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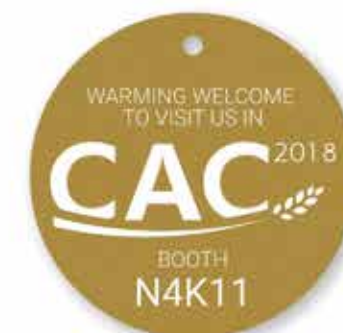
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# Russell IPM: To Build an Integrated Bioproducts Solution for the Next Five Years



**Dr Nayem Hassan**  
Head of Research and  
Development of Russell IPM

Russell IPM is the leading manufacturer of pheromone based insect monitoring and control systems in the UK and one of the largest in Europe. Its core expertise covers insect behaviour modifying systems and natural-product-based bio-rational pest management. When it comes to biopesticides or biocontrol, we have to think of Russell IPM. In the following interview, Dr Nayem Hassan, Head of Research and Development of Russell IPM, introduced us to the development plan of Russell IPM in the next five years

**We know that Russell IPM is an innovative company. Can you introduce the current product line of Russell IPM to us? And what is the research plan for the next 5 years?**

Russell IPM products offer a safer alternative of natural origin to crop protection solutions that are based on the applications of pesticides. At Russell we design, develop and manufacture biorational products that are safe for both farmers and produce consumers, effective in nourishing and protecting plants and good to the environment. Our integrated pest control systems enable growers to produce crops without pesticide residue, preventing chemical toxicity from entering the food chain. During the next five years will be focusing on the development of further such biological crop management strategies that will include bio-fertilisers, bio-stimulants, seed treatment solutions and biological crop protection products. Simultaneously, we are developing smart crop management systems that utilise real-time monitoring to pinpoint crop protection strategies. Our goal here is to bring climatic and pest outbreak data to farmers' fingertips. To that end, we recently have invested in constructing a new dedicated facility for microbial fermentation and biopesticides production in Flint, UK. This new state-of-the-art production line will be more efficient and ergonomic in manufacturing large quantities of bio-pesticides in a short space of time. Consequently, we can respond to the market quickly with cutting edge UK-quality products.

**In recent years, biopesticides have developed rapidly. How has Russell IPM developed over the past few years? What are the existing major markets? What markets are planned to develop in the future?**

Keeping up with the global trends, Russell IPM has developed a number of our own biological pesticides, including microbial, plant extract-based, microbial extract-based and some containing soap salts or surfactants. Our pheromone lures range has been expanded to include mating disruption systems and multiple species pheromone lures for agriculture, public health and pest control use. We have a strong R&D team that collaborates with major UK universities and research institutes. Thanks to our foresight, even during the height of the recession during the last ten years Russell IPM has invested substantially in R&D and infrastructure and has produced biorational solutions that are still going strong, for example, specialised roller traps against Western flower thrips, pheromone-based systems for the monitoring and control of Tuta absoluta, Fall armyworm, fruit flies of economic importance and other open-field and protected crops pests. In recognition of our efforts to remain at the forefront of innovation, the company has just been awarded the prestigious Queen's award for Enterprise for a 3rd time this year. Our products reach over 80 countries, but we are now going to redouble our expanding sales force to deepen our partnerships in the UK, Europe, Middle East, Africa and Asia. The new markets in Agriculture that we are targeting are South America, North America, Canada, Eastern Europe, Russia and Southern Africa.

**We know that Russell IPM has established business in China for several years. What achievements has Chinese company made during these years? How do you see the opportunities and challenges in emerging markets like China?**

Russell IPM China and our team there are promoting the biopesticides we have for agriculture

and stored product insects. One major problem that Chinese growers face is fungal diseases in vegetables and ginger, root rot and Chinese fruit fly, *Bactrocera minax*. We are developing products for those problems, as well as promoting our product for mating disruption of stored product moths. Our five offices in China are now registering a number of the latest biopesticides and biofertilisers we make. Last but not least, over the course of the last two years, Russell IPM China has established strong collaboration ties with a certain Chinese university to test market-specific pheromone-based technologies and to train the local work force to produce the most effective new products in China. The major challenge there is the registration process, as well as the comparatively higher price of biological pesticides compared to cheap chemical

pesticide. The farmers and growers need to be convinced of the benefits of switching to bio-pesticides and that takes time and effort.

**Can you please introduce some details about Russell IPM Training? What is the original intention of setting Russell IPM Training and what achievements has been made?**

Russell IPM provide training on IPM solutions and biorational crop protection for agriculture, public health, food hygiene and smart monitoring. Our trainers are fully qualified with relevant academic degrees and wide overseas field experience. We also are working closely with scientists from developing countries. As part of one project for the development of a biorational solution funded by the Bangladesh government, Russell IPM will

train around 50 scientists at our satellite offices in the country over the next 3 years. We have obtained accreditation as trainers at Level 2 for food hygiene by the Royal Society for Food and Hygiene.

**Can you share with us about Russell IPM's experience in the promotion of biopesticides to growers?**

We promote biopesticides through field trials and product demonstrations, during farmers' days, seminars, training, regional and international exhibitions. We are an active member of IBMA and the EU SCLP Pheromone Task Force. In addition, we aim to deliver papers through various high-profile crop and pest-specific seminar, symposiums and international congress. Via our social media and websites, as well as other digital forums, we aim to promote safer, cleaner biopesticides.

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# Biostimulants, A Marketing Challenge



By **Michel de Rougemont**  
 Founder and Partner of MR-int  
 Michel de Rougemont Enterprise  
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It does not matter whether a cropping system is high or low input, oriented to productivity or subsistence, conventional, organic, integrated, sustainable, permanent, fair, or whatever; beside land, intelligence, sweat and energy, four crop inputs are indispensable: seeds, water, fertilizers, and plant protection products. All the rest is optional.

Biostimulants form part of this rest and face additional marketing challenges to those of required inputs. Growers are used to evaluate their supplies according to price, efficacy and, to some extent, service level of their distributor or of the manufacturer. They don't need to be convinced that their crops need nutrition or pest control. Bio-stimulants, already a misleading and often misused denomination, must be sold under different claims, those of enhancing the plant metabolism in a manner that provides measurable and significant agronomic benefits other than nutrition or pest control. This is no straightforward endeavour.

For such products, the regulatory environment is as disoriented as the market itself. As soon as phytosanitary defence mechanisms are in play, a product must be registered as a pesticide, with all the technical hurdles and costs that it entails. For example, while *Trichoderma* spp products were originally sold as stimulant, now only those companies having made this regulatory investment may put them on the market; and their competitive place remains within a narrow bio-fungicide category, for authorized uses only. Few countries regulate bio-stimulants and if they do, it will be as a special chapter within their fertilizer laws. A new European regulation is stalled since 2016 that attempts to find a common definition and to provide a set of general requirements for this quite heterogenous product group. Thus, biostimulants proliferate with a wild array of benefits that are claimed and not challenged by the obligation to demonstrate actual modes of action and their corresponding agronomic value.

As no reference for effectiveness and quality is provided, the grower must make his own mind and evaluate if it is worthwhile to invest in applying a product that may add value to his crop in the form of yield increase, higher produce quality, precocity, abiotic stress resistance, or reduced consumption of other inputs. These five possible claims must be sustained by unequivocal proofs, mostly in the form of field trial results. And one has to trust that such results have been fairly evaluated.

