Biologicals 2017
An analysis of corporate, product and regulatory news in 2016/2017
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Welcome to the fifth instalment in Agrow’s series of annual biologicals reviews. Biologicals, especially biopesticides, came into prominence in the first half of the current decade when a mix of political and regulatory pressures led to the big players looking at biologicals as possible components of crop protection solutions. That was followed by a flurry of acquisitions and deals during the period 2012-2014 by the big agrochemical players seeking to give a jump start to their biopesticide programmes.

But during the last couple of years, the limelight has moved to mega deals and acquisitions involving the Big Six themselves: DuPont and Dow Chemical agreeing to merge their businesses; Syngenta’s board accepting ChemChina’s acquisition offer; and Monsanto accepting Bayer’s acquisition offer. What could be the potential impact of these on the biologicals sector?

Bayer points out that its combined R&D portfolio with Monsanto would have exceptional depth, reach and great commercial potential. Both companies have complementary pipelines over short-, medium- and long-term with potential for further incremental innovation to address key challenges in the agricultural area in a new way, it adds.

Do the companies not involved in the mega deals perceive them as a threat?

BASF, the only one among the Big Six that was not involved in a big-ticket deal, feels “very comfortable” about its position. “Our crop protection business – with approximately €5.6 billion ($6.1 billion at the current rate) in sales, industry leading margins (FY 2016: 29.9%) and supported by about one quarter of BASF’s entire R&D budget – has the critical mass to remain competitive in a changing industry environment,” says BASF Crop Protection’s vice-president of global strategic marketing for Functional Crop Care, Alyson Emanuel. She points to its “well filled” innovation pipeline, with peak sales potential of €3 billion ($3.3 billion) from products launched between 2015 and 2025.
The company keeps a close watch on potential acquisition opportunities. “As a general practice, we constantly review acquisitions and divestitures opportunities as part of our active portfolio management.” The company has “clearly defined” key criteria. “We focus on innovative business segments that offer specific customer benefits, segments that can grow above market average and enable growth in attractive regions, especially in emerging markets, as well as segments that can make our portfolio even more countercyclical.”

**Arysta LifeScience** (part of Platform Specialty Products), which was an early entrant to the biologicals segment, says that most companies currently undergoing an M&A process have a clear strategy on biologicals. “It will be interesting to see if synergies are found by the combined companies,” says Paula Pinto, vice-president, global portfolio management.

Specialist biologicals companies such as **Marrone Bio Innovations (MBI)**, **Stockton** and **BioConsortia** also do not seem to perceive the industry restructuring as a threat. “The bigger you get the slower you get,” says MBI chief executive officer Dr Pamela Marrone. “The combination of research programmes within the soon to be ‘big four’ is expected to expand the spend on biological research but, historically, large organisations have a harder time with rapid innovation,” concurs the chief executive officer of BioConsortia, Marcus Meadows-Smith.

Dr Marrone also points out the opportunities for small, nimble, fast companies to be innovators. Mr Meadows-Smith has a similar view. “There will probably be a lull in the M&A of the SMEs, but this will give time for the SMEs to develop superior products and prove efficacy and grower acceptance.” He sees potentially more opportunity for smaller players to have an impact in the biologicals market with the upcoming consolidations. “There are still many well-established, independent, small and mid-sized companies working on biologicals that have shown recent success in the market that have been building up their portfolios and pipelines for some time.”

Mr Meadows-Smith also points out that “most of the industry leaders have made research investments or acquisitions in the biologicals space at this time, and thus are primed to support and advance acceptance and usage of biologicals in standard commercial agriculture”. Stockton CEO Guy Elitzur is in agreement. “Regardless of the mega M&As, biopesticides will keep growing and be integrated into the conventional programmes in the short and long run.”

**Product launches and pipeline**

**Bayer CropScience**’s biofungicide, Contans WG (Coniothyrium minitans), received regulatory approval in South Africa last year. The biofungicide, Serenade ASO (Bacillus subtilis strain QST 713), received use expansions in a number of markets. Bayer CropScience’s head of biologics R&D, Benoit Hartmann, says that apart from combating diseases such as Botrytis spp, bacterial infections and black sigatoka on bananas as well as soil-based syndromes, the product also shows strong effects on improved plant growth and stimulation of plant defence. Serenade Prime was launched in Australia in May 2016 with a focus on plant growth and yield effects. The bionematicide, BioAct Prime (Paecilomyces lilacinus 251), which received Greek approval in April, will be launched there this year with many other countries around the globe to follow.

In terms of forthcoming launches, Bayer’s bioinsecticide, Requiem Prime (extract of Chenopodium ambrosioides), will be launched in 2017/2018 in many European countries. The seed treatment, Votivo (Bacillus firmus + clothianidin), will be launched in Europe in 2018.

Bayer has production sites for biologicals at Tlaxcala, Mexico and Wismar, Germany. Bacterial microbials are produced in Tlaxcala while Wismar produces fungal microbials.

**BASF** launched the biofungicide, Serifel (Bacillus amyloliquefaciens strain MB1600), in South America and Central America. The biofungicide, Integral (B subtilis strain MBI 600), was launched in Asia. In the EU, an emergency measure based on the EU Regulation 1107/2009 was granted for use of the bioinsecticide, Velifer (Beauveria bassiana strain PPR1 5339), in Germany and Austria on potatoes to protect against wireworms in February 2017. Under the trade name Broadband, Velifer was initially developed for and is on the market in South Africa, the company says.

Velifer is currently under evaluation in Australia and the company expects that to be completed by the end of 2017. Velifer will be launched in Asia in 2017. The seed-applied biofungicide for oilseed rape, Integral Pro (Bacillus amyloliquefaciens MBI 600), is in the final stages of regulatory approval in France and Germany.
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The company has also recently submitted applications with the US EPA to register the biofungicidal seed treatments, Velondis Flex (*Bacillus subtilis* strain BU1814), Velondis Extra (*B subtilis* strain BU1814 + *B amyloliquefaciens* strain MBI 600) and Velondis Plus (*B subtilis* strain BU1814 + *B amyloliquefaciens* strain MBI 600).

Nodulator Duo is a combination of inoculant and biofungicide and will be launched in Canada in 2018. It will have the Nodulator rhizobia inoculant (*Bradyrhizobium japonicum*) along with the biofungicide, Velondis Flex (*B subtilis* strain BU1814).

In 2016, BASF agreed a deal with French plant biotechnology company Plant Advanced Technologies for the discovery and development of novel biopesticides. Some promising starting points have been identified although BASF points out that development time will take about ten years.

BASF has several production sites for biological solutions, from foliar- and seed-applied biocontrols to seed-applied biostimulants or inoculants. The facility at Somersby, Australia produces the Nodulaid range of inoculants. Expansion is underway at the site for Velifer production, which is expected to come online this year. Other facilities include: Littlehampton, UK for beneficial nematodes-based insect management Nemasyx products and the inoculants, HiCoat and HiStick; Durban, South Africa for HiCoat, Broadband and Velifer; Saskatoon, Canada for Nodulator inoculants; Ames, Iowa, US for Serifel and Integral; and additional sites in the US and South America that produce a range of biologicals products including Gelfix, HiStick, HiCoat, Rhizoflo, Nodulaid, Nodulator, Vault and Integral.

Dow AgroSciences points out that the majority of its activity in the biologicals space has involved natural products, such as the insecticide, spinosad. Microbial-based biological products are a logical extension of its leadership in the natural products market space, it says. “We have expertise both inside the company and with collaborators that can help us grow in this area.” The company has an “active testing programme” to work with multiple third parties in the biological technology space, but does not currently offer any products in this area.

Two of Arysta’s bioinsecticides based on *B bassiana* strain 147 and strain NPP11B005 have recently been cleared for EU approval. The company plans to launch them in 2018 in France and southern Europe, contingent upon regulatory approvals.

A licensing agreement last year with the Chinese Academy of Agricultural Sciences’ Institute of Plant Protection for protein-based plant disease control technology has led to a biological product being under evaluation. The next step will be the development and regulatory phases, with an expected launch around 2020-2021.

An exclusive licensing agreement with US biostimulant company Beem Biologics for novel plant-derived biostimulant technology has led to a product that is currently under field testing with aim of having it registered with the US EPA as a plant growth regulator in 2019.

Arysta has production sites at: St Malo, France for the production for seaweed extract-based biostimulants and biofungicides; Pau, France mainly for the production of virus-based bioinsecticides, including carpopovirusine and *B bassiana*-based products; and Saltillo,
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BENDICARB
DIAFENTHIURON
EMAMECTIN BENZOATE
ETOXAZOLE
FENAZAQUIN
IMIDACLOPRID
INDOXYCARB
LUFENURON
METHOMYL
PYRIFLOXYFEN
TEFLUBENZURON
THIAMETHOXAM

FUNGICIDE
BOSCALID
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FAMOXABONE
FLUOXONIL
MANCOZEB
PYCNOXYSTROBIN
PROPICONAZOLE
PROTHIOCONAZOLE
PYRACLOSTROBIN
TRIFOXYSTROBIN
TRITICONAZOLE

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CYHALOFOP-BUTYL
DICAMBA
FLORASULAM
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Mexico for various biostimulants and nutrition products with a strong focus on natural plant extracts.

Among recently launched products, MBI highlights: the bioinsecticide, Majestene (Burkholderia rinojensis strain A396), in the US; the bioinsecticide/acaricide, Grandevo (Chromobacterium subsutganie strain PRAA4-1T), in Mexico; the biofungicide, Roygia (Reynoutria sachalinensis extract), in Chile, and the anti-transpirant product, Inveron, in the US. The company has also launched an unnamed bioinsecticide/nematicide for seed treatment applications in collaboration with Albaugh, which is marketing the product. The deal between the two companies covers all crops in the US and Canada.

