markets.

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Dr Nigel Uttley: To show how complex it can get when trying to establish a generic I've chosen mesotrione as a good example of how the inventor company can utilise a number of tools to create a strong market defence strategy using SPCs, patents, process patents, formulation patents and then data protection. Mesotrione was discovered by Syngenta. It is Syngenta's second triketone herbicide following suclotrione. It is a systemic, selective maize product that can be applied pre- or post-emergence to control annual broadleaf weeds and certain grasses. Let's look at the 5 IPR areas utilized by Syngenta to protect mesotrione after its basic patent expired in 2005. We talked about data protection which gives 10 years protection from 2003 to 2013. However, there are a number of mixtures for mesotrione, some with patent protection until 2016 - essentially another 3 years where the majority of the market is just not open to generic manufacturers (**Exhibits 21 – 24**).

The chemistry and technology involved in the manufacture of mesotrione are relatively straight forward and involves some basic intermediates obtainable from a number of sources. However, when you register a product there's always an impurity profile and certain impurities may have specific issues. In the case of mesotrione there is one impurity in particular that is considered to be of toxicological concern and must remain below 0.0002% (w/w) in the technical product. Thus, the process conditions rather than the actual technologies involved in the synthesis will be the key to whether generic manufacturers are capable of producing an acceptable product. I know that Chinese manufacturers do offer two grades of mesotrione – one that does meet this criteria and one that doesn't.

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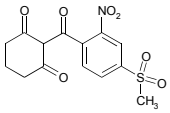
Exhibit 21

Post-patent defence strategies for example mesotrione

- SPCs
- Mixtures patents
- Process Patents
- Formulation Patents
- Data Protection



Source: Enigma

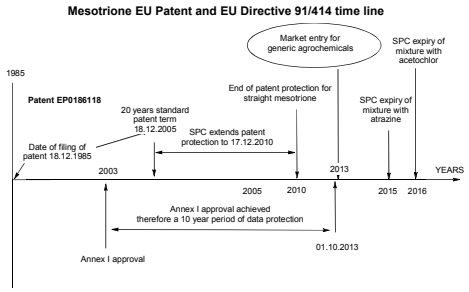
Exhibit 22

Mesotrione: - SPCs

- EU expiry date Dec 2005
- Supplementary Protection Certificates (SPCs) exist in EU giving a maximum expiry of 17.12.2010, thus an extra 5 years protection

Source: Enigma

Exhibit 23



Source: Enigma

Exhibit 24

Mesotrione: mixture patents – many including:-

- EP0756452 is to a synergistic herbicidal composition of mesotrione plus atrazine, EP0756452 is due to expire on 29/03/2015
- EP0840548 is to a mixture of mesotrione + chloroacetamides (acetochlor) and is due to expire on 10/07/2016
- A SPC exists for a mixture product of mesotrione with terbuthylazine which expired 17/12/2010

Source: Enigma

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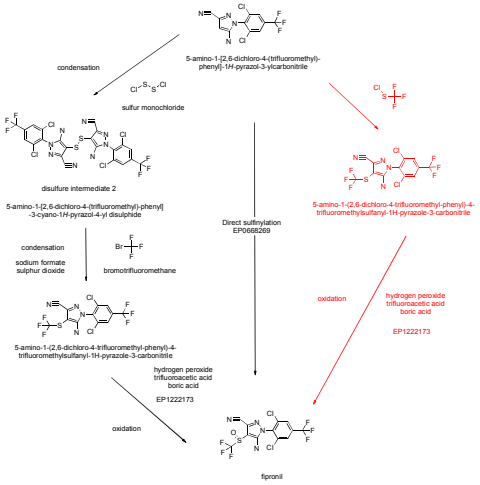
Another example is fipronil from BASF ($500m sales in 2010). Fipronil is an insecticide and insecticides are generally not mixed with other insecticides. So the opportunity to segment the market and protect it through mixture products is not really there. The basic patent for fipronil has already expired.