Depending on the mode of action, to prove efficacy and efficiency is either

very simple or then almost impossible. For example, roots inoculants have straightforward, observable modes of action and well reported outcomes such as nitrogen fixation or the extension of the rhizosphere. On the other hand, a mixture of various plant extracts may leave no observable trace in the plant and its effect may only be evaluated by sophisticated statistical analysis to distinguish it from mere fertilization. A "snake oil" suspicion may not be far away.

The first marketing challenge is to be aware of that necessity, and to organize a set of representative field trials, preferably performed by independent or official institutes, to anchor claims in a valid scientific foundation.

Having done that, two additional challenges must be faced: communication and distribution. As biostimulants do not [yet] form part of closed well-known categories, the communication around a product must begin with basic education, to explain e.g. what a mycorrhiza is, or to demonstrate a relation between soil composition, rhizosphere and drought resistance. Only then is it possible to show how a given product may offer a valuable and competitive solution. The need for such communication seems quite obvious for the biologists and the agronomists having developed the product. It is not as simple for the field sales representatives, the distributor's sales and technical personnel, and the growers themselves.

In the agricultural input market, distributors combine the tasks of logistical points of sales, cash collection, product

promotion, and technical assistance to the growers within their catchment area. The arrival of products requiring investments in basic communication and follow-up to assess customer satisfaction represents a commercial and organizational disruption. Also, the sales representatives of the manufacturer must be able to get closer to the end-user which may be a source of tension with the distributor.

Next challenge: the portfolio syndrome. When a company manages a large range of products it is customary to rank them according to their expected performances in terms of volumes, margins and supporting costs. Thus, business competition begins within a company for a product to obtain some place in the sun. Sales representatives will be driven by sales objectives, rarely by the maximization of hours spent in product communication. Therefore, the promotion of bio-stimulants within a diversified

company may not get a top priority, despite of the underlying values that it may carry for environmental or safety reasons. A way of addressing this challenge is to split the organization, and to get dedicated teams interacting with different distribution channels than the traditional ones dealing with fertilizers or pesticides. Such split has also proven necessary to keep alive biocontrol products within multinational monsters. Doing that is not without conflict, and the holy grail of a holistic customer-oriented strategy from the plough to the fork may remain out of reach. Also, small companies focussed on a narrow product range may not have a sufficient critical mass to undertake all the required marketing efforts.

The ultimate challenge is to gain repeated relationships with the end-users, those who decide to invest in products, apply them and reap benefits. Biostimulants are discretionary products;

when a user can be convinced of the advantage in using one, he will make a purchase decision, albeit only as long as the otherwise prevailing economic conditions allow him to do so. Growers are highly sensitive in their spending; they know well when and where cost saving is more important than potential additional benefits. Exposed to many products with characteristics that are difficult to understand, or to trust, they have a natural aversion to unproven claims. Marketing of such products has therefore its costs and its time requirement, higher than other conventional agricultural inputs.

Biostimulants, or plant enhancement products, add value to agriculture and contribute to its efficiency and sustainability. In addition to technical excellence, their growth potential will be fully exploited by addressing well the corresponding marketing challenges.

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# Challenges of Proving Biostimulants & Biofertilizers

Co-authored by Ignacio Colonna, Latin America Research Manager of AgriThority;  
Jerry Duff, President & Founder of AgriThority;  
Marco Toapanta, Global Director – Science & Technology of AgriThority



As one of the fastest growing segments of agricultural inputs, biological products are typically categorized as bio-stimulants, biopesticides or bio-fertilizers. The active ingredients in biologic products, by definition, are derived from naturally-occurring microorganisms, plant extracts, beneficial insects or other organic matter.

The nature of living organisms and natural chemistries in biologic products present unique challenges in the product evaluation and field development process

as well as regulatory hurdles. Recognizing and addressing these challenges with a plan to deliver a strong product position backed by consistent and reliable trial data can produce valuable results. A well-planned approach also helps avoid the pitfalls that could delay the product development process and market entry as well as increase costs.

Challenges often arise when initiating a trial in a different country, either for counter-season data generation or local

product development. Expertise in protocol development can reduce the number of total trials and seasons required to evaluate performance and gather data for product registration. Proficient analysis can increase the value of the information. Inefficiencies result in less reliable data and may require supplemental trials to support the project goal.

AgriThority has tested bio-stimulants and bio-fertilizers in more than 800 protocols around the world over the past

ten years, with proven experience meeting demands in regulatory and product development processes across many geographies. Through implementation of trial designs and protocols specific to this category of products we can more accurately evaluate performance and accelerate the product's path to commercialization. Use of innovative research tools also aid in the development of Best Management Practices to guide expectations and successful use by the growers.

## Early Trial Planning

Early project planning can have a significant impact on the effectiveness of a trial. An adequate efficacy evaluation involves an optimal timing window to allow full expression of product effects on the target crop. But, the first steps are to start early and to ensure regulatory compliance.

A biologic or bio-stimulant product imported to a field location from another country requires regulatory permits. South America may be used as an example. While these products may gain importation approval to, for example, Paraguay in less than one month, Brazil and other countries may take six months or more to process. Ignoring this additional time in planning can imply a field trial start under non-relevant environmental conditions, compromising future use of the data generated in the project. In many countries, new bio-stimulant or bio-fertilizer products are not adequately covered in existing local regulatory legislations, thus permit and registration processes are not completely clear. In these situations, regulatory experience and fluent communication with the importing country's government institutions can streamline the application process and expedite permit approval.

When testing biologic products, consider storage and handling requirements of products containing

living organisms during shipment and at the testing location. In some countries, customs release can involve a significant period. If the product requires special conditions, be sure these can be followed during the shipping process and by the trial organizer. Requirements may include refrigeration of the product prior to use, or application as a seed treatment shortly before planting. For biologicals, including a viability test in the protocol may be a good check to ensure proper product quality in each experiment.

## Early Development Trials

New technology testing often jumps "from lab to field," skipping the early development trial which allows for a better understanding of its effects on crops. Early development trials fine-tune aspects of future protocols by measuring early crop growth. Conducted in a greenhouse or as a closely controlled plot trial, the early development study is relatively low cost and short duration yet increases the effectiveness of future field trials significantly. It provides a better understanding of the product by discovering the optimal application rate as well as compatibility and synergies with other technologies normally used in the target crops.

Early development trials can be an effective source to substantiate product claims and complement the data needed in registration application. The early development stage provides an opportunity to show how the biologic product performs in coordination with other biologic or synthetic chemistries through detailed measurements. Testing includes controlled levels of biotic and abiotic stress factors that can provide an initial understanding of the scope of product effects. This is often difficult to perform in larger scale field trials at early stages.

## Location Selection

Trial scope is typically limited by cost constraints; therefore, each trial should be designed to produce a maximum amount of information for product development and registration. The optimal design of a field trial is strongly influenced by the environments which best demonstrate product performance or match conditions experienced by the target grower (e.g. a stronger relative product effect under low-yielding environment).

A careful choice of trialing environments may consider the soil type, temperature range, probability of drought and heat stress, plus pest and disease infestations and other factors that may affect expression of product effect on the crop. Trial organizers may have capabilities to further control stress factors through irrigation systems or retractable roof structures under well calibrated protocols.