Among new active ingredients in its pipeline, MBI points to its biofungicide, MBI 110, based on a new strain of B amyloliquefaciens, for which is being considered for US approval. The company has also agreed a deal with Nufarm to develop Grandevo for Australia and New Zealand. MBI expects a launch in New Zealand in 2018 and in Australia in 2019.

MBI produces Grandevo, Regalia and Zequanox at its facility in Michigan and has contractor sites for its other products.

During 2016, Stockton's Melaleuca alternifolia extract-based biofungicide, Timorex Gold, was approved in Brazil, South Africa, Serbia, New Zealand, China, Ecuador, Spain and several additional states in the US. In 2017, the company expects approvals in Colombia, Argentina, Guatemala, Serbia, Peru, Nicaragua and Dominican Republic. Stockton's combined biological and chemical fungicide, Regov (M alternifolia extract + difenoconazole), was registered in Israel and is in the process of registration in Colombia.

Belgian company Biological Products for Agriculture (Bi-PA) received EU approval in 2016 for its biofungicide based on Trichoderma atroviride strain SC1 for use on grapevines. Vintec, the product based on that ai, has been launched in five European countries (France, Belgium, Germany, Austria and Luxembourg). Registrations in other European countries are ongoing. As France was the zonal rapporteur member state for the southern zone, the company expects that registrations in Spain, Portugal, Greece and Italy will shortly follow. Bi-PA has other uses in development for the product.

Earlier this year, Bi-PA acquired a 25% stake in Australian company Innovate Ag. Bi-PA will develop and register Innovate Ag's bioinsecticide, Sero-X (Clitoria ternatea extract), outside Australia and New Zealand. The product has received Australian approval. The generation of data for its development outside Australia is ongoing and the dossier will be submitted as soon as possible, Bi-PA says. The companies, Belchim, American Vanguard and Unifert, hold stakes in Bi-PA, which gives it access to their marketing channels in Europe, Americas and North Africa/Middle East, respectively.

BioConsortia is in its research and development phase. “Certain leads for are in second or third year field trials with major partners, as well as self-funded projects, for drought tolerance, nutrient use efficiency and yield improvement in stressed and standard agronomic conditions,” says Mr Meadows-Smith. Some new consortia for biofungicide activity are moving into their first year of field trials.

Combination products
BASF’s view is that most often, biocontrols will be used along with and to complement chemistry-based solutions in IPM programmes, although it is possible circumstances may arise where a biocontrol can address a need for which there is no chemistry-based solution available. The company’s research directions include development of combinations of biological and chemistry and it also has such commercial offers on the market, such as the fungicide, Xanthion (pyraclostrobin - trade-marked as F500 + Integral - Bacillus subtilis strain MBI 600).

“Chemistry will always be more relied upon due to the typically wider spectrum of control and efficacy under most environmental conditions, but we see biologicals growing to be an important factor in coming years,” says Ms Emanuel. Biological products extend BASF’s portfolio and are not substitutes for BASF chemical crop protection products, she says.

Arysta LifeScience has more than 50 stand-alone biosolutions products, covering biocontrol, biostimulants and innovative nutrition. The company has also developed numerous ProNutiva crop production input programmes, which are integrated solutions consisting of protection, stimulation and/or nutritional inputs, derived from natural biosolutions and conventional crop protection. It is also in the process of developing ProNutiva pre-mixes, creating specific combinations of biological as well as conventional aids.

MBI is also looking for partners for pre-mixed combination products. Albaugh is already stacking MBI’s microbe with its chemicals, points out Dr Marrone.
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Registration process
A more streamlined regulatory process for the approval of biologicals has been high on the wish list of biopesticide companies across the world irrespective of their location. The system in the EU has often been a cause of complaint and the European Commission has been under pressure over the last year from the European Parliament, which passed several resolutions calling for faster biopesticide approvals.

Progress has been made in the EU just as this article was being written. The Commission will soon clarify and extend the scope of ais that may be considered as “low-risk” substances, in a bid to boost approvals of biological and naturally occurring pesticides. Micro-organisms, baculoviruses and semiochemicals will be considered as low risk, unless specific concerns are identified, while naturally occurring substances will be exempted from certain hazard-based criteria. The proposed amendments will be made to the identification criteria for low-risk pesticides in the EU agrochemical registration Regulation (1107/2009). They have been voted through by EU member states and will come into effect following publication in the EU Official Journal.

Bayer says that there are some jurisdictions where the regulatory frameworks for biopesticides are well established, with data requirements that are specific and appropriate for the various biological product types. The company is working through various industry associations including CropLife International and its regional/country affiliates, as well as the International Biocontrol Manufacturers Association (IBMA) and the Biological Products Industry Alliance (BPIA), to advocate for globally harmonised regulations and data requirements.

Mr Hartmann points out ongoing activities such as the OECD’s Expert Group on Biopesticides (EGBP), which is developing a harmonised approach specific to biopesticide registration through numerous projects. He also mentions the UN FAO/WHO JMPM, which has recently drafted a new guidance document for biological pest and biocontrol/biopesticides and some $1.8 billion for biopesticides.

Compared with the decade-long development timelines of synthetic chemistries and genetically modified crop traits, biological products generally take 3-7 years to develop and get to market, informs Mr Meadows-Smith. The natural products cost $5-25 million rather than $100-300 million for the alternative, he adds.

Outlook
BASF predicts increasing use of biologicals to complement chemistry-based products over the next five years. The company estimates an annual biologicals market growth of 10-12%. It sees an increasing market driven need for nematicides/nematode control as available chemistries are phased out for reasons including registrations that are expired or withdrawn. BASF estimates the annual losses from nematodes at $100 billion globally.

Arysta expects the biologicals market to grow at a more accelerated pace than 2016, in line with the expected moderate improvement of the crop protection market.

Dr Marrone views biologicals as a bright spot with continued good growth due to the global drivers of residues, resistance, labour efficiency and environmental safety. BioConsortia expresses certainty about the “amazing strength of interest” in microbes from conventional growers for biopesticides, and also more recently for fertiliser use efficiency as well as for soil health, plant health, and cost effective methods for significant yield increase. “It remains a very exciting time in the industry,” affirms Mr Meadows-Smith.
• HERBICIDES
  - Flumioxazin
  - Diclosulam
  - Flumetsulam
  - Isoxaflutole
  - Foramsulfuron
  - Sulfentrazone
  - Mesosulfuron
  - Imazethapyr
  - Imazamox
  - S-Metolachlor
  - Acetohlor
  - Haloxyfop
  - Fomesafen
  - 2,4-D, 2,4-DB, 2,4-DP-p
  - MCPA, MCPB, MCPB-p
  - Glyphosate
  - Dicamba
  - Atrazine
  - Terbutryn
  - Diuron
  - Bromacil
  - Diflufenican
  - Propanil
  - Clomazone
  - Picloram
  - Triclopyr

• FUNGICIDES
  - Pyraclostrobin
  - Azoxystrobin
  - Cyprodinil
  - Fluazinam
  - Prothioconazole
  - Cyproconazole
  - Tebuconazole
  - Propiconazole
  - Pyrimethanil
  - S-Metolachlor
  - Acetohlor
  - Haloxyfop
  - Fomesafen
  - Metolachlor
  - Butachlor
  - Quinalofop
  - Oxyfluorfen
  - Ametryn
  - Terbutylazine
  - Hexazinone
  - Metribuzin
  - Pendimethalin
  - Bispyribac
  - Bentazone
  - Clopyralid
  - Fluroxypyr

• INSECTICIDES
  - Spiroxamine
  - Chlorfenapyr
  - Dinotefuran
  - Clothianidin
  - Methoxyfenozide
  - Pymetrozine
  - Imidacloprid
  - Chlorpyrifos
  - Bifenthrin
  - Acetamiprid
  - Methomyl
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Biocidal-related mergers, acquisitions and deals in 2016

JANUARY
Sumitomo Chemical’s US-based biopesticide and biorational products subsidiary, Valent BioSciences, entered into a North American distribution agreement for the Streptomyces lydicus strain WYEC 108-based Actinovate biofungicide range with the BioAg Alliance between Monsanto and Danish company Novozymes.

MARCH
US agrochemical company American Vanguard acquired a 15% stake in the Belgian biological products company, Biological Products for Agriculture (Bi-PA), and gained distribution rights to Bi-PA’s Trichoderma spp-based grapevine biofungicide, Vintec, in the Americas and access to products in development.

April
Belchim Crop Protection agreed to acquire French biologicals company Jade, a subsidiary of the group, Alidad Invest.

APRIL

Dow AgroSciences agreed to collaborate with US company TeselaGen Biotechnology to produce a “state-of-the-art” biological design automation platform aimed at accelerating the discovery of crop protection and seed products.

JUNE
US biopesticide company Marrone Bio Innovations and the Israeli mycorrhizal inoculants firm, Groundwork BioAg, agreed to collaborate on the development of a seed treatment combining biopesticides and a mycorrhizal biostimulant.

Marrone Bio Innovations (MBI), granted exclusive rights to US fertiliser company Koch Agronomic Services and its biostimulant affiliate, Koch Biological Solutions, to sell MBI’s Reynoutria sachalinensis-based biofungicides, Regalia Rx and Regalia Maxx, for use on arable crops in the US and Canada, respectively.