However, process patents can form a key defence strategy once a product loses basic patent protection, especially when utilising other strategies such as mixture patents is restricted. This applies to fipronil. BASF has developed a number of processes to fipronil and filed patents (for example, **Exhibits 26** & **27**). BASF is pursuing patent litigation against Makhteshim Agan Group (MAI) and other companies claiming infringement of its process patents. The threat of litigation is sometimes enough for the smaller companies, to go and make something else. In addition, it is not just the manufacturing company which is at risk. Marketing companies and distributors could also be liable should infringement be proven (or alleged); it is these companies in the supply chain who have very little knowledge of chemistry and manufacturing process, which find the risk most difficult to assess.

Exhibit 25

Fipronil: process patents – key market defence strategy of BASF



Source: Enigma

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Exhibit 26

Fipronil: process patents – key market defence strategy of BASF

- EP0668269 – "Process for the sulfinylation of heterocyclic compounds", which expires 17.02.2015. EP0668269 involves the direct sulfinylation
- EP1222173 – "Process for preparing 4-trifluoromethylsulfinylpyrazole derivative" which expires 22.10.2019. EP1222173, is an improvement on the general process of sulfinylation followed by oxidation and generic manufacturers must therefore use different oxidation conditions.

Source: Enigma

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Is the EU an attractive market for generics? Yes, it has a large market potential, but it's quite fragmented. The cost of market entry is very high in comparison to Asia. Chinese generic companies are more likely to go to those markets where it's easier to get registrations. Registration issues are expensive and very difficult, especially since the European Commission is constantly changing the goalposts (**Exhibit 27**).

Exhibit 27

Is the EU an attractive market for generics?

- Market potential – large but fragmented by many mixture products and different national distribution systems
- Cost of market entry – very high (in comparison)
- Synthesis/technology/manufacturing issues – not substantially more difficult than other markets
- Registrations issues – expensive and constantly changing
- Intellectual Property Rights (IPR) – complex and more difficult than in other regional markets

Source: Enigma

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The Chinese Agrochemical manufacturing industry

The Chinese market is a mixture of a free market and Government planned controls. There's over 2,600 manufacturers and there's been tremendous growth in the last five years, although the last three years has seen poor profitability and an oversupply situation, and from an environmental viewpoint there's not the same level of investment in the EU or US. We think consolidation is essential and the government can help by restricting the number of licences and transfer of licences – but then how will government know which companies to encourage and which to ban/restrict? Consolidation through acquisitions is in its infancy in China but I expect that this will increase as companies seek to adhere to the new 5 year plan (**Exhibit 28**).

In the five year plan they said they're going to reduce by 30% the number of pesticide companies and reduce active substance manufacturers to just 300. So they're just going to close factories down. By 2015 they want the top 20 manufacturers to account to 50% of the total value of sales and by 2020 70% – a real consolidation (**Exhibit 29**).

Exhibit 28

Government Control

- Mixture of free market and government plans/controls - 5 year plan and cooperative manufacturing groups
- Over 2,600 manufacturers - last 5 years tremendous growth
- Last 3 years poor profitability (oversupply)
- Environment - low investment
- Consolidation essential

Source: Enigma

Exhibit 29

5 year plan (2011 – 15)

- Reduce by 30% number of pesticide companies and reduce AS manufacturers to 300
- By 2015 top 20 manufacturers should account for 50% of total annual sales and by 2020 70%
- 20 companies with annual revenues in excess of $300 million/annum
- 5 companies with sales in excess of $750 million/annum
- 2-3 companies with sales in excess of $1.5 billion (ChemChina/MAI takeover)
- Create between three and five pesticide production industrial parks

Source: Enigma

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Exhibit 30 gives an idea of some of the Chinese companies that are around in agrochemical manufacturing. The Chinese crop protection industry association is trying to control the number of companies and has created some co-operative groups (**Exhibit 31**).