Attempting to measure product response to too many biotic and abiotic environmental factors in a single project is normally tempting but may create inefficiencies when considering the typical range of responses. When focusing on stress environments, trialing efforts should account for a higher relative experimental error. Thus, it is wise to adequately plan the total required number of locations.

## Tools to Measure Plant Performance

Data generated by the trial is amplified through advanced tools used to quantify crop response. Measurable data permits objective product comparisons, more interpretable and credible by growers than subjective information sources dependent on the "eye test."

Examples of advanced trial evaluation tools are ground or aerial (drone, plane or satellite)-based Normalized Difference Vegetation Index (NDVI) sensors, which

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## MARKET INSIGHT

provide a visual snapshot of the greenness or indices closely related to crop health and photosynthetic activity in the trial at a given point in time. When overlaid with the experiment layout grid (Figure 1), a software process converts the aerial image to measurable values to compare products within the trial.

Similarly, a quantitative estimation of plant size and leaf area at early growth stages can be achieved through use of simple digital image processing software. A remarkable example in our evaluation of responses and characterization of bio-stimulants, bio-fertilizers and biopesticides has been the use of Smartfield<sup>™</sup> sensors for crop canopy temperature estimation under drought or nutritional stress. The sensors are positioned in the field to collect multiple data points each day along the season to detect possible response from

treatments that improve crop tolerance to stress (Figure 2). As the crop water status and plant health improves, the sensors record a lower leaf temperature. Measurement of root structure can be achieved through samples removed from the field during the trial and further processing through digital images and conversion to numerical data through software such as WinRHIZO<sup>™</sup>.

### Analysis is Key

Once the trial is complete, statistical analysis and adequate use of data visualization tools convert data into usable information and actionable next steps. A careful inspection of the dataset and a robust analysis ensures lack of confounding effects that may hinder or bias estimation of product performance. The product development team relies on the analysis to determine whether to continue developing the product or proceed to registration. Once the bio-fertilizer or bio-stimulant is available to growers, data can substantiate claims and validate product performance. After commercialization, continuous trialing can show product consistency over several seasons, performance in new environments, or integration with newer technologies.

Well-designed trials performed on schedule with qualified suppliers can increase efficiencies and control costs in product development. Through early planning and efficient implementation of trials, companies often can accelerate the introduction of new bio-stimulant and bio-fertilizer technologies to market and encourage use of more sustainable agricultural production practices.

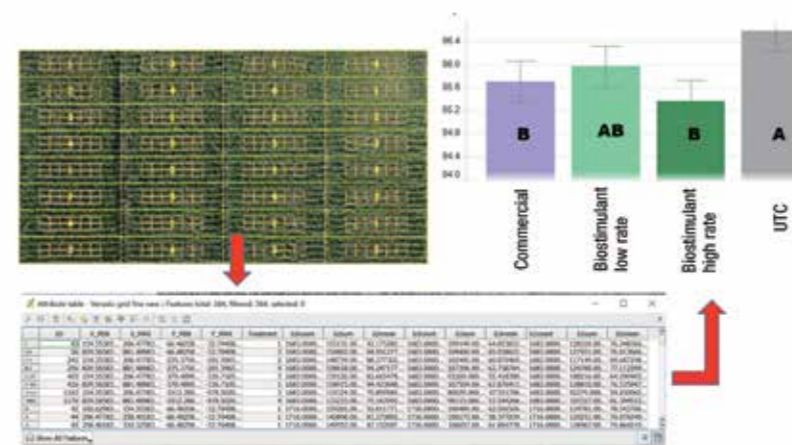


Figure 1. Applying a grid to drone photography translates visuals to quantifiable data

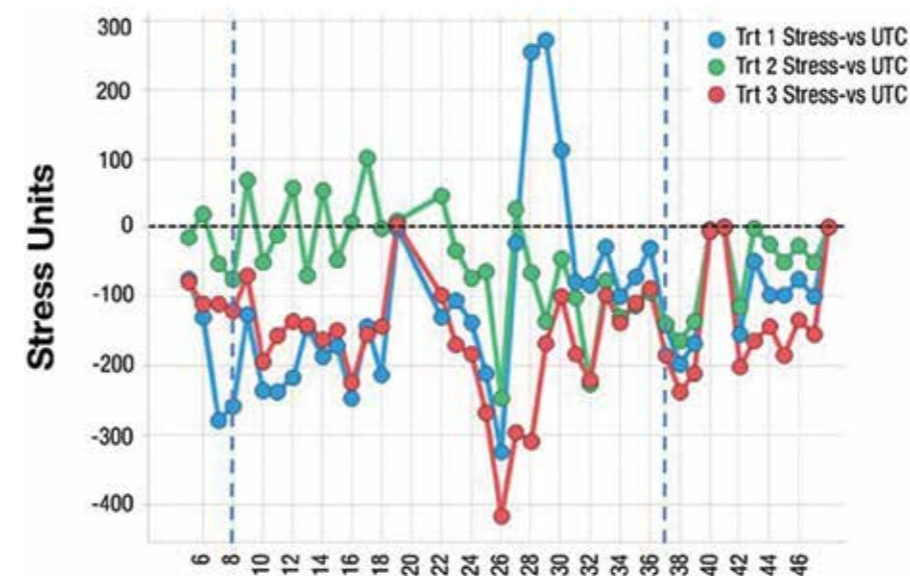


Figure 2. In-field sensors measure environment stress and quantify crop response objectively



# A Distributor's Perspective on How to Improve Biopesticide Adoption



By **Jesse Rosales**  
Branded Technologies Portfolio  
Manager- Pesticides of Wilbur-  
Ellis Company

## Market and Segment Overview

The global market for pesticides reached \$68.7B in 2017 <sup>1</sup>. Biopesticides contributed to just under 5% of that to achieve a global value of \$3.3Bn <sup>2</sup>. Looking forward, biopesticide growth is expected to outpace that of synthetic pesticides during the five-year forecast period beginning in 2016; corresponding CAGRs are 14.1% and 4.8%, respectively <sup>3</sup>. Major drivers for growth include increased regulatory scrutiny of synthetic chemistries, consumer demand for residue-free and organic food products and integrated resistance management strategies.

While many suppliers have deployed acquisition, partnership & licensing strategies to participate in this segment, their prioritization of biopesticides remains proportionate to market opportunity. This means these products' resourcing, in terms of dollars toward discovery, development and support, is quite far off from that of their conventional counterparts. Accordingly, three interesting trends have emerged over the past decade: 1) many small startups have entered the market hoping to capture opportunities that do not meet major suppliers' internal hurdles 2) major suppliers have entered this space though deals- likely to signal to consumers the firm's acknowledgement of the segment and to diversify their portfolios 3) distributors are using this segment as a point of differentiation and as a tactic to recoup program paymentsA lost in the current environment of supplier consolidation.

There are two fundamental differences in how biopesticides get to market. Firstly, they generally move through development more quickly: the barriers to entry for biopesticides are significantly lower. Secondly, discovery and development costs are typically in the range of \$10M - \$15M compared to synthetic development costs of \$300M+ <sup>4</sup>. Biopesticides then achieve registration in around 18-months through the EPA's biopesticide division. At this point, biopesticides are ready for market introduction.