Mitsui & Co’s US subsidiary, Certis USA, appointed UAP Canada as exclusive distributor of its biofungicide, Double Nickel (Bacillus amyloliquefaciens strain D747), in Canada.

Italian agrochemical company Isagro’s US subsidiary, Isagro USA, appointed US biopesticide company Marrone Bio Innovations as the distributor of Isagro’s biofungicide, Bio-Tarn 2.0 (Trichoderma asperellum strain ICC012 + T gamsii strain ICC080), to agricultural markets in four US states.

Italian biostimulants company Valagro acquired Indian biostimulant and biopesticide company SriBio.

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grower analytics application in biologicals research.

**AUGUST**
The US biopesticide company, **Marrone Bio Innovations (MBI)**, entered into an agreement with US agrochemical and specialty chemical company Albaugh to develop and market an unnamed MBI bioinsecticide/nematicide for seed treatment applications.

The US biopesticide company, **Vestaron**, entered into a multi-year agreement with Italian contract manufacturing firm Capua BioServices to produce Vestaron’s peptide-based Spear (GS-omega/kappa-Hxtx-Hv1a – trade-marked as Versitude) family of bioinsecticides.

**SEPTEMBER**
**BASF** and French plant biotechnology company Plant Advanced Technologies agreed a collaboration for the discovery and development of novel agricultural biopesticides.

**Bayer** and German research institute Forschungszentrum Julich entered into a five-year research collaboration on the effects of microbial seed treatments on root growth and microbial colonisation of root systems.

**OCTOBER**
The Dutch bioproducts company, **Koppert Biological Systems**, acquired certain microbial biopesticides from Swedish firm Lantmannen BioAgri.

**DECEMBER**
Belgian biological pest control company **Biobest** agreed to acquire Kenyan biocontrol solutions provider Real IPM Kenya.

UK-based biocontrol and micro-encapsulation technology company **Eden Research** signed an exclusive commercialisation agreement for its nematicide formulation with Belgian chemical company Taminc, a subsidiary of US specialty chemical firm Eastman Chemical.

**JANUARY**
US biostimulant company **Agrinos** entered into a distribution partnership with US distributor Van Diest Supply Company.

Monsanto and Danish company Novozymes’ **BioAg Alliance** granted exclusive distribution rights in the US and Canada for its biofungicide, Taegro 2 (Bacillus subtilis var amyoliquefaciens strain FZB24), to Italian agrochemical company Isagro’s US business, Isagro USA.

The Canadian company, **Bee Vectoring Technologies**, entered into formal agreements with several leading US strawberry growers to conduct large-scale commercial demonstrations of its proprietary growing system for its bee-delivered biofungicide, Vectorite with CR-7 (Clonostachys rosea strain CR-7).

**FEBRUARY**
The Belgian biological products company, **Biological Products for Agriculture (Bi-PA)**, acquired a 25% stake in Australian company Innovate Ag. Bi-PA will develop and register Innovate Ag’s bioinsecticide, Sero-X (Clitoria ternatea extract), outside Australia and New Zealand.

**MARCH**
Dutch bioproducts company **Koppert Biological Systems**, Brazilian pest management company ISCA Technologies and Dutch remote sensing firm TEC-IB joined forces on a project to control red palm weevils (Rhynchophorus ferrugineus) on date palms in the Middle East.

**APRIL**
Israeli bioprecast company **Havatzer** signed an exclusive commercialisation agreement with Israeli biotechnology company **Sericat**.

**MAY**
Spanish bioremediation company **Biogard** entered into an agreement with US greenhouse and nursery specialist OHP to develop novel bioinsecticides.

**JUNE**
The US-based, UK-listed bioproducts company, **Paulo Research Foundation, the Fapesp**, agreed to co-develop biological pest and disease control products.

**JULY**
The US-based Brazilian subsidiary, **Koppert do Brasil Sistemas Biológicos**, and the Brazilian Sao Paulo Research Foundation, the Fapesp, agreed to co-develop biological pest and disease control products.

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Israeli bioprecast company **Havatzer** signed an exclusive commercialisation agreement with Israeli biotechnology company **Sericat**.

**MAY**
Spanish bioremediation company **Biogard** entered into an agreement with US greenhouse and nursery specialist OHP to develop novel bioinsecticides.

**JUNE**
The US-based, UK-listed bioproducts company, **Paulo Research Foundation, the Fapesp**, agreed to co-develop biological pest and disease control products.

**JULY**
The US-based Brazilian subsidiary, **Koppert do Brasil Sistemas Biológicos**, and the Brazilian Sao Paulo Research Foundation, the Fapesp, agreed to co-develop biological pest and disease control products.

**AUGUST**
Agrinos entered into a distribution partnership with US distributor Van Diest Supply Company.

**SEPTEMBER**
BASF and French plant biotechnology company Plant Advanced Technologies agreed a collaboration for the discovery and development of novel agricultural biopesticides.

**OCTOBER**
The Dutch bioproducts company, **Koppert Biological Systems**, acquired certain microbial biopesticides from Swedish firm Lantmannen BioAgri.

**NOVEMBER**
Platform Specialty Products’ agrochemical business, **Arysta LifeScience**, entered into an exclusive licensing agreement with US biostimulant company Beem Biologics for novel plant-derived biostimulant technology.

**DECEMBER**
Belgian biological pest control company **Biobest** agreed to acquire Kenyan biocontrol solutions provider Real IPM Kenya.

UK-based biocontrol and micro-encapsulation technology company **Eden Research** signed an exclusive commercialisation agreement for its nematicide formulation with Belgian chemical company Taminc, a subsidiary of US specialty chemical firm Eastman Chemical.
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## New active ingredients registered or launched in 2016

<table>
<thead>
<tr>
<th>Company &amp; active ingredient</th>
<th>Use</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOPESTICIDES &amp; OTHERS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **AEF Global** | Bacillus thuringiensis var [bioinsecticide]  
kurstaki strain EVB-113-19 | Various | Proposed approval in US as Bioprotec |
| **AgBiTech** | Spodoptera frugiperda multiple nucleopolyhedrovirus strain 3AP2 [bioinsecticide] | Various including maize, sorghum, oilseeds, pulses, potatoes, fruit, vegetables, turf & ornamentals | Approved in US as Fawligen |
| **Agro-Levures et Dérivés** | Saccharomyces cerevisiae strain LASO2 [biofungicide] | Grapevines, tomatoes, strawberries, pome & stone fruit | Approved in EU |
| **Andermatt Biocontrol** | Cydia pomonella granulovirus [bioinsecticide] | Almonds, walnuts, pome & stone fruit | Approved in Spain as Madex Twin |
| **Heliothis armigera nuclopolyhedrovirus [bioinsecticide]** | Soybeans, beans, tomatoes, rice, cotton, peanuts, maize, potatoes & other crops | Approved in Brazil as Verpavex & Spain as Helicovex |
| **BASF** | Bacillus amyloliquefaciens strain MBI600 [biofungicide] | Grapevines | Proposed approval in EU |
| **Bayer CropScience** | Bacillus firmus strain I-1582 [bionematicide] | Maize, sweet corn, cereals, forage brassicas & grass | Approved in New Zealand as Poncho Votivo (with clothianidin) |
| **Bi-PA** | Trichoderma atroviride strain SC1 [biofungicide] | Grapevines | Approved in EU |
| **Certis Europe (Mitsui & Co)** | ethyl-2E,4Z-decadienoate [pheromone] | Fruit | Approved in Spain as Cidetrack CM & Cidetrack OFM |
| **Certis USA (Mitsui & Co)** | Bacillus mycoides isolate J [biofungicide] | Fruit & vegetables | Approved in US as BmJ WG or LifeGard WG & approved in Canada as BmJ WG |
| **Chinese Academy of Sciences’ Institute of Applied Ecology** | Bacillus methylotrophicus strain BAC-9912 [biofungicide] | Cucumbers | Approved in China |
| **Danstar Ferment** | Phlebiopsis gigantea strain VRA 1992 [biofungicide] | Conifers | Approved in US as Rotstop C |
| **Innovate Ag** | Clitoria ternatea extract [bioinsecticide] | Cotton | Proposed approval in Australia as Sero-X |
| **Eden Research** | eugenol/geraniol/thymol [biofungicide] | Grapevines | Approved in Bulgaria & Italy as 3AEY |
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- Unique perspectives from end users
- Regulations for bio pesticides and bio stimulants
- Importance of labeling
- New biologicals coming into the market
- Case studies and good management of biologicals

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- DuPont Crop Protection • CIPM
- Bayer CropScience • Bio Consortia
- Arysta LifeScience • Marrone Bio Innovations
- TSG USA • Lallemand
### New active ingredients registered or launched in 2017

**Company & active ingredient** | **Use** | **Status**
--- | --- | ---
**Inner Mongolia Jinto Pharmaceutical Industry** | alkaloid of *Sophora alopecuroides* [bioinsecticide] | Cabbages | Approved in China

**LidoChem** | *Bacillus amyloliquefaciens* strain PTA-4838 [bionematicide] | Maize, sorghum, soybeans, cotton, small-grain cereals, canola, sunflowers, oilseeds, potatoes, sugar beet, vegetables & fodder crops | Proposed approval in US as Varnimo ST

**Marrone Bio Innovations** | *Chromobacterium subtisuga* strain PRAA4-1T [bioinsecticide/acaricide] | Fruit & vegetables | Approved in Mexico as Grandevo