The important point is "to jointly raise funds for overseas registration". This is important because the Chinese manufacturing companies often don't get involved in European or American registrations, nor do they provide funds to achieve these registrations and thus they have no control in the marketplace.

Exhibit 30

Companies

- China's top ten companies have sales between $150 – 300 million pa
- Jiangsu Yangnong Chemical's pesticide sales remained level in the first half of 2011 with the same period last year, increasing just 0.1% to $150.6 million (at the current rate).
- Shenzhen Noposion Agrochemicals recorded a 15.2% increase in agrochemical sales to $178.9 million (at the current rate) in the first half of 2011.
- Zhejiang Wynca Chemical saw agrochemical sales for 2010 continue to slide, down 7% to $286.5 million (at the current rate).
- Chinese pesticide company mergers in 2011. The inaugural list includes only two companies: Shenyang Sciencreat Chemicals, a manufacturer of active ingredients with a registered capital of $74.2 million and CNSG Agrochem, a formulations producer with a registered capital of $15.2 million.
- Acquisitions – a number of companies available at "knock-down" prices but will struggle to find buyers because of "out-dated and uncompetitive" product lines

Source: Enigma

Exhibit 31

CCPIA Cooperative Groups - goals

- To "call on constraints of disorderly competition and vicious situation incurred by blind capacity expansion"
- To "propose production, construction, application and the market situation so that government is comfortable in taking effective measure against overcapacity and other detrimental matters for the orderly development of the industry"
- To "jointly raise funds for overseas registrations, improvement of production techniques, research and development of formulations…."
- To "standardise the market order and crack down on illegal manufacturers and counterfeit products"

Source: Enigma

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Whilst I've been saying that azoxystrobin's a well protected market and the price hasn't fallen, imidacloprid is not quite so well protected. Fundamentally, this is because it often is not mixed with other active substances so you don't have all these secondary patents to protect it, post active ingredient patent. (**Exhibit 32**)

Exhibit 32

Example – imidacloprid

(2009 figures CCPIA)

- 60 registered imidacloprid manufacturers
- Total capacity – 25,000 tons of a.i (100%)
- Output – 12,000 tons (8,000 tons exported)
- World market – 18,000 tons
- Price/ton
  1996 RMB 1.2 million
  1999 RMB 0.5 million
  2004 RMB 0.16 million
  2010 RMB 0.10 million

Source: Enigma

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One interesting development going forward is that a Chinese National Chemical Corporation, ChemChina (which is a Government run establishment that's taken over Makhteshim-Agan Industries (not covered)), is the leading generic/off patent company in the world with sales of ~$2bn. Makhteshim-Agan has outlets all round the world, and invests in registrations. With the ChemChina takeover, everyone is waiting to see what's going to be the new business strategy. Are we going to see a whole load of active ingredients coming out of China and being funnelled through this marketing organisation?

This would result in the R&D companies having serious competition from the generic companies. They will still have all their patents but they will have much greater competition with an outlet in the marketplace.

So what is the future for EU barriers for entry? Registrations are complex but they are becoming slightly easier as people work their way through the system. Instead of registering your formulated product in each country, there's now three zones within Europe so if you're in the UK you're part of the northern zone, so if you get your product registered in the UK then it should be rubber stamped for Germany.

Patents are very complex and likely to remain so unless generics industry challenges validity of mixture patents, which I believe is unlikely – I've been advocating this for at least 10 years and there's little evidence of this happening. Process patents are likely to be used more in an attempt to put up entry barriers (**Exhibit 33**). I expect market segmentation will increase, for example, through mixtures.