The historical model that has been applied to conventional products has been for distributors to take fully-developed products and sell them to consumers as is (i.e. minimal additional market development is needed). This is ineffective for biopesticides because of the amount product characterization that is still to be done- this is usually conducted during the longer product development cycle of synthetics- for consumers to comfortably adopt the product. An alternative model that more evenly spreads the onus of product and market development throughout the value chain is needed for biopesticides to achieve the level of resourcing and consumer familiarity for biopesticides to succeed.

## Challenges with the Paradigm

Marketing biopesticides through the current paradigm is leading to a misalignment of expectations throughout the value chain. A very simplified model of the supplier-distributor-consumer relationship (see Figure 1) details key expectations at each level. Conventional products benefit from a longer development cycle and more investment to characterize product performance. The less-stringent requirements of biopesticide registrations mean products do not require efficacy

data for every crop on its EPA product label B. This contributes to the challenges of biopesticide adoption.

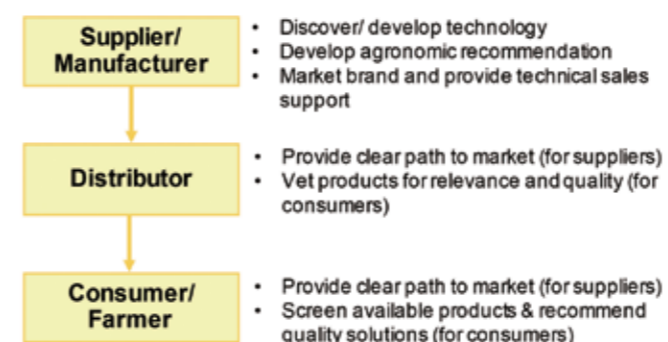


Figure 1: Agricultural Inputs Value Chain

### Challenge #1: market readiness expectations.

Consumers and distributors expect traditional chemistry to be fully characterized, have empirical studies, and have been evaluated by major universities by the time the product is launched- and rightfully so. The specialty segments where biopesticides typically compete often do not justify the resourcing that goes into the broad-acre segments where mainstream chemistries compete

and thus, biopesticide pre-launch characterization may never achieve parity.

### Challenge #2: service expectations.

The traditional chemistry manufacturer has core business in large segments like corn and soybeans that are profitable enough to justify much higher staffing levels of customer support roles (e.g. sales reps, technical services, product development, account management). Consequently, biopesticide firms typically have fewer specialists and this leads to disparate capabilities to fully develop products prior to launch and support products afterwards.

### Challenge #3: systems to appropriately vet products and suppliers.

Distributors are well versed at vetting conventional products and suppliers- this usually involves an introduction to key team members and product strategies, a data review and a guarantee that supply will not be broken. Biopesticides vastly differ from synthetic chemistry during the last step because manufacturing is quite nuanced and can be challenging. Biopesticide quality controls are often a series of qualitative markers that suggest consistency across production batches. Scale up from small

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laboratory-sized production batches to commercial scale is a very challenging problem to solve. Generally, distributors lack expertise to appropriately vet biopesticide suppliers.

**Challenge #4: efficacy expectations.**

The primary purchase motivator for pesticides is efficacy, but biopesticides are often selected for their contribution toward residue and resistance management programs, shorter pre-harvest and re-entry intervals, safety to beneficials, organic certification, etc. These advantages come as a tradeoff to efficacy under heavy pressure, but it is key to understand these products are not intended for such situations. While products like Sonata (manufactured by Bayer and distributed in the U.S. by Wilbur-Ellis) offer curative activity, like many other biopesticides, they should be applied preventively or in light to moderate pest pressure. The marketer should manage expectations as much as the evaluator should place products in situations where they can succeed- even if this means slightly altering timing or practices.

**Collaborative Product and Market Development as a Solution**

Biopesticide adoption is in need of an innovation on how suppliers, distributors and consumers conduct product and market development. Innovations are seldom the product of a single technological discovery or the output of a single inventor, instead they are more often the combination of technologies, processes, people and ideas in ways that develop something truly game changing. A viable solution for biopesticide adoption is to pool resources and capabilities, across members of the value chain, while managing market readiness expectations and educating consumers on the holistic value proposition.

While there are few companies that have the resources to thoroughly develop biopesticides (e.g. Bayer-Monsanto, BASF, Corteva, etc.), there is no shortage of companies with such an intent. The challenge for the latter group is that product development thoroughness- based on current expectations- comes with a big price tag. The alternative is to network core competencies for product development to piece meal a product offering. A hypothetical example of this is engaging the screening capabilities of Company A with the manufacturing capabilities of Company B and the field development capabilities of Company C to develop a new product that is sold through company D's retail reach.

The final component of this alternative model is to educate consumers on expectations of such products. This would involve disclosing to consumers that they are being presented with products that are still being characterized by the time they enter the market. This would also require a willingness on the consumer's part to send feedback through the value chain for continued product characterization.

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**Conclusion**

Such a solution can potentially be challenged by disputes over rights to intellectual property, contract negotiations, etc., but it represents an alternative approach to developing products that face adoption challenges in the current paradigm. Such risks can easily be justified by enabling companies to better focus on their core competencies, decreased development cost burden on each collaborator and increase of biopesticide solutions to consumers. It is incumbent upon agribusiness leaders to try an outside-of-the-box approach to raise the quality level and rate of adoption of biopesticides if we are to continue experiencing the type of growth this segment has recently enjoyed.

**FOOTNOTES**

A: Program payments refers to the money paid by suppliers to distributors for meeting sales goals.

B: It has been my experience that the biopesticides do not require efficacy data for every crop on the label.

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# The Overview of China's Biopesticide Market: Opportunities and Challenges

## Global Biopesticide Market

Global sales of biopesticides have exceeded \$3 billion and currently account for only 5% of the entire plant protection market. However, the market for biopesticides grows at a rate of nearly 15 - 20% per year and is expected to reach \$5 billion by 2020. Synthetic pesticides are increasingly being replaced by biopesticides. Biopesticides are estimated to occupy half of the pesticide market in around 2050.

Europe and North America are the main markets of biopesticides, which their market shares reach 36% and 35% respectively, followed by 16% in South America, 8% in Asia Pacific, and 5% in other regions. There is a huge market in the Asia-Pacific region that has yet to be developed. The growth rate of global biopesticides in the crop protection market is strongly driven by the development of the industry in this region.

Category		Variety number		Product number	
		2016	2017	2016	2017
Microbial pesticide	Bacterial	14	15	59	67
	Fungus	13	17	347	367
	Virus	11	11	63	70
	Protozoa	1	1	1	1
Biochemical pesticides	Pheromone	3	4	74	81
	PGR	14	16	392	383
	Plant anti-attractant	6	7	115	135
Botanical pesticides		25	26	240	262
Total		87	97	1291	1366

Year	Export		Import	
	Quantity (ten thousand tons)	Amount (billion U.S. dollars)	Quantity (ten thousand tons)	Amount (billion U.S. dollars)
2013	0.2995	0.2709	0.0052	0.0247
2014	0.4197	0.3979	0.0018	0.0119
2015	0.2658	0.2970	0.0051	0.0169
2016	0.2234	0.2060	0.0073	0.0197
2017	0.1667	0.1617	0.0126	0.0219

## The History of Biopesticide Application in China

- In 1960, biopesticides began to be produced in China and the applied arable land area exceeded 2 million hectares.
- In 1997, 30,000 tons of biopesticides were used in more than 10 million hectares farmland.
- In 2008, 327 kinds of biopesticides were registered and the application area of biopesticides accounted for 1.6% of the total cultivated land area.
- In 2017, biopesticides accounted for 8% of total pesticide use. In farmland using pesticides, more than 10% of the land area was occupied by biopesticides.