**Burkholderia rinjensis** strain A396 [bionematicide] | Fruit & vegetables | Approved in Mexico as Majestene

**Muscador albus** strain SA13 [biofumigant] | Strawberries, lettuces & other crops | Approved in US as MBI-601 EP

**Reynoutria sachalinensis** extract [biofungicide] | Grapevines & blueberries | Approved in Chile as Regalia Maxx

**Rizoflora Biotecnologia** | *Pochonia chlamydospora* isolate PC10 [bionematicide] | Cotton, maize, soybeans, vegetables & fruit trees | Approved in Brazil as Rizotec

**SenesTech** | triptolide + 4-vinylcyclohexene [radeticide] | Rat contraceptive | Approved in US as ContraPest

**Stockton** | *Melaleuca alternifolia* extract [biofungicide] | Grapevines, bananas, broccoli & lettuces | Approved in New Zealand & Brazil as Timorex Gold

**Suterra** | (3S,6R)(3S,6S)-3-methyl-6-isopropenyl-9-decen-1-yl acetate [pheromone] | Citrus crops & other orchards | Approved in US as CheckMate CRS

---

**Company & active ingredient** | **Use** | **Status**
--- | --- | ---
**AgBiome Innovations/SePRO Corporation** | *Pseudomonas chlororaphis* strain AFS009 [biofungicide] | Turf & ornamentals | Approved in US as Zio

**Bayer CropScience** | *Paecilomyces lilacinus* strain 251 [bionematicide] | Fruit & vegetables | Approved in Greece as BioAct Prime

**Eden Research** | eugenol/geraniol/thymol [biofungicide] | Grapevines | Approved in France as 3AEY

**Simbiose Agro** | *Trichoderma harzianum* strain Cepa Simb-T5 [biofungicide] | | Launched in Brazil
Where regulatory demands continue to increase in complexity, TSGE’s objective is to enable the industry to meet these challenges, and to support the growth and development of new and existing products in the European market. Contact us to discuss your requirements on +44 (0) 1423 799 633 or tsge@tsgeconsulting.com

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EU to set new approval criteria for low-risk pesticides

The European Commission is to clarify and extend the scope of active ingredients that may be considered as “low-risk” substances, in a bid to boost approvals of biological and naturally occurring pesticides. Micro-organisms, baculoviruses and semiochemicals will be considered as low risk, unless specific concerns are identified, while naturally occurring substances will be exempted from certain hazard-based criteria. The proposed amendments will be made to the identification criteria for low-risk pesticides in the EU agrochemical registration Regulation (1107/2009). They have been voted through by EU member states and will come into effect following publication in the EU Official Journal. The Commission has been under pressure over the last year from the European Parliament, which passed several resolutions calling for faster biopesticide approvals.

Regulation 1107/2009 introduced the “low-risk” category, under which ais could benefit from a longer 15-year approval period. The existing identification criteria are largely based on a long list of hazard characteristics that must not be present. For the sake of clarity, more details should be provided, says the Commission. It notes that hazard criteria on persistence and bioconcentration could prevent approval of certain naturally occurring substances, such as botanicals and minerals, even though they present “considerably less” of a risk than other ais.

The changes stipulate that a half-life in soil of more than 60 days or a bioconcentration factor higher than 100 would normally exclude an ai, other than a micro-organism, from being considered low-risk. However, a naturally occurring substance that exceeds these levels may still be considered low-risk, provided that it does not trigger any other hazard criteria.

Micro-organisms will be assessed at strain level for compliance with low-risk criteria. They will be considered low-risk unless the strain has demonstrated multiple resistance to antimicrobials used in human or veterinary medicine. Baculoviruses will be considered low-risk, unless a strain has demonstrated adverse effects on non-target insects. Semiochemicals, which include pheromones, will be considered low-risk, unless they trigger any hazard criteria.

A further amendment stipulates that ais that have been defined as priority substances under rules on preventing water pollution will not be considered as low-risk ais.

The changes are limited to identification criteria, and there are no amendments reflecting the MEPs’ call for a separate “fast-track” approval process for biopesticides. In previous debates with MEPs, the Commission pointed out that low-risk pesticides are to be given priority in the next round of renewing existing EU approvals. EU Health and Food Safety Commissioner Vytenis Andriukaitis also noted that the effectiveness of incentives, such as longer approval periods, is to be assessed during the review of agrochemical legislation under the REFIT “fitness check” programme.
## Key Products

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Fungicide</th>
<th>Herbicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difenoconazole</td>
<td>Propiconazole</td>
<td>Clethodim 24% EC</td>
</tr>
<tr>
<td>Azonxystrobin</td>
<td>Pyrimethanil</td>
<td>Ammonium Glyphosate 65% SP</td>
</tr>
<tr>
<td>Thiacloprid</td>
<td>Zineb</td>
<td>Glyphosate-isopropylammonium 30% AS</td>
</tr>
<tr>
<td>Fosetyl-Al</td>
<td>Propineb</td>
<td>Fomesafen 250 g/L AS</td>
</tr>
<tr>
<td>Chlorothalonil</td>
<td>Cymoxanil</td>
<td>Nicosulfuron 40 g/L OD</td>
</tr>
<tr>
<td>Mancozeb</td>
<td>Metam-sodium</td>
<td>Nicosulfuron 2.5%+Atrazine 20% OD</td>
</tr>
<tr>
<td>Mesotrione</td>
<td></td>
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</tr>
</tbody>
</table>

## CONTACT US: LIMIN CHEMICAL CO., LTD
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<table>
<thead>
<tr>
<th>Technical</th>
<th>Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyraclostrobin 98% TECH</td>
<td>Spiromesifen 98% TECH</td>
</tr>
<tr>
<td>Thifluzamide 96% TECH</td>
<td>Tolfenpyrad 97% TECH</td>
</tr>
<tr>
<td>Spirodiclofen 98% TECH</td>
<td>Dinotreuran 98% TECH</td>
</tr>
</tbody>
</table>

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EU member states have supported proposals for new EU approvals of three biopesticides and renewed authorisation for a fourth. Two approvals are for Platform Specialty Products business Arysta LifeScience’s Beauveria bassiana bioinsecticides: strain 147 and strain NPP111B005. Arysta submitted the two applications in November 2012, for strain 147 for use on ornamental palm trees, and for NPP111B005 for use on bananas and ornamental palm trees. Arysta sells B bassiana products under the Ostrinil trade name.

The third new authorisation is for Danish company Novozymes Biologicals’ biofungicide, Bacillus amyloliquefaciens strain FZB24, as a “low-risk” active ingredient, making it eligible for a 15-year approval period, rather than the standard ten years. Novozymes applied in June 2013, for use on cucurbits, potatoes and grapevines. Novozymes and Monsanto’s BioAg Alliance sells the ai as Taegro 2, and recently granted US and Canadian distribution rights to Italian company Isagro’s US business, Isagro USA.

The renewed approval is for Bayer CropScience’s biofungicide, Coniothyrium minitans strain CON/M/91-08, which also grants it “low-risk” status. It is sold as Contans, for soil decontamination against Sclerotinia sclerotiorum in oilseed rape, lettuces, cucumbers, beans and sunflowers.

The approval decisions require publication in the EU Official Journal before coming into force.
The topic of the future of the crop protection industry often incorporates the vision of a crop protection toolbox incorporating biopesticides and biostimulants in addition to conventional active ingredients. But the industry seeks the simplification of the registration process for biologicals.

The European Commission is in the process of extending the scope of ais that may be considered as “low-risk” substances, in a bid to boost approvals of biological and naturally occurring pesticides. But Regulation 2003/2003 relating to fertilisers only focuses on inorganic (mineral) fertilisers. There are 28 national fertiliser regulations which, to a varying extent, offer the possibility for registration of biostimulants or biostimulant-like products. In addition, in certain countries, the national plant protection laws cover at least some type of biostimulants, for instance, in Germany.

A vote of the European Parliament on a new EU fertiliser Regulation, which will also cover biostimulants, is foreseen for September 2017 with a possible applicability in 2019. It is expected to expand the scope and also include organic fertilisers, soil improvers and biostimulants. As the progress to bring this new piece of legislation to life has been delayed and stopped several times already, it is likely that these target dates will be postponed again, making it unclear when biostimulants can be marketed on an EU-wide basis and what will be the expense in time and money for the manufacturer.

The current proposal of the new fertiliser Regulation allocates biostimulants a special Product Function Category (PFC 6), defining them as: “certain substances, mixtures and micro-organisms, commonly referred to as plant biostimulants, [which] are not as such nutrients, but nevertheless stimulate plants’ nutrition processes. Where such products aim solely at improving the plants’ nutrient use efficiency, tolerance to abiotic stress, or...
crop quality traits, they are by nature more similar to fertilising products than to most categories of plant protection products. Such products should therefore be eligible for CE marking (Conformity marking under general principles of Regulation 765/2008) under this (the new) Regulation and excluded from the scope of [agrochemical registration] Regulation 1107/2009”.

Whereas there seems to be a common understanding of the basic definition for biostimulants, several topics regarding their registration are currently under discussion. As for fertilisers, thresholds for heavy metals are being debated. Also, a shelf-life proposal of at least six months for microbial biostimulants, as proposed by the Council, is to be removed. For non-microbial biostimulants, there is no differentiation foreseen between organic and inorganic components, which would be a clear and highly welcomed simplification compared with the current situation. There are discussions ongoing on the accepted extraction methods for non-processed or mechanically processed plants, plant parts or plant extracts [Component Material Category (CMC) 2], which is to be extended from water extraction only. It is emphasised that only processing methods will be allowed that will not affect the chemical nature of the substance. For micro-organisms (CMC 6), a positive list is being compiled and there will be a mechanism to amend the list, with individual quality criteria still to be addressed. Various discussions on these lists and how to amend them are ongoing. Due to the complexity of that issue, a new expert group on microbial biostimulants has to be launched and will include participation by the European Food Safety Authority (EFSA), other experts and industry. Micro-organism identification will be at the strain level. The prioritisation criterion for such amendments to the list will be the market potential for a proposed micro-organism.