Exhibit 33

The future – EU barriers to entry

- Registrations – complex but becoming easier
- Patents – very complex and favours R&D sector
- Markets – increased segmentation through mixture products (extended IPR)
- Many generic companies lack critical mass
- Fewer local marketing companies available for acquisition

Source: Enigma

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The future for China has to be market led and not technology pushed, only by this way will there some control on the number of suppliers. Consolidation is essential. They need to invest in registrations albeit it an expensive exercise. Investment in registration dossiers - Chinese companies need to understand that the way forward is to invest in registrations via acquisitions, JVs etc in order to establish long term and profitable business in the EU and this is not achieved by sitting in booths at exhibitions around the world displaying a list of active ingredients for sale.

Is the ChemChina/MAI deal the blueprint for the way forward into Europe? – The Chinese government clearly thinks so and this deal is a major goal of its 5 year strategic plan for the agrochemical industry.

Security of supply - If you already import from China or are seeking to increase your imports then security of supply should be a major concern. Do you know how far backward integrated in the manufacturing process your supplier is – is your supplier vulnerable to Government control, environmental issues, raw material shortages etc.

It's quite clear that the agrochemical industry in China has developed at a rapid rate but it seems to find itself in difficulties and there is no doubt in my mind that this has been caused by a technology push development strategy when a market led strategy is needed (**Exhibit 34**).

Exhibit 34

Source: Enigma Consulting

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Q&A Session

Jeremy Redenius: Have you seen any evidence that ChemChina might now be entering markets more aggressively?

Dr Nigel Uttley: I think in the next few weeks we will see ChemChina start to put forward their strategy. It is starting to look like MAI is going to be the vehicle by which the Chinese active ingredients go through - but not all Chinese active ingredients. I think we could expect further acquisitions of the larger generic companies such as Nufarm, Cheminova, United Phosphorus etc.

Q: In pharmaceuticals we see drugs are fairly good and it is hard to create a drug nowadays better than those already on the market. Are you seeing the same kind of things in the agrochemicals industry? And are the new active ingredients sufficiently better to actually command a better price?

Dr Nigel Uttley: In general the agrochemical industry, from an R&D viewpoint, is relatively mature – because the needs of the farmer are met by existing products. Innovations will continue especially in the area of fungicides where resistance to existing products is an issue, and new active ingredients and mixtures are needed.

Q: On regulation, it strikes me that food is a very important thing, and yet the crop protection industry has managed to put in barriers to generic products which effectively raise prices for people all over the world. Is there any sort of backlash against that from any sector at all?

Dr Nigel Uttley: I would say not significantly. The actual generic industry has failed to come together as an industry to try and combat the R&D sector. For pharmaceuticals there's a great driving force to get generics into the market if you are the National Health Service or you're a healthcare provider you want cheaper drugs. One of the fundamental differences between the pharmaceutical and agrochemicals industry is that once a pharmaceutical comes off patent, if you can prove bioequivalence you don't have to generate the supporting trials data – that becomes available.

In agrochemicals, this is not the case. You still have to generate the data or you have to pay compensation to the inventor to be able to use the data. Around 30 years ago American politicians decided that they should increase the percentage of generic pharmaceuticals scrips which at the time was only about 18% now by allowing the registration dossier to be used by generic companies this has increased to about 60%.

Q: Is there an appetite to do the same in the agrochemicals industry?

Dr Nigel Uttley: I don't think there is. People talk about food being expensive but in the developed world there is plenty of food and we waste a lot of it! But the world population is ~6.5bn and I think ~2 bn people live off less than $2 a day and to them the price of food is crucial to their very existence.

Q: Is it fair to say that the conclusion of the presentation is that the decline in active ingredients means that generics will become more important over time but it may not be as quick as you think?

Dr Nigel Uttley: Yes – because the active ingredient isn't just the be all and end all. There's this cascade of products down from the active ingredient, the mixtures which can also have IPR protection.

Q: Is there anything to stop generics producers mixing products, once they come off patent? Assuming it has access to that single off product item? Or is it because the generic producers just don't yet have the scale? What about farmers? Could they mix products themselves?