## Development Status of China's Biopesticide Market

In 2016, the value of biopesticides in China was \$220 million. It is estimated that by 2025, it will reach \$1,363 million, with a compound annual growth rate of 22.4%. The rising demand for safe and high-quality crops and the increasing emphasis on ecological protection have all contributed to the surge in sales of biopesticides in China. In addition, the registration of active ingredients of biopesticides in China has exceeded the EU.

By the end of 2017, the total number of registered pesticide products in China was 38,248, of which 1,266 were biochemical pesticides, microbial pesticides, and botanical pesticides, accounting for 3.3%, involving 97 active ingredients (including different strains). There were 2,415 registered agricultural antibiotics, accounting for 6.3%, involving 13 active ingredients.

In 2017, there were 38 newly registered pesticide species (active ingredients), of which

10 were biopesticides, namely *Metarhizium anisopliae* CQMa421, *Bacillus thuringiensis* G033A, *Bacillus amyloliquefaciens* B1619 and *Pseudotumor*.

According to the official statistics of Institute for the Control of Agrochemicals, Ministry of Agriculture (ICAMA), in 2017, China exported approximately 1,667 tons of biopesticides (excluding agricultural antibiotics), and the export value was US\$16.17 million, which was a significant drop of 25.4% and 21.5% respectively from 2016. In 2017, China exported 1.467 million tons of pesticides and exported 6.76 billion US dollars. The export volume and export amount of biological pesticides accounted for 0.11% and 0.24% respectively. It can be seen that the export of biopesticides accounts for very little or even negligible, which is inconsistent with the status of China's pesticide-exporting countries.

## Policy Supports

Related favorable policies for biopesticides in China are as follows:

- On January 6, 2013, the State Council of China approved the issuance of "Several Policies for Accelerating the Development of the Biological Industry" to promote the development of high-quality plant immunity inducers, bio-bactericides, and bioinsecticides.
- On February 17, 2015, the China's Ministry of Agriculture proposed a zero-growth action plan for the use of synthetic pesticides by 2020.
- In June 2017, the State Council of China promulgated the new "Pesticide Management Regulations."
- In December 2017, the China's Ministry of Agriculture declared that the last 12 highly toxic pesticides would be banned in the next five years. Among them, endosulfan and methyl bromide would be completely banned in 2019. Aldicarb, phorate, and iridfos-methyl

would be withdrawn in 2018. Ethoprophos, omethoate, methyl isoprene, and aluminum phosphide would be withdraw before 2020. Chloropicrin, carbofuran and methomyl would strive to withdraw before 2022.

A series of policies in China are promoting the rapid development of biopesticide. The relevant regulations such as production licenses for pesticides, traceability of QR codes, and business licenses have become increasingly stringent, making it more difficult for synthetic pesticides to obtain registration, forcing synthetic pesticide companies to shut down or update their technologies. More than 30% of synthetic pesticide production plants in the country will be shut down. In addition, the environmental production restriction policy has caused the price of synthetic pesticides to soar, and its relative price advantage of biopesticides is being weakened. The prohibition on the use of highly toxic pesticides also makes synthetic pesticides increasingly being replaced by biological pesticides.

## Industry Challenges

Biopesticides can be divided into microorganisms and biologically-derived

extracts. At present, the research of related technologies is still relatively limited in China. The problems of short shelf life, high cost and easy degradation of biopesticides need to be solved. Coupled with the non-standard production and use, the application effect of some products is unsatisfactory, making the use of domestic biopesticides lower than in Europe and the United States.

Many scientists have completed preliminary studies in this area. For example, in response to the rapid degradation of biological pesticides, some studies have shown that nanomedicines can increase the efficacy of biopesticides and reduce the losses caused by degradation (caused by volatilization, leaching, etc.). For example, nanoparticles can reduce the volatilization of neem oil and prolong the duration of drug action. Therefore, nanotechnology helps to strengthen the stability of biological pesticides, enhance efficacy, and facilitate the promotion of products. However, more field trials are needed to demonstrate the effectiveness of the technology. Although more and more new technologies have emerged, the comprehensive system research results are still relatively few. The frequency of application of biological pesticides, storage stability, and economic





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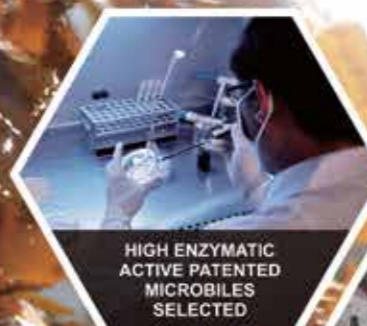
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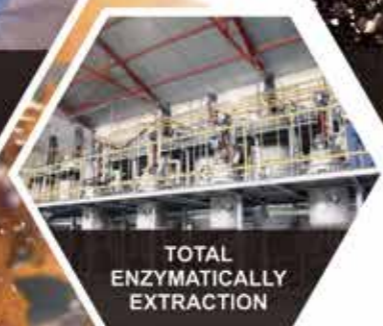


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benefits are still the main research areas of such pesticides.

### Future Outlook

The speed of development of the biopesticides in the future will depend to a great extent on the research progress of product technology. This industry still faces some challenges in China. In the future, it is necessary to further reduce the cost of biopesticides so that more growers can afford quality plant protection products. At present, the development of biopesticide technology in China is not yet mature, and more research funds are needed to support it. Pesticide companies can strengthen cooperation with research institutions, and they can also cooperate with multinational corporations in R&D, or cooperate in the sales of quality products abroad.

In terms of application, biopesticides

cannot completely replace synthetic pesticides, but the combined use of the two types of pesticides is an effective program for pest control. For crops such as fruits, tea, and vegetables, which require extremely severe pesticide residues, they will be the main target for biopesticides. In addition, after the products are sold to growers, the related training services should also be provided in order to ensure that the products can be used correctly and the efficacy of the products can be normalized.

Undoubtedly, the Chinese market for biopesticides will continue to develop rapidly. People's increasing attention to food safety and environmental protection has contributed to the surge in sales of biological pesticides in China. The gradual withdrawal of toxic pesticides from the market will release sites for biopesticides. The new biopesticides laws and regulations and green channels

will simplify the process of entering such products into the market and save registration costs. In addition to the favorable policies related to biopesticides, the transfer of land, the development of eco-agricultural demonstration areas, and the innovation of pest control technologies are all driving this industry forward.

It can be predicted that competition in this emerging industry will become increasingly fierce in the future. Whoever seizes the market first can benefit from it and contribute to the sustainable development of agriculture in China as soon as possible!

Source:

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# List of Overseas Fertilizer Companies in China

The current global biostimulant market is valued at about 1.3 billion USD, Among which the value in China is about 200 million USD. It is estimated that by 2020, the global market value of biostimulant will reach 2-3 billion USD, and the annual growth rate will be over 10%. In the next 3-5 years, the market value in China will also reach 400-500 million USD.