An issue not currently addressed in the draft Regulation is that of maximum residue limits (MRLs) for biostimulants. Requirement for implementation of MRLs is an authorisation system, which is not foreseen for biostimulants according to the draft of the upcoming Regulation.

A grave concern for industry is the still unsolved question of data protection. No data protection provisions are foreseen in the new Regulation. Data protection could only be awarded under the EU Registration, Evaluation and Authorisation of Chemicals (REACH) Regulation. A possible blueprint to address this issue could be the handling of medical devices Class 1, which are also handled under a CE system.

According to the draft Regulation, “products with one or more functions, one of which is covered by the scope of Regulation (EC) No 1107/2009, are plant protection products covered by the scope of that Regulation”. This regulatory differentiation of substances and products with more than one function does not mirror the scientific conditions. As several substances clearly show effectiveness against abiotic as well as biotic stresses, it remains to be seen if feasible possibilities will arise to include “abiotic” functions under the framework of Regulation 1107/2009 if not under the framework of the future fertiliser regulation. In view of the farmer’s toolbox, the loss of valuable functions of substances “only” due to regulatory and legislative obstacles seems very unfortunate.

As already indicated, when the new legislative framework for biostimulants at EU level will come into force is uncertain. As biostimulants are already an acknowledged tool in parts of the agricultural practice, several national authorities have adapted their national legislation in the recent past to cover this gap and make more biostimulating substances available to their farmers. For example, in Spain, the national fertiliser regulation (Real Decreto 506/2013) was amended to include products containing micro-organisms that increase the availability of nutrients for plants. The French Decree No. 2016-532 of April 27th 2016 on the procedure for national authorisation of natural biostimulant substances was published on April 30th 2016. Natural biostimulant substances are authorised without further procedures provided they fulfil certain conditions related to effects on human and animal health or the environment, the origin of the substance (e.g. plant, animal or mineral origin), or the manufacturing process.

This “non-harmonisation” is in line also with the draft of the new EU fertiliser regulation that stipulates that “contrary to most other product harmonisation measures in Union legislation, Regulation (EC) No 2003/2003 does not prevent non-harmonised fertilisers from being made available on the internal market in accordance with national law”. It is foreseen that this possibility should remain. In liaison with the adaptions of the national fertiliser laws regarding biostimulants as described above, the upkeep of national biostimulant registrations even after implementation of the EU framework, increase the importance of national registrations for biostimulants regarding business strategies for registration and rollout of new biostimulant products in EU.
DuPont’s crop protection and seed sales rose by 3.8% to $3,928 million in the first quarter of 2017. The company’s agriculture segment recorded a 2% volume gain, a 2% rise from price and product mix effects and a 1% boost from currency factors, partly offset by a 1% dip from portfolio and other effects.

Price increases were led by double-digit gains in Brazil due to the continued expansion of DuPont Pioneer’s genetically modified insect-resistant Optimum Leptra (MIR162xMON810xXT1507) maize, the launch of dicamba herbicide-tolerant Roundup Ready 2 Xtend technology and increased sunflower seed sales. Volume improvements resulted from the timing of seed deliveries, which boosted revenues by some $140 million. Volume gains also came from increased insecticide and sunflower seed sales, partially offset by an expected decrease in the North American maize acreage.

The crop protection business performed strongly in Asia and Europe, with growth driven by insecticides, including the return of Vydate (oxamyl) volumes. The company continued to experience higher-than-normal inventory levels in Latin America, specifically Brazil, but believes that the global industry is stabilising.

Operating income rose by 12.3% to $1,236 million due to improved pricing and volume growth. Operating margins expanded by about 2.4 percentage points.

Outlook
DuPont forecasts its agriculture segment to record a mid-single-digit percentage increase in sales during the first half of 2017 due to volume growth, pricing gains and positive currency impacts compared with the same period last year. Volume gains are expected to come from the shift in timing of seed deliveries and increased new product sales such as dicamba-tolerant Xtend soybeans, FeXapan (dicamba) herbicide and the fungicide, oxathiapiprolin (trade-marked as Zorvec). The company also points to higher insecticide and sunflower seed volumes, partially offset by reduced maize plantings. Price appreciation should be led by double-digit gains in Brazil from Leptra maize, the full launch of Xtend soybeans in North America and higher sunflower seed sales in Europe.

Operating earnings are forecast to increase by a high-single-digit percentage due to volume growth, pricing gains and positive currency effects. The company expects higher product costs coming from increased soybean costs in North America.

Dow merger
DuPont points to significant progress on key milestones during the first quarter on the planned merger with Dow Chemical. It has agreed to divest a portion of its crop protection business, including certain research and development capabilities, to FMC in connection with the European Commission’s conditional regulatory clearance of the merger. The company continues to expect the transaction to be completed in August.

DuPont’s agriculture segment results ($ million)

<table>
<thead>
<tr>
<th></th>
<th>1st qtr ended March 31st 2016</th>
<th>% change 2017</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>3,786</td>
<td>+3.8</td>
<td>3,928</td>
</tr>
<tr>
<td>Operating income</td>
<td>1,101</td>
<td>+12.3</td>
<td>1,236</td>
</tr>
</tbody>
</table>
Lower sales of agrochemicals and seed reduced Dow AgroSciences’ sales by 4.7% to $1,568 million in the first quarter of 2017. Volumes were down by about 5% and prices were flat. Crop protection prices were down, while seed prices were higher than in the first quarter of 2016.

Crop protection volumes declined despite higher demand for insecticides in most geographic areas and continued adoption of the herbicide, halaxuxifen-methyl (trade-marked as Arylex), Dow points out. Insecticide sales grew by 9% due additional registrations for spinetoram and spinosad and strong demand in Europe due to mild weather. Those gains were more than offset by reduced demand for herbicides and insecticides in the Asia Pacific region, particularly driven by lower demand for rice herbicides in China. Flooding last year led to high channel inventories that continued into this year. There was also lower demand for herbicides in North America due to the shift from maize to soybeans.

Seed volumes fell largely due to reduced demand for maize seed in North America based on lower acreage forecasts. There was also weaker demand for sunflower seed in the Europe, Middle East, Africa and India region and Latin America. These factors were largely offset by volume gains for maize in Latin America and cotton in the US, reflecting the successful launch of genetically modified herbicide-tolerant Enlist cotton and early grower adoption, Dow notes.

Earnings before interest, tax, depreciation and amortisation (EBITDA) amounted to a loss of $118 million compared with a positive $403 million in the first quarter of 2016. EBITDA was adversely impacted by a $469 million charge over US court ruling over a patent agreement with Bayer CropScience. Last month, the US Court of Appeals for the Federal Circuit ordered Dow to pay Bayer $455 million for violating a patent agreement related to a gene used to convey tolerance to the herbicide, glufosinate-ammonium. Dow has appealed the ruling.

Excluding that charge, operating EBITDA fell by 12.9% to $351 million. A higher contribution from the seeds business was more than offset by the lower volume of crop protection sales, particularly in Asia Pacific. The operating EBITDA margin fell by two percentage points to 22%.

The business forecasts flat EBITDA in the first half of 2017 compared with the same period last year.

DuPont’s agriculture segment results ($ million)

<table>
<thead>
<tr>
<th>1st qtr ended March 31st</th>
<th>2016</th>
<th>% change</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1,646</td>
<td>-4.7</td>
<td>1,568</td>
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<tr>
<td>EBITDA¹ (loss)</td>
<td>403</td>
<td>-</td>
<td>(118)</td>
</tr>
<tr>
<td>Operating EBITDA¹</td>
<td>403</td>
<td>-12.9</td>
<td>351</td>
</tr>
</tbody>
</table>

¹ earnings before interest, tax, depreciation and amortisation.
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Bayer agchem sales up 3% in first quarter

Bayer CropScience’s crop protection sales rose by 3.2% to €2,251 million ($2, million at the current rate) in the first quarter of 2017. Currency and portfolio-adjusted revenues inched 0.9% higher. All segments other than fungicides posted gains.

Herbicide business remained the largest segment following a rise of 7.9% in sales to €912 million. Business was up 5.3% on an adjusted basis. Revenues from fungicides fell by 4.8% (-6.2% on an adjusted basis) to €787 million. Insecticides were up 6% (+3.9%) to €301 million, but seed treatments (SeedGrowth) posted the highest increase at 11.1% (+7.1%) to €251 million.

The seed business recorded a greater rise with sales up 13.3% (+8%) at €722 million. The integrated business saw business increase by some 5.5% (+2.5%) €2,973 million.