Dr Nigel Uttley: So could a farmer theoretically mix product A and product B together and spray them? Yes, they can, and if there's a significant sort of cost benefit then they perhaps would. However, generics companies might face more difficulties, they might not have access to the second compound, or the second compound might still be protected in its own right. If it's not patent protected and they can get hold of both

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products, they have to be careful of what they put on the label, because the R&D company may have IP rights to the mixture.

Q: You mention the quirk which makes the agrochemical industry very different to the Pharma industry is that you have to generate the data yourself. Is that a permanent rule? Why has that historically come about – have the R&D companies lobbied for that?

Dr Nigel Uttley: It partly came about because of the re-registration of products which occurred in Europe and in US. What happened was that the regulators decided that they didn't have enough data under the old system, so all the new active ingredients would have to go through a certain checklist of data. But, at the same time all the old products would need to be re-registered – and some of these products have been on the market since the 1940s. However, data gaps became evident, so the regulators wanted new data from the companies to fill in the gaps, but some of the industry pushed back, saying that they couldn't afford to do it, and if we are to do it we need data protection.

So this is how the data protection rule came about, so for an old product that was re-registered, any new data got five years, and post-1993, new active ingredients got a ten years data protection. So azoxystrobin is a "new" product and so got 10 years protection.

Q: Is the marginal benefit of new mixtures declining?

Dr Nigel Uttley: We are getting into an area that I'm not terribly comfortable with because I am not particularly familiar with the biology. The newer fungicides have more specific activity and are more targeted at specific diseases so you will get fungicide mixtures that will target a specific problem but then it will be mixed with a broad spectrum fungicide as well. In general, mixtures are less important for herbicides and insecticides.

Q: So herbicides have more of an issue as there are not as many options in terms of mixing?

Jeremy Redenius: I think the one case that jumps to mind is for managing glyphosate resistance they are using glufosinate from Bayer, and they are now talking more about using 2,4D in mixtures to manage the glyphosate resistance weeds. These three products are all quite old, 2,4D is from the 40s. I'm not convinced that making mixtures like that will be as defensible as the farmer is more familiar with those chemicals, they've been around for a long time, and there is ample generics supply. They can just get them, bring them together themselves and that's a big part of the herbicide market.

Dr Nigel Uttley: Unless it's a specific herbicide that takes out a specific weed that's causing problems, then they will have to mix that with a general one. I think they've been very fortunate in getting patent protection for a lot of these mixtures, claiming a synergistic affect which may be the case but here's a degree of obviousness also. But as a precedent has been set by the patent examiners, it is difficult to reverse this.

Q: Can you give us an idea of how the distribution network and sales channels of the R&D players can create barriers for the generic companies?

Dr Nigel Uttley: In the European market what we tend to see is a basket of products offered, and then we will see cross-selling of new products with older ones. What the big companies have is brand and the trust that comes from that. There are quite a few examples in the industry of problems associated with buying from generic companies (for example, counterfeit products from the generic sector, not necessarily in Europe, but in the rest of the world, where a farmer may receives a five litre container full of coloured water and that's about it) so the R&D companies will make a big deal of that.

Q: How robust are the various types of patents? If you look at the pharmaceutical industry it's only composition of matter patents that really matter, as the other patents are almost treated as irrelevant.

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Dr Nigel Uttley: Formulation patents are quite important to pharmaceuticals and for agrochemicals and I certainly see them being defended rigidly by the R&D companies.

There was a very good product (clomazone from FMC Corp), where they developed a micro encapsulated formulation which reduced exposure to people and was patent protected resulting in about an additional 14 years of market protection.

In addition, we see the R&D players aggressively pursuing any infringements with litigation. They have large teams of highly experienced lawyers looking after their interests.

Q: You gave the imidacloprid example where a Chinese company come in and the price basically crashed. How long was there between the patent protection expiring and the China production coming on line? How quickly are the Chinese moving?