China is very likely to become the largest market for biostimulant in the future.

In recent years, biostimulant products represented by humic acid, chitin, fish protein, alginic acid, etc. have been gradually moving from Europe and the United States to China, becoming a powerful tool for assisting Chinese chemical fertilizers and pesticides

to improve crop quality and farming efficiency. People in the industry believe that biostimulants have become a blue ocean for overseas companies competing for the beach.

According to incomplete statistics, special fertilizer and biostimulant companies currently entering China's market mainly include:

Company Name	Country	Company Name	Country
Arysta LifeScience	USA	Agrinos	Norway
Alltech Crop Science	USA	Yara International ASA	Norway
Agmor Inc.	USA	Albit Scientific and Industrial LLC	Russia
Arcotech, Inc.	USA	BioAtlantis Ltd	Ireland
Bio Huma Netics, Inc.	USA	BIOSTADT INDIA LTD	India
Brandt Consolidated, Inc.	USA	OREALIS-ROSIER S.A.	Belgium
CYTOZYME	USA	Lima Europe N.V.	Belgium
GROWMORE INCORPORATED	USA	SAP International Corporation Bvba	Belgium
PRO•SOL	USA	CHUBU ECOTEC CO.,LTD	Japan
Stoller Enterprises, Inc.	USA	COMPO GmbH	Germany
U. S. Borax Inc	USA	Humintech	Germany
Biolchim S.p.A	Italy	PLANTA-Düngemittel GmbH	Germany
GREEN HAS ITALIA S.p.A.	Italy	DOKTORTARSA TARIM SANAYI VE TICARET A.S.	Turkey
PROTEO INTERNATIONAL SRL	Italy	GAT FERTILIZERS LTD.	Israel
Sipcam S.p.A	Italy	Haifa Chemicals Ltd.	Israel
SCLS.p.A	Italy	ICL Group	Israel
Valagro S.p.A	Italy	HYUNDAI TUKSAN.CO	South Korea
AXEB BIOTECH,SL	Spain	Kelp Products (Pty)Ltd South Africa	South Africa
Agritecno Fertilizantes S.L.	Spain	Koppert B.V.	The Netherlands
Tradecorp	Spain	Van Iperen International B.V.	The Netherlands
MENADIONA	Spain	Omnia Specialities Australia Pty. Ltd	Australia
SERVALESA S.L	Spain	Rural Liquid Fertilisers Pty Ltd	Australia
Acadian Seaplants Limited	Canada	Omex Agrifluids Ltd.	UK
Allie's Wholesale Garden Supplies Ltd.	Canada	ADOB Sp. z o.o. Sp. k.	Poland
Plant Products Co.,Ltd	Canada	SQM	Chile

# Baculoviruses against problematic lepidopteran pests

## Resistant pests – a growing menace for agriculture

Resistances to broad spectrum insecticides in problematic pests have been increasing for years. Coupled with an increasingly short life cycle of technologies (e.g. GM-crops) and the adverse effects of broad spectrum insecticides (flaring of secondary pests such as mites, aphids, etc.) farmers are losing money to a man-made problem. These issues call for a new approach in conventional farming. The tool to achieve effective, economical control has been there for decades.

## Baculoviruses – an ideal solution

Baculoviruses are highly suitable to prevent problems caused by resistant lepidopteran pests. They are naturally occurring pathogens that are specific to certain pests. Due to the unique mode of action baculoviruses are an ideal tool for resistance management and for improving existing spray.

## How baculoviruses work

Baculoviruses have co-evolved with the pest and are therefore perfectly adapted to the hosts' environment and behaviour. They need to be ingested by the target pest. Inside the midgut, the virus multiplies inside the host cells, releasing billions of virus particles once the larvae are dead. Each particle is a new source of infection for other individuals nearby. Baculovirus infections can also be transmitted to the next generation, having a long-lasting effect on the population.

Baculoviruses kill their target through disease outbreak and not by poisoning them. Therefore, even low dosages can control pest populations when applied early. This makes baculoviruses very effective and economically interesting tankmix partners in IPM programs. Due to their specificity, baculoviruses do not harm any beneficial insects in the crop, so potential secondary pests such as aphids or mites can still be controlled by those beneficials.

## Andermatt Biocontrol baculovirus products

All our baculovirus products are liquid and easy to use. Due to the high concentration, only a small amount of product is needed at each application. The products can be tankmixed with the vast majority of plant protection products (restrictions apply).

## Advantages of using baculoviruses in IPM

- ✓ Early suppression of pest leads to money and time savings
- ✓ Great tool for controlling insecticide resistant populations, no cross-resistance
- ✓ Easy to use (liquid, tankmix possible)
- ✓ Host specific: not causing secondary pest problems, harmless to beneficials
- ✓ No residues on crops, minimal pre-harvest and re-entry interval
- ✓ Can be used in organic production

## Andermatt Biocontrol baculovirus portfolio

**Codling Moth (*Cydia pomonella*)**  
Madex, Madex Plus, Madex Max, Madex Top

**Codling Moth (*Cydia pomonella*)**  
**Oriental Fruit Moth (*Grapholita molesta*)**  
Madex Twin, Madex HP

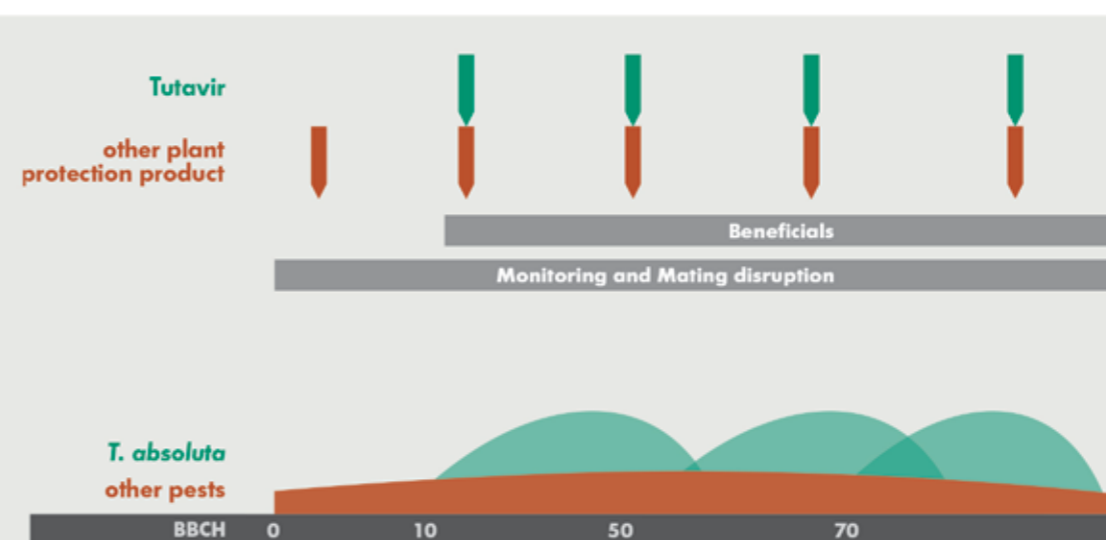
**Cotton leafworm (*Spodoptera littoralis*)**  
**Fall armyworm (*Spodoptera frugiperda*)**  
Littovir

**Tomato leafminer (*Tuta absoluta*)**  
Tutavir

**Cotton bollworm (*Helicoverpa armigera*)**  
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**Beet armyworm (*Spodoptera exigua*)**  
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Possible spray program for Tutavir. As soon as first trap catches are registered, Tutavir is sprayed to keep the *Tuta absoluta* population low. Because Tutavir does not affect any other organisms, it can be combined with the release of beneficials.