**CropScience**
The CropScience business rose by 6.3% (+3.2%) to €3,120 million. The figures give a like-for-like comparison following the

**Bayer’s 1st qtr agchem/seed sales by category (€ million)**

<table>
<thead>
<tr>
<th>Segment</th>
<th>2016 ($ million)¹</th>
<th>% change</th>
<th>2017 ($ million)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop protection</td>
<td>2,182 (2,384)</td>
<td>+3.2</td>
<td>2,251 (2,459)</td>
</tr>
<tr>
<td>Herbicides</td>
<td>845 (923)</td>
<td>+7.9</td>
<td>912 (996)</td>
</tr>
<tr>
<td>Fungicides</td>
<td>827 (904)</td>
<td>-4.8</td>
<td>787 (860)</td>
</tr>
<tr>
<td>Insecticides</td>
<td>284 (310)</td>
<td>+6.0</td>
<td>301 (329)</td>
</tr>
<tr>
<td>SeedGrowth</td>
<td>226 (247)</td>
<td>+11.1</td>
<td>251 (274)</td>
</tr>
<tr>
<td>Seeds</td>
<td>637 (696)</td>
<td>+13.3</td>
<td>722 (789)</td>
</tr>
<tr>
<td><strong>CP/Seeds total</strong></td>
<td><strong>2,819 (3,080)</strong></td>
<td><strong>+5.5</strong></td>
<td><strong>2,973 (3,248)</strong></td>
</tr>
</tbody>
</table>

¹ at the current rate.
Eurofins Agroscience Services

Bringing together global, multi-disciplined research capabilities with market leading product development and technical support services to the crop protection industry. Our ability to deliver a full range of regulatory research services and professionally managed scientific solutions sets Eurofins Agroscience Services aside as the ideal partner for agroscience research.

We Are Experts In:
- Analytical Chemistry
- Animal Health
- Ecotoxicology
- Environmental Fate / $^{14}$C Studies
- Field Studies
- Regulatory Affairs

Eurofins Agroscience Services Group

easinfo@eurofins.com
www.eurofins.com/agroscienceservices
Agribusiness intelligence

Bayer CropScience results (€ million)

<table>
<thead>
<tr>
<th>Business segment</th>
<th>2016 ($ million)¹</th>
<th>% change</th>
<th>2017 ($ million)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>CropScience</td>
<td>2,936 (3,208)</td>
<td>+6.3</td>
<td>3,120 (3,409)</td>
</tr>
<tr>
<td>Crop protection/ seeds</td>
<td>2,819 (3,080)</td>
<td>+5.5</td>
<td>2,973 (3,248)</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>117 (128)</td>
<td>+25.5</td>
<td>147 (161)</td>
</tr>
<tr>
<td>EBITDA²</td>
<td>1,086 (1,186)</td>
<td>+0.5</td>
<td>1,091 (1,192)</td>
</tr>
<tr>
<td>EBIT¹</td>
<td>955 (1,043)</td>
<td>+1.5</td>
<td>970 (1,060)</td>
</tr>
</tbody>
</table>

¹ at the current rate; ² earnings before interest, tax, depreciation and amortisation; ³ earnings before interest and tax.

Bayer obtained “gratifying gains” for its seed business with oilseed rape and soybean seeds, while sales of cotton seeds saw “substantial declines”.

Business grew by an adjusted 2.9% in the Asia Pacific region to €366 million. There were double-digit gains for herbicides on the back of product launches in Japan and China as well as favourable weather conditions in Australia. Seed treatment and fungicide sales were up, while insecticides suffered “substantial” falls largely due to depressed business in India.

The weakest region was Latin America where sales dropped by an adjusted 9.8% to €250 million. There was a substantial decline in fungicide sales with the business suffering from high inventory levels. That was partly offset by growth in sales of herbicides in Argentina and for the seed business.

Divisional earnings were slightly higher. Earnings before interest, tax, depreciation and amortisation (EBITDA) rose by 0.5% to €1,091 million, and by 2.4% before special items to €1,115 million. EBIT was up 1.6% at €970 million and by 5.1% before special items to €1,007 million.

The company sent out information packages during the quarter to prospective bidders for assets worth some $2.5 billion as part of its commitments to the proposed takeover by parent company Bayer of Monsanto. It inaugurated two of three soybean research facilities it is to open this year.

Bayer expects just 1% growth for the year for its seed and crop protection combined business.

---

1. at the current rate; 2. earnings before interest, tax, depreciation and amortisation; 3. earnings before interest and tax.
Chemspec Europe 2017 is Europe’s major sourcing and networking event for the fine and speciality chemicals industry. For purchasers and agents looking for specialised ingredients or bespoke solutions, the event is a renowned marketplace to source products, exchange expertise and build international contacts.

Compared to the previous event, Chemspec Europe 2016 in Basel experienced an increase of 7% in net floor space. Only a few weeks before this year’s show, Chemspec Europe 2017 is following up on this success: To date, 388 exhibitors from 29 countries have secured their stands on a net floor space of 6,140 m². For the first time ever, net floor space exceeds the 6,000 m² mark, representing an increase of more than 5%.

Chemspec Europe 2017 is bigger than ever and with expanded conference programme

Chemspec Europe is known for its varied conference programme, which is organised in cooperation with renowned partner organisations. The conferences not only provide the latest results of ongoing R&D projects but also a framework for exchanging expertise with industry professionals and valuable networking opportunities. Due to popular demand, this year’s conference programme has been expanded.

Germany, the UK, Switzerland, Belgium and France are the major European exhibitor countries. Asian exhibitors mainly come from China and India. Companies from the USA will also be well represented.

Expanded conference programme

Chemspec Europe is the International Exhibition for Fine and Speciality Chemicals. Its 32nd edition will take place in halls A5 and A6 of the Munich Trade Fair Centre, Germany. Due to high demand, exhibition space has been expanded twice in the run-up to the show, resulting in this year’s net floor space exceeding the 6,000 m² mark for the first time ever. Furthermore, visitors to Chemspec Europe 2017 can expect an even wider conference programme than at previous events.
For the first time, the programme will include the conference “Innovative Start-ups: New Chemicals & Industrial Biotechnology”, organised by BCNP Consultants. On Thursday, 1 June 2017, from 13:00 to 16:00, eight innovative chemistry start-ups and entrepreneurs will present new substances and new production routes in the fields of classical chemistry and industrial biotechnology.

Dr Magid Abou-Gharbia’s ever popular “Pharma Outsourcing Best Practices Panel” will not be his only contribution to the 2017 conference programme. On Wednesday, 31 May 2017, from 11:30 to 12:30, Dr Abou-Gharbia, from the Moulder Center for Drug Discovery Research, will give an additional lecture on the topic “Drug Development in a Changing Environment: Current Challenges and Future Opportunities”.

The day before the official start of the exhibition, on Tuesday, 30 May 2017, from 14:00 to 17:30, EFCG will return with “The Crop Protection & Fine Chemicals Forum”. The remaining conference programme includes the Agrochemical Outlook Conference, sponsored by AGROW, and the Regulatory Services Conference, organised by REACHReady. The two-day RSC Symposium, organised by the Royal Society of Chemistry, will offer presentations on “Continuous Flow Chemistry for Industrial Processes: Across Specialty and Fine Chemical Market Sectors”.

You can find the complete conference programme on the exhibition website www.chemspeceurope.com.

Show Preview 2017 with more than two hundred exhibitors and product details

The Chemspec Europe 2017 Show Preview is available online as well as in print. In the bilingual brochure (English and German), more than two hundred exhibiting companies provide a detailed overview of their products and services for this year’s exhibition.

The Show Preview also contains an exhibitor list, the detailed conference programme, general facts about the exhibition and important information for your journey and visit. Furthermore, the brochure includes specialised articles written by Dr Marina Fuentes, Technical Advisor at REACHReady, entitled “REACHReady 2017: Regulatory Climate Chemspec” and by Dr Bruce Lane, Chairman of the RSC Symposium, on the topic “Continuous flow chemistry in the speciality chemicals industry”.

Information for visitors

Chemspec Europe 2017 will take place in halls A5 and A6 of the Munich Trade Fair Centre, Germany, and can be accessed via the East Entrance (“Eingang Ost”). Opening hours of the exhibition will be on Wednesday, 31 May and Thursday, 1 June 2017 from 09:00 to 17:00.

Ticket registration is available on the exhibition website www.chemspeceurope.com. Online tickets for Chemspec Europe 2017 are free. On-site, a ticket will cost € 50. Tickets are valid for both exhibition days and include entry to the conferences.

The show website offers up-to-date information about the event, its exhibitors and their products, the detailed conference programme as well as useful tools to plan your visit to the show.
Syngenta’s crop protection sales decreased by 1.9% to $2,554 million in the first quarter of 2017 compared with the same period during the previous year. The decline was a similar 2% at constant exchange rates (CER). Volumes remained stable but pricing was “slightly lower”, the company says. The more favourable currency trend that began in the second half of 2016 continued, with the Russian rouble and the Brazilian real strengthening against the dollar.

Herbicides remained the company’s largest category, accounting for 38% of annual crop protection revenues. The category fell 5.8% to $970 million.

Sales of selective herbicides dropped 5.8% (-6%) to $829 million, primarily impacted by the late start to the season in Europe. In the US, Acuron (bicyclopyrone + mesotrione + atrazine + S-metolachlor) and Dual Gold (S-metolachlor) continued to expand despite competitive market conditions, Syngenta says.

Non-selective herbicides fell 6% (-11%) to $141 million. The decline was largely “due to softness” in glyphosate.

<table>
<thead>
<tr>
<th>1st qtr ended March 31st</th>
<th>2016</th>
<th>% change</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicides</td>
<td>1,030</td>
<td>-5.8</td>
<td>970</td>
</tr>
<tr>
<td>Selective</td>
<td>880</td>
<td>-5.8</td>
<td>829</td>
</tr>
<tr>
<td>Non-selective</td>
<td>150</td>
<td>-6.0</td>
<td>141</td>
</tr>
<tr>
<td>Fungicides</td>
<td>908</td>
<td>+1.5</td>
<td>922</td>
</tr>
<tr>
<td>Insecticides</td>
<td>387</td>
<td>-2.3</td>
<td>378</td>
</tr>
<tr>
<td>Seedcare</td>
<td>244</td>
<td>+4.1</td>
<td>254</td>
</tr>
<tr>
<td>Other</td>
<td>35</td>
<td>-14.3</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,604</td>
<td>-1.9</td>
<td>2,554</td>
</tr>
</tbody>
</table>
10th Agrow Awards
Now Open for Entries

The crop protection and seed industry’s most prestigious awards have been the benchmark for industry excellence for ten years. Now you can celebrate success at the Agrow Awards 2017.