Dr Nigel Uttley: I haven't really seen that Chinese generic companies always wait for patent protection to come off. I've walked round exhibitions and you see the standard Chinese companies with little booths listing a number of active ingredients and you'll see some paper covering the names of certain active ingredients because they've been sued in the past – but you can see the name! It's very amateur. I am starting to see some improvement and you see some of the multinationals filing for patent protection in China as well. In the past the time between patent protection expiring and production coming on line has been very, very quick indeed.

Q: Can you give us your take on the generic risk to Syngenta's azoxystrobin?

Dr Nigel Uttley: I think that's all down in Jeremy's paper?

Jeremy Redenius: Yes, so to give you some insight, we started writing our note [from April 30, 2012 *Syngenta: Shooting (Ami)Star. Why the Generic Threat to Syngenta's Blockbuster Is Overdone; (It's Not Glyphosate)*] the opposite way around. Originally our hypothesis was that with patents expiring in a couple of years, azoxystrobin was going to blow up.

As we started doing the research with Nigel, we realised that it wasn't as easy as we originally thought for generic competition to come into the market and completely rewrote the story. There are SPCs and secondary mixture patents, as Nigel just explained, in Europe. Also Syngenta's been awfully clever about mixing the products in different ways. They've also been clever about getting contract manufacturing to prevent people from building a new competing plant. Syngenta now has the world's biggest azoxystrobin plant and is supplying the next three biggest competitors, with the provision that they then blend it with their own ingredients. So they're not necessarily competing head-to-head.

Nigel Uttley: The strategy of a large generic company is to look at all these products coming off patent. They have the capability globally to market them. They have the capability to manufacture them or process the active ingredient. They can then go straight to the R&D company and say, "we can take it head on, but what we'd like to do is to take your e.g. azoxystrobin and mix it with something else". So they create another product and grow the market.

So the deal is for the R&D company to sell the active ingredient to the competitor and grant access to the registration data. They don't actually see the data but they're allowed to quote it. And so Mahkteshim Agan, NuFarm, Cheminova they've become, in some ways, almost a conduit for the R&D companies to get new products into the market place but with a degree of control.

Q: With these supply agreements do you see pricing collaboration? How much price discipline do you see?

Dr Nigel Uttley: I can't say there's any agreement on pricing but they are fixed into buying the active ingredient at a certain price so there's a certain amount of control.

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Q: So when we look at the latest off patent chemicals, how do we tell whether it's going to be one that plunges or holds its own? Is there a simple rule of thumb or do we have to consider each individual case?

Dr Nigel Uttley: It's each individual case, absolutely. You've got to look at where the product is sold. If it's 50% Europe then that's a more protected market. You've got to look at is it sold as a straight product or in mixtures with associated mixture patents. This is the thought process we went through with azoxystrobin.

Jeremy Redenius: With azoxystrobin (or the strobilurins at least where we had data), at least half is sold in Europe, and the next 30% was US, Japan and Brazil which are relatively tough from a patent or registration point of view. Well, Brazil's not so tough but there is a three year backlog on registrations. So we estimate that about 80% of azoxystrobin is actually in protected markets. I think the other thing I learned was that fungicides are more protected than insecticides or herbicides. So if you think of the companies, Syngenta and Bayer are more skewed towards herbicides and BASF towards fungicides.

Dr Nigel Uttley: It's a difficult thing to assess, I would ask the companies what are their secondary patents or strategy and see what they come up with.

Jeremy Redenius: It'd be a good question for CFO or Head of R&D. I've noticed the first question, a lot analysts ask, including myself at the beginning, was when's the patent expiry? And then start thinking about it from there, but we've learnt the patent expiry date can be quite misleading.

Q: How much of an impact do you think deterioration of farm economics would have on the willingness of the farmers to adopt generics? Would the first thing be for farmers to switch to generics? Or would you be more likely just to cut down on application?