## New Products with No Active Substances: Innovation and Sustainable



By Majda Ortan, ing.  
Director of PH. AGROHOM.

No, it did not start before six years ago, when I - engineer Majda Ortan founded my business activity, placed my own developed innovative products on the Slovenian market as plant strengthening products and began to offer them on small Slovenian market as products for general use, under brand name Cora agrohomeopathie®. While those products do not contain active substances, this is in accordance with Slovenian legislation and for the Slovenian market. I started with development of those products more than 40 years ago, as teenage girl with passion for Nature and Natural Science. Since then, with those myself developed products I realized famous statement of Nikola Tesla: " If you want to find the secrets of the Universe, think in terms of energy, frequency and vibration". I did so, I went some steps further and realized these my great ideas for modern, innovative, advanced natural products that give excellent results in professional sustainable agriculture, horticulture and gardening.

Before six years ago, I founded my nowadays business. Today its activities completely covered my own developed products, manufacturing them in our own production and sale them. My company has kept reserved all exclusive rights to produce them, to sell them (in Slovenia and in export), to advice for their use, for the development of complete and complex spraying programs with those my products (branded as Cora agrohomeopathie® or otherwise) for wide range of agricultural crops, for sharing and spreading good practice achieved with them, for educating activities with seminars and workshops, for their export and also to granted rights for their sales (distribution) on foreign markets. In my 100% ownership and as strictly secured business secret I managed to keep for myself all recipes for those products and 100% material rights for them.

### About innovative and sustainable products without active substances

On Slovenian market they are placed under the brand Cora agrohomeopathie®. They are innovative, myself developed products for natural, sustainable cultivation with strengthening the vitality of the plants and so indirectly strengthening plant resistance to plant diseases, pests and stress. Cora agrohomeopathie® products don't contain active substances. Active are energy vibrations of appropriate complexes of suitable plants and minerals, which are results of appropriately customized homeopathic procedures, therefore they are also called energized homeodynamic products. These active vibrations are stabilized on the carrier medium (43% ethanol). Thus, shelf life of those products is 3 years. Unlike most of today's existing products on the market, that principally work (affect) directly on the plant problems (diseases, pests, stress), products Cora agrohomeopathie® by holistic approach work directly on plants by strengthening their vitality balance and by that indirectly strengthening plant resistance to diseases, to pests, to stress due to the environmental impacts.

Products Cora agrohomeopathie® are used appropriate diluted with water, as spray, applied by the normal spraying equipment. Recommended is preventive use – preventive use is an advantage. The crops are eatable immediately after spraying - products Cora agrohomeopathie® are without withdrawal period after the spraying. Product features are also effectiveness, longer lasting effects, after four hours after spraying, the rain do not wash effect of spraying anymore! They are safe for humans and animals, are safe for the environment and have negligible carbon footprint.

61 of products Cora agrohomeopathie® have the confirmation of compliance, that they are allowed in organic cultivation. Confirmation was issued by Institute for Organic Farming, Faculty for Agriculture and Life science, University in Maribor, Slovenia, EU.

In six years of their use on Slovenian market, products achieved good reputation and many of good practices in professional use. Some of results were also presented on international scientific conferences. Our active knowledge sharing successful spread them among users.

Wide range of professional, special products Cora agrohomeopathie® allows us to make whole sprinkler programs for different varieties of agricultural crops. Currently, our comprehensive spraying programs with products Cora agrohomeopathie® are already available for the professional growing of vegetable seedlings with strengthening of their own immunology, for the professional growing various types of vegetables, for the professional growing of strawberries, for the growing of hops. This year, by using products Cora agrohomeopathie®, have been also produced ecological cherries in professional fruit growing. We are also nearing completion our comprehensive program with products Cora agrohomeopathie® for the professional growing of apples. Those products without active substances also offer solutions for such challenges as *Drosophila suzukii* and annual seed weeds, which are currently in use in Slovenia by farmers and home gardeners. You can find some more information about products Cora agrohomeopathie® and about some exposed good practices in their professional use under the link here, or for readers of the paper edition of the magazine: <http://cora-agrohomeopathie.com/wp-content/uploads/Some-EXPOSED-GOOD-PRACTICES-Presentation-CORA.pdf>

### Cooperation possibilities

I started my business from myself - as an independent entrepreneur and we have never been supported by money from Innovation Funds or some other funds or granted money. With products Cora agrohomeopathie® and opportunities, which they brings in farming and gardening, are created an enormous values, even this in terms of financial revenues becomes shown in the (near and also in more distant) future. Many big, serious problems in food production and climate change are the challenges, on which we already have many "hot" and great sustainable answers with products Cora agrohomeopathie®. That is why we are opening us to the world. We have great offer of energized, sustainable products and some number of interesting development projects with new, myself developed, natural, energized homeodynamics products without containing active substances.

I want to highlight such our new product in stage of development, which is intend to help forest trees to solve the problems with bark beetle and consequently help to stop forest degradation due to the bark beetle. We are open for the cooperation with professional foreign forest institutions for monitoring the results of trials in real conditions. I look forward to serious offers from outside of the EU, also from the USA, where millions of forested acres have been affected by bark beetles. After successful product validation, it is possible to continue business cooperation in the field of product distribution outside the EU.

Our production have possibilities to be by size and capacity

adapted to the needs of the market and customers. As we create, produce and sale advanced, interesting, sustainable and useful products in food growing, we also have the appropriate strategy of concluding long-term business partnerships with world-wide companies, that are capable, able and willing to become in good cooperation with us part of the sales distribution of advanced, natural, high sustainable and useful, necessary solutions offered by Cora agrohomeopathie® products, also introduction of another brand is possible.

**You are welcome to contact us with your business propose!**

### PH. AGROHOM.,

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# Forecast and Early Stress Detection for A Successful Biotimulant Strategy



By Carlos Repiso  
Biostimulation R&D  
coordinator at Tradecorp

## Abiotic stress: the most harmful factor for the growth and productivity of crops

Stressful conditions related to non-living factors, widely known as abiotic stress, are becoming a first order and patent problematic in today's farming. Nutrition and sanitary state have been for a long time farmer's main concern. Today, adverse environmental conditions, which strongly limit produce quality and yield, are becoming an increasing disquiet. In spite of still being a recent topic, the research community has sorted abiotic stress as the most harmful factor for the growth and productivity of crops worldwide (Gao et al, 2007). Furthermore, these factors are in most cases taking place in combination with other biotic or abiotic stress factors, resulting in the most detrimental scenario in current agriculture (Mittler, 2009). Sadly, it is expected that abiotic stress pressure will depress agricultural yields in most countries over the next few decades (Cline W., 2007; Müller et al., 2009).

## Identification of the causes of abiotic stress for the definition of a suitable strategy

The main characteristic of abiotic stress is that we cannot (or hardly) avoid its occurrence. Depending on the source of the adverse effects, they can be sorted in two general kinds: permanent and occasional stress.