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- Choice of 16 categories
- Simple online application process
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E: nikki.handley@informa.com
T: +44 (0) 20 7017 4751

Sponsorship queries and table bookings
Ben Watkins | Sponsorship Manager
E: ben.watkins@informa.com
T: +44 (0) 20 3377 3911

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Indofil Industries Limited
Fungicides made up 36.1% of crop protection sales. The category rose by 1.5% (+2%) to $922 million. Growth was driven by benzovindiflupyr (trade-marked as Solatenol)-based products in France, Germany and the US. This more than offset the impact of market weakness in Latin America.

Insecticide sales dipped by 2.3% (-4%) to $378 million. The decline was primarily due to lower sales in northern Europe.

Seedcare (seed treatment business) sales grew 4.1% (+2%) to $254 million. The growth was driven by “good performances” by Cruiser (thiamethoxam) and Fortenza (DuPont’s cyantraniliprole) in Latin America.

**Regional sales**

Europe, Africa and the Middle East (EAME) was Syngenta’s largest region, accounting for almost half (47.7%) of crop protection sales. Revenues from the region were down 4.4% (-3%) to $1,218 million. A late start to the season in northern and central Europe was due to cold weather. This was offset by an “excellent performance” in south-eastern Europe and ongoing growth in the CIS, as well as by solid growth in France due to the highly successful launch of the fungicide, Elatus Plus (benzovindiflupyr), at the end of 2016.

North America made up about a quarter (+24.4%) of crop protection sales. Revenues from the region rose by 4.7% (+4%) to $624 million, driven by the “ongoing success” of the fungicide, Trivapro (benzovindiflupyr).

Syngenta’s sales by business segment ($ million)

<table>
<thead>
<tr>
<th>1st qtr ended March 31st</th>
<th>2016</th>
<th>% change</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop protection</td>
<td>2,604</td>
<td>-1.9</td>
<td>2,554</td>
</tr>
<tr>
<td>Seed &amp; traits</td>
<td>979</td>
<td>+1.7</td>
<td>996</td>
</tr>
<tr>
<td>Controls</td>
<td>112</td>
<td>+4.5</td>
<td>117</td>
</tr>
<tr>
<td>Flowers</td>
<td>68</td>
<td>-2.9</td>
<td>66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,742</td>
<td>-0.9</td>
<td>3,710</td>
</tr>
</tbody>
</table>

1 may not add up due to elimination of inter-segment sales.

Annual lawn and garden sales were up 1.7% to $183 million. Syngenta has split the lawn and garden business into “controls” and “flowers” so as align the two business units with crop protection and seeds, respectively. Controls sales were up 4.5% to $117 million. Flowers revenues declined 2.9% to $66 million.

**ChemChina acquisition**

In recent weeks, the ChemChina takeover of Syngenta has made “very significant progress”, with the receipt of regulatory approvals including from the EU and the US, Syngenta says. “We look forward to closing the transaction in May 2017,” says Syngenta chief executive officer Erik Fyrwald. On April 13th, ChemChina announced that the tender offers to purchase all publicly held shares and ADSs will end on May 4th. The board of directors of Syngenta has unanimously recommended the offer to shareholders.

**Outlook**

“While conditions for growers at the start of 2017 remain difficult, our business is steady and currencies are no longer a drag on our performance,” says Mr Fyrwald. For the full year, the company maintains its targets of low single-digit growth in sales, an improvement in the EBITDA (earnings before interest, tax, depreciation and amortisation) margin and strong free cash flow generation.
Arysta’s sales up 3% in Q1

Platform Specialty Products’ agrochemical business, Arysta LifeScience, recorded a 2.7% increase in sales to $415 million in the first quarter of 2017. The $11 million revenue gain included $8 million from volume and product mix improvements and a $3 million boost from currency effects. Sales were up by about 2% in constant currency terms, with organic growth put at 2%. Growth was driven by volume gains in certain European markets and in Africa.

Revenues were boosted by territorial expansion initiatives in Europe, which were partly offset by colder growing conditions in North America and Europe, which has persisted into the second quarter. Good weather conditions, a stable macro environment and market share gains resulted in a good start to the year in Latin America, the company points out.

The adjusted EBITDA margin rose by 0.8 percentage points to 21.9% compared with the first quarter of 2016 or by 1.4 percentage points to 22.5% on a constant currency basis. There was a modest margin headwind from pricing pressures of certain generics in the Europe, Africa and Middle East region and Latin America, the company points out.

The company says that it remains on track to achieve mid- to high-single-digit percentage growth in constant currency adjusted EBITDA for the full year.

Arysta’s results ($ million)

<table>
<thead>
<tr>
<th>1st qtr end March 31st</th>
<th>2016</th>
<th>% change</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>404</td>
<td>+2.7</td>
<td>415</td>
</tr>
<tr>
<td>Adjusted EBITDA¹</td>
<td>85</td>
<td>+7.1</td>
<td>91</td>
</tr>
</tbody>
</table>

¹ earnings before interest, tax, depreciation and amortisation.

www.agribusinessintelligence.com
BASF recorded a 4.2% rise in crop protection revenues to €1,855 million ($2,027 million at the current rate) during the first quarter of 2017. Volume contributed 2% and positive currency effects another 2% to the growth, which was achieved “despite a market environment that remained difficult”. Prices were constant during the quarter.

Earnings before interest and tax (EBIT) before special items declined by €58 million to €595 million. That was the result of lower average margins due to a different product mix. Fixed costs rose slightly, due in part to the start up of new plants.

Sales in Europe “nearly matched” the level of the previous year’s first quarter. The company increased volumes “considerably” in central and eastern Europe, especially for herbicides. But western Europe posted a volume decline.

Positive currency effects and increased demand led to “considerable sales growth” in North America. Higher volumes arose primarily from herbicides, especially BASF’s dicamba herbicide formulation Engenia and Zidua PRO (saflufenacil – trade-marked as Kixor + imazethapyr + pyroxasulfone).

Sales rose “considerably” in Asia. That was largely attributable to higher volumes of fungicides due to earlier demand in China and the launch of Seltima (pyraclostrobin - trade-marked as F500) in India. Herbicide volumes also rose in Indonesia and Australia.

In the company’s South America, Africa and Middle East region, a “considerable increase” in sales was mainly the result of positive currency effects from the Brazilian real. Higher volumes of herbicides in Argentina and of insecticides in Africa and the Middle East contributed to the increase, while lower prices dampened sales development.

### BASF’s crop protection results (€ million)

<table>
<thead>
<tr>
<th>1st qtr ended March 31st</th>
<th>2016 ($ million)¹</th>
<th>% change</th>
<th>2017 ($ million)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1,780 (1,945)</td>
<td>+4.2</td>
<td>1,855 (2,027)</td>
</tr>
<tr>
<td>EBITDA²</td>
<td>645 (705)</td>
<td>-7.8</td>
<td>595 (650)</td>
</tr>
<tr>
<td>EBIT3 before special items</td>
<td>591 (646)</td>
<td>-9.8</td>
<td>533 (582)</td>
</tr>
<tr>
<td>EBIT³</td>
<td>590 (645)</td>
<td>-10.0</td>
<td>531 (580)</td>
</tr>
</tbody>
</table>

¹ at the current rate; ² earnings before interest, tax, depreciation and amortisation; ³ earnings before interest and tax.
FMC’s agrochemical sales down 3% in Q1

FMC’s agrochemical sales fell by 2.9% to $530.4 million in the first quarter of 2017. Gains in Asia and North America were more than offset by declines in Europe and Latin America. The downturn came from a 3% dip in volumes, with prices and currency effects having no impact on revenues. FMC attributes the decline mainly to a shift in the timing of sales from the second quarter to the first quarter.

Operating income rose by 1.2% to $83 million. A $5 million gain from currency effects and a $5 million boost from price, mix and other factors more than offset the $9 million adverse impact from lower volumes. The operating profit margin amounted to 15.6% compared with 15% for the first quarter of 2016. “We improved profitability in an environment that remains challenging,” says FMC’s president, chairman and CEO, Pierre Brondeau.

Revenues grew by 19% to $107 million in Asia. That was due to favourable weather in Australia driving strong demand for herbicides and the successful launch of a new rice herbicide in China. Good rainfall in South-East Asia led to extended rice planting in Indonesia and higher demand for rice insecticides.

North American sales were up by 1% to $152 million. That was largely due to a shift in sales from the second quarter to the first quarter rather than improved market conditions, FMC points out. There were strong pre-emergence herbicide sales and early demand in Canada.

European business declined by 14% to $177 million. The downturn is attributed to a late start to the season in north-western Europe, high channel inventories for fungicides and the strengthening of the euro against the dollar. FMC also points to favourable pricing and product launches in the region.

Sales in Latin America fell by 6% to $95 million. The company points to continued growth in Latin America outside Brazil, with Mexico performing well. Channel inventories of FMC products in Brazil declined by 35% compared with the same time last year and by over 50% since the end of 2015. Favourable weather conditions helped cotton production in Brazil and strong pricing in Mexico helped to offset adverse currency effects.