Dr Nigel Uttley: That would have a big effect. It will either drive the generics industry or the farmer will just not use products, they will cut down the amount of input. The agrochemical industry as a total would go down. In terms of switching to generics, I think it depends on the situation, what level of say, infestation that you've got, if it's severe then you may try and get a cheaper option. So that might drive the industry but that's a long cycle. Neither can you suddenly turn the tap on for generic products in the EU because the registration takes so long to achieve. One of my reports mentions that it can take best part of four or five years for generic company to get to market once they have identified an active ingredient. Even if they know how to make it they still have to do all the field trial work which is a minimum of two years and then you've got to put in your registration dossiers.

Q: If I'm a farmer where do I get my data from? How do I cross check what a company representative is saying?

Dr Nigel Uttley: Well the farmer goes to the distributor they will give a balanced viewpoint – the distributor will have various products in there that might do a similar job. In addition, farmers will employ "field walkers", these are consultants that just walk the fields looking for disease or weed or insect problems and giving help on which products the farmer might need. There is plenty of advice available to the farmer.

Q: But all the field trials are done by the R&D companies themselves aren't they?

Dr Nigel Uttley: Not necessarily, no.

Q: Are there any independent bodies then?

Dr Nigel Uttley: Yes, there is a big service industry developing registration dossiers, doing field trials and developing toxicology and environmental impact data.

Q: Can you give me an example of somebody who does field trials?

Dr Nigel Uttley: Eurofins. There are also specific companies that will just manage the development of the registration dossier. So you will have your field trial people, your toxicology people, your environmental results, and they'll bring all that together in a dossier and present that to the authorities.

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Q: On seed traits, do you think that these will mean that some crop protection chemicals can be done away with completely?

Dr Nigel Uttley: I think the theory is fantastic but in practice I don't see it happening. Not in the next 20 years at least. I do think that GM crops are coming through, for example glyphosate tolerant soybean seeds destroyed a lot of DuPont's sulfonylurea market 10-15 years ago. There is the potential for certain companies to lose out to new GM traits coming through.

Q: You mentioned ChemChina looking at someone like a NuFarm as another branch out of China. Are there any other companies that would fit the mould that could be potential targets for them?

Dr Nigel Uttley: Cheminova a potential one. There are also some very large cooperatives in the US which aren't quite in that mould but could also be a target, Agrium springs to mind. Also Nufarm, and Sipcam, an Italian company, who are pretty strong in Europe in South America.

Q: You highlighted a point about the Chinese companies needing to raise funds to get more overseas registrations. How easy or hard is that for them to get the registrations, assuming they have the money?

Dr Nigel Uttley: It's a different strategy to the one they have at present. They either have to do JVs with the marketing companies here or they have to acquire them. The Chinese Government is trying to create that mindset.

Q: Is it just China we have to be concerned about? I mean Saudi Arabia's building a big phosphate mine. I were in charge of Saudi Arabia, where we are high on hydrocarbons and short of food, I'd try and get everybody involved in the food supply chain.

Dr Nigel Uttley: The only other country really that's big in the generics industry is India. Saudi Arabia don't really have the chemistry, but they have massive volumes of oil and that's where they start from whereas the Chinese and Indians have very good organic chemists.

Q: SABIC is looking to biotech overseas. Do you think they would look to buy some of this technology so they can develop it?

Dr Nigel Uttley: Yes I'm sure they have the capability if they want to. From a population viewpoint I think it is unlikely, whereas with India and China you're talking about a third of the world's population.

Q: With the graph showing the number of active ingredients per year, would you expect that to come back? If you had to forecast that forward for the next ten years what would you expect to see?

Dr Nigel Uttley: It seems to have levelled out at around five or six per year and I would expect that to continue, given the issue of resistance, there is still a need for new active ingredients.