- The first group gathers all those constraints that are always present in our crops, like salinity, strong wind, radiation exposition, etc.
- While the second one refers to those unexpected events that subject crops to sub-optimal or lethal conditions during a short period of time, such as drought, frost, floods, heatwaves, etc.

The event scenario is being worsened by the climatic alteration suffered around the world. When a farmer is asked about the evolution of weather conditions, they usually claim unnatural and unexpected events. In other words, "strange weather is becoming stranger". In fact, renowned organizations such as FAO or NASA have remarked completely unexpected events across the planet in the last years.

How to face these situations is the key for increasing crop performance and farmer profitability. In the case of permanent stress conditions, crop selection and plant adaptation becomes crucial. In the case of occasional stress situations, preparing the plant for enduring stressful events turns out to be the best strategy. However, achieving the latter is not always easy.

## Preventing the effects of abiotic stress: forecasting, early stress detection and preventive applications of biostimulants

Forecasting and early stress detection turn out to be a crucial task in our current paradigm. Fortunately, weather forecasts have been refined with increased accuracy in recent years and the development of new technologies in sensing have become a key tool. Real time monitoring of field parameters, combined with official weather forecasts, are today a reality that allow farmers to better predict stress occurrence and pest/disease incidence.

However, abiotic stress detection is not always an easy task, especially under sub-optimal conditions, or when stress is starting. In these scenarios, stress triggers the plant's physiological and metabolic response in order to adapt itself to the new conditions. This usually involves a high consumption of energy at the expense of growth, yield or quality (figure 1). Yet, some of these changes are not visible to human eye, providing often the sensation that nothing wrong is going on with the crops. Unfortunately, stress is almost always present in one way or another in our crops.

Even if stress detection can be a difficult task that cannot always be implemented in the field, new technologies have been developed to detect alterations in plants and help farmers and technicians to early detect stress conditions, such as thermal imaging (figure 2), NDVI, IRGA equipment, leaf sensors, etc.

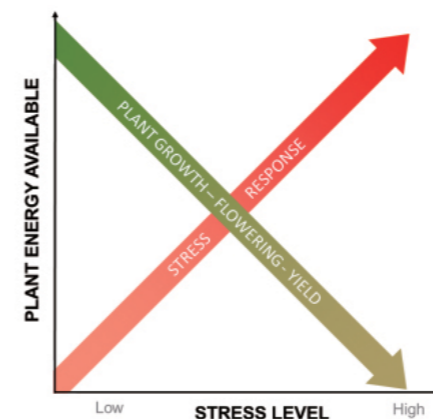


Figure 1. The plant's response to stress implicates a considerable waste of energy for both fighting the stress and recovering, in expense of farmer profit.

Successful results in stress prevention cannot be understood as isolated elements: weather, soil and plants are a synergic whole that cannot be understood separately. Just by the global interpretation and monitoring of all these elements together, this complex system can be figured out, taking into account such different management components as nutrition, soil properties, weather conditions and plant phenological stage. We need to read the signs and listen to our crops.

Unfortunately, abiotic stress detection is not enough by itself. Plants need to be prepared for the upcoming stressful events and biostimulants, amongst other benefits, are able to prepare the plant to better conquer stress periods. Tradecorp's in depth research has proven that preventive applications of certain biostimulants can effectively prepare the plant for stress endurance. Because of the detrimental use of energy and risk involved in these situations, preventive applications have been shown to increase the plant's performance rather than curative actions once stress has occurred (or is taking place).

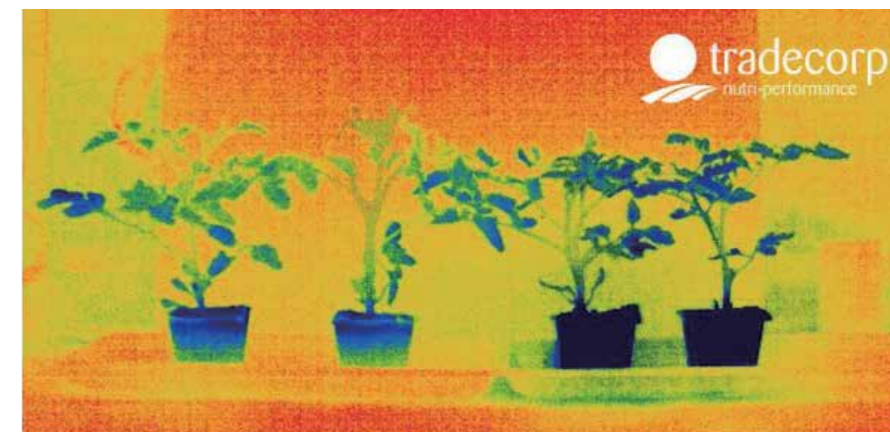


Figure 2. Plants irrigated on the right and plants on the left suffering for three days of water shortage. Stomatal closure results in low evapotranspiration and increase in leaf temperature, as well as reduced photosynthesis. However, no wilting effect was detected by visual methods.

## Priming effect biostimulants: preparing plants for stress endurance

In terms of preventive action, Phylgreen, Tradecorp's gentle, pure extract from the seaweed *Ascophyllum nodosum*, is a flagship product. Intensive research by Queen's University Belfast claims that, the preserved active ingredients from *Ascophyllum nodosum* present in the product, are able to alter the plant's genetic expression in terms of stress response. When "primed" by the product, the plant is set under a systemic "alert state" that makes it more "aware" and ready to respond under stress conditions. Thanks to this alteration, the stimulation of the primary metabolism and the accumulation of compatible osmolytes and hydroxyl radicals (ROS) quenchers, the crop is not only able to increase its chances of survival, but also to avoid a dramatic drop of yield and quality.

The combination of weather forecast and the stress monitoring cannot be understood without the implementation of preventive actions, such as Phylgreen. This strategy requires:

- To detect the most stressful periods and their harmful effect on the plant.
- To select the right moment and dose for application.
- To ensure that the most critical crop stages have been prevented from stress.

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# Qingdao Seawin Biotech Group: 18-year Business Deployment to Shape a Global Marine Industry Chain



**Shan Junwei**  
President of Seawin

*Qingdao Seawin Biotech Group is an industry leader in seaweed fertilizer development and production, with its dominant seaweed fertilizer brand: SEAWINNER. AgroPages recently conducted an interview with Shan Junwei, president of Seawin, who gave an overview of Seawin Biotech's excellent product quality, strong production capacity and first-class customer service system, which represent the robust business development capability and the upmarket seaweed fertilizer image associated with Seawin Biotech.*

**AgroPages:** Can you briefly explain the key technology of Alga 2008? How does it increase growers' yield, and in what aspect?

**Shan:** Since 2008, Seawin Biotech began its research and development activities, utilizing rich and readily available green algae resources of the coastal area of Qingdao. Through the use of patented degrading technology, a moderate and high-efficient extraction process has been worked out, which results in the successful development of the green algae extract, Alga 2008. The product can retain the key active ingredients of green algae to the maximum, which enables a significant effect on the enhancement of crop growth and stress resistance.

In 2017, through the University of California Davis, Seawin Biotech conducted a field trial of Alga 2008 on table grapes. Test data revealed that compared to conventional fertilization, twice foliar spraying of Alga 2008 at the use of 2qts/acre could increase brix by