Outlook
FMC expects its Agricultural Solutions business to post operating earnings of $80-100 million in the second quarter, with a margin in the “mid- to high-teens percent”. For the full year, its forecasts earnings of $410-450 million, with a “high-teens percent” margin. Full-year revenues are expected to amount to $2,200-2,400 million. The company points to a strong second half in Latin America and a strong year in Asia. FMC’s forecasts exclude any potential gains from the pending acquisition of a significant part of DuPont’s crop protection business. The assets to be divested by DuPont generated revenues of some $1,400 million in 2016.

FMC’s Agricultural Solutions results ($ million)

<table>
<thead>
<tr>
<th>1st qtr end March 31st</th>
<th>2016</th>
<th>% change</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>546.1</td>
<td>-2.9</td>
<td>530.4</td>
</tr>
<tr>
<td>Operating profit</td>
<td>82.0</td>
<td>+1.2</td>
<td>83.0</td>
</tr>
</tbody>
</table>
In association with Agrow, the Agrochemical Outlook Conference will give a review of the market in 2016. It will look to offer insights into the challenges and opportunities facing the industry in 2017. The conference will cover these subjects from the different perspective of industry experts, manufacturers and key suppliers to the industry. They in turn will give an understanding of how industry requirements in 2017 can be met.

### Morning Session

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Company</th>
<th>Presentation Title</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanjiv Rana</td>
<td>Agribusiness Intelligence Informa</td>
<td>“Global Crop Protection Industry (Market, Corporate and Regulatory Round Up)”</td>
<td>31st May 2017</td>
<td>10.30</td>
</tr>
<tr>
<td>Dr. Andrea Missio</td>
<td>WeylChem International GmbH</td>
<td>“Powerful Halogens: Balance Between Innovation and Large Scale Manufacture”</td>
<td>31st May 2017</td>
<td>11.05</td>
</tr>
<tr>
<td>Dr. Adolf Heintze</td>
<td>Eurofins Agroscience Services Ltd.</td>
<td>“REACH – Are You Compliant?”</td>
<td>31st May 2017</td>
<td>11.40</td>
</tr>
</tbody>
</table>

### Afternoon Session

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Company</th>
<th>Presentation Title</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenn Carroll, Ph.D.</td>
<td>Vertellus</td>
<td>“Unlocking the Value Hidden in Your CMO”</td>
<td>31st May 2017</td>
<td>13.35</td>
</tr>
<tr>
<td>Dr. Jan Haller, PR&amp;D</td>
<td>Novasep</td>
<td>“Reduce Cost and Shorten Production Steps with Hazardous Chemistry”</td>
<td>31st May 2017</td>
<td>14.00</td>
</tr>
<tr>
<td>Dr. Jim Bullock</td>
<td>i Formulate Ltd.</td>
<td>“Developments in Agrochemical Formulation”</td>
<td>31st May 2017</td>
<td>15.10</td>
</tr>
</tbody>
</table>

### Morning Session

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Company</th>
<th>Presentation Title</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Janssen</td>
<td>ERM &amp; JSC International Ltd.</td>
<td>“Happy Families”</td>
<td>1st June 2017</td>
<td>10.30</td>
</tr>
<tr>
<td>Dr. Erick Nfon</td>
<td>Smithers</td>
<td>“The Challenges of Performing Environmental Fate Studies for Difficult Compounds”</td>
<td>1st June 2017</td>
<td>11.05</td>
</tr>
<tr>
<td>Deepti Gupta &amp; Anjaneya Mishra</td>
<td>Invest India</td>
<td>“Investment Opportunities in India”</td>
<td>1st June 2017</td>
<td>11.40</td>
</tr>
</tbody>
</table>
Speakers:

Sanjiv Rana – Editor in Chief (Agrow)
Sanjiv Rana has been leading Agrow, the global news provider for the crop protection industry, since 2007. He has been following developments in the crop protection market for over a decade and has a keen understanding of the global market. Sanjiv is a frequent speaker at industry conferences. He followed up an honours degree in science with an MBA and worked in the agrochemical sector for four years before shifting to journalism in 1998. He later acquired Master’s degrees in English Literature and International Journalism.

Dr. Andrea Missio – WeylChem International GmbH
Andrea Missio is Director of Business Development at WeylChem International, a member of the WeylChem Group of Companies. He started his activity in 2011 and his focus is on the Agrochemical and Pharmaceutical markets.
Before moving to WeylChem International, Andrea worked for 5 years as Director of R&D and Business Development Manager for Miteni, a company specialising in Fluorine chemistry and a member of the WeylChem Group of Companies. While at Miteni, he brought his expertise in chemical synthesis developed over 19 years spent in the pharmaceutical industry’s R&D labs, working for companies like Glaxo (now GSK), Hoechst RousselVet (now part of the US Merck Group) and for a German Biotech.
Despite his current role is mostly business oriented, Andrea still maintains a keen interest in the science and in the technology of chemical synthesis.

Dr. Adolf Heintze – Eurofins Agroscience Services Ltd.
Dr. Adolf Heintze joined Eurofins Regulatory AG as Team Leader for a new Regulatory Group in Niefern, Germany on July 1, 2015. In this role, Adolf manages a team of qualified regulatory experts in the area of Agrochemical regulatory affairs. Before joining Eurofins Regulatory AG, Dr Adolf Heintze was Managing Director at GAB Consult GmbH in Stade. He was responsible for consulting in the area of registration of Chemicals, Agrochemicals, Biocides, Feed Additives and Veterinary Products. He was with GAB Consult for over 10 years, starting his career as a Study Director for Analysis at IBR and later at GAB Biotechnologie GmbH.

Glenn Carroll, Ph.D., Global Market Manager – Vertellus
Vertellus’ Global Market Manager Dr. Glenn Carroll brings more than three decades of experience in the global chemical industry including the commercialization of new products, technology development and business management. His experience in the chemical sector encompasses a breadth of industries including coatings, oil & gas, semiconductors, pharmaceutical and agrochemical industries. He earned a B.S. in chemistry from Ohio State University and a Ph.D. in organic chemistry and photochemistry from the University of Minnesota Twin Cities.

Dr. Jan Haller, PR&D – Novasep
3/1996 – 9/1997 postdoc at UCLA, USA; Prof. Ken Houk (main topic: theoretical investigation of the osmium tetroxide mediated dihydroxylation of alkenes, its mechanism and its stereoselectivity, set up of force field parameters based on B3LYP-results).
Douglas Porto – Corbion

Douglas Porto has joined Corbion in June 2016 and serves as a Market Application Specialist for the Agrochemicals segment. Having spent most of his career as an Agrochemical Formulation Chemist, Doug has held global technical responsibility positions at BASF and Croda. With expertise in the Market of Agrochemical Formulations, Biopesticides and Micronutrients, Doug is a strong contributor to new technology development. Doug earned a B.Sc degree in Chemical Engineering and M.Sc degree in Biochemistry from Federal University of Rio de Janeiro (UFRJ).

Dr. Jim Bullock – i Formulate Ltd.

Dr Jim Bullock is co-founder and director of iFormulate Ltd which since 2012 has provided R&D support to companies engaged in formulation across all chemical-using industries. In agrochemicals, as well as conducting client assignments, iFormulate developed and delivered a popular training course “Introduction to Agrochemical Formulation Strategies” with ATI/Informa and recently authored the 2016 Informa Agrow Formulation report. After a D.Phil from Oxford, Jim led R&D projects in imaging at Ilford Ltd and activities on crystal engineering and dye formulation and chemistry at ICI/Zeneca. At BASF, in UK and Germany, Jim headed formulation development for colours and held marketing, strategy, R&D and regulatory affairs functions for BASF’s global biocides business. Jim also served as CEO of Intelligent Formulation Ltd which promoted formulation technology in the UK.

Robert Janssen – ERM

Dr. Ir. Robert Janssen is a chemical engineer and organic chemist by profession. He pursued a career in the chemical industries occupying several positions in the development and technical marketing of fuel & lubricant additives as well as strategic sourcing of chemicals. Since the launch of the REACH regulation his team of specialists was dedicated to the design and deployment of compliance strategies in the supply chain of a leading chemical manufacturer with headquarters in Switzerland. Since 2015 he is a Partner at ERM for product stewardship services. He has specialized in the preparation of authorizations under REACH, the Biocidal Product Regulation and supporting clients on compliance solutions in their supply chains.

Dr. Erick Nfon – Smithers

Dr. Erick Nfon is a Regulatory Scientist with particular experience in environmental fate modeling and regulatory affairs. Erick has spent 14 years working in Academia, Industry and at European Contract Research Organisations and regulatory consultancies. His responsibilities include environmental risk assessments, dossier preparation and submission, and the provision of scientific expertise and advice to support registration programmes for plant protection products, biocides, pharmaceuticals, and general industrial chemicals.
Sichuan Leshan Fuhua Tongda Agro-Chemical Technology Co., Ltd., specializes in glyphosate and glufosinate manufacturing, with current annual Glyphosate 95% Tech production capacity of 120,000 Mt (glycine route) and Glufosinate 95% Tech capacity of 10,000 Mt. It is the largest producer in China and the second largest, world-wide. Fuhua is projecting Dicamba and 2,4-D in capacity of 5,000 Mt/a each in the next two years by fully utilizing the advantages of its integrated industrial production chain involving phosphorus, brine, glyphosate and silicone, making it to be the most competitive agro-chemical products producer in the field. The factory is located in Leshan city, Sichuan Province, an area with extensive resources for Agro-chechemical manufacturing, and the international sales offices are located in Shanghai and Singapore. Fuhua exports to America, Asia, Africa, Oceania and Europe, with over 2500 employees around the world.

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