Q: Could we see the number of active ingredients lagging crop prices? Back in the mid 90s, at least in real terms crop prices were very high. So we see a high number of active ingredients in the late 90s and now we're back in a period where real crop prices are high again and have been for the last couple of years. Could two or three years from now we see some more R&D coming through?

Dr Nigel Uttley: I think we have seen R&D capabilities cut down over the years, not necessarily chopping their budget because they've moved that into the development of mixtures and formulations, and the registrations. So the total spend on R&D would not have gone down. Certainly R&D has moved away from the actual ingredient emphasis that it used to have. One thing we've not talked about is the Japanese inventor companies. There are four or five of them and they're relatively small in terms of turnover but they probably invent 50% of the active ingredients coming through. Ten years ago there were probably eight or nine, so there has been a bit of consolidation in that industry and I would expect there to more of that. So we might expect to see Japanese companies merging or acquisitions in that space to perhaps three Japanese companies.

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Q: Are they consolidating because they're under a particular risk or because they thought it was more cost effective and so we can expect better things from them?

Dr Nigel Uttley: Well I think they've got this big R&D spend and they don't have the turnover to justify it. So I see more consolidation of the Japanese.

Jeremy Redenius: Thanks everybody for coming.

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Valuation Methodology

We value our companies using a mix of relative P/E, absolute P/E, DCF and sum-of-the-parts methodologies

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Our financial forecasts are based on our forecasts for economic growth, and assume prevailing exchange rates remain unchanged into the future. The performance of chemicals companies can be significantly influenced by changes in demand, in turn driven by changes in industrial growth and consumer spending. For some of our commodity-linked companies, changes in the oil price could also have a significant effect as well as diverse foreign exchange movements. A decline in agricultural commodity prices would affect farmers' agrochemical spending, as would persistent and simultaneous adverse weather conditions in a number of regions across the globe. Long-term consumer resistance to genetic modification could hamper growth potential as well as any changes in regulation. Delay of product launches could have a similar effect. In this period of continuing consolidation, unexpectedly large dilutive acquisitions could have a downward effect on all our companies.

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12-Month Rating History as of 06/21/2012

Ticker	Rating Changes	
BAS.GR	M (RC) 09/01/11	O (IC) 09/16/10
BAYN.GR	O (RC) 05/29/12	M (RC) 03/10/11
SYNN.VX	M (RC) 09/06/11	U (RC) 05/17/11
SYT	M (RC) 09/06/11	U (IC) 06/09/11

Rating Guide: O - Outperform, M - Market-Perform, U - Underperform, N - Not Rated
Rating Actions: IC - Initiated Coverage, DC - Dropped Coverage, RC - Rating Change

BAS.GR / BASF SE

Date	Rating	Target(EUR)
09/16/10	O(IC)	61.00
11/04/10	O	68.00
12/09/10	O	71.00
03/04/11	O	77.00
08/03/11	O	74.00
09/01/11	M	56.00
10/11/11	M	53.00
02/03/12	M	58.00

IC - Initiated Coverage

BAYN.GR / Bayer AG

Date	Rating	Target(EUR)
09/16/10	O(IC)	59.00
11/04/10	O	63.00
12/06/10	O	66.00
03/10/11	M	64.00
04/21/11	M	62.00
08/30/11	M	50.00
02/03/12	M	54.00
03/13/12	M	60.00

IC - Initiated Coverage

SYNN.VX / Syngenta AG

Date	Rating	Target(CHF)
09/16/10	M(IC)	263.00
10/19/10	M	294.00
02/10/11	M	325.00
05/17/11	U	250.00
07/26/11	U	240.00
09/06/11	M	240.00
02/07/12	M	280.00

IC - Initiated Coverage

SYT / Syngenta AG

Date	Rating	Target(USD)
06/09/11	U(IC)	56.30
07/26/11	U	59.30
09/06/11	M	60.40
10/24/11	M	53.07
02/07/12	M	60.50

IC - Initiated Coverage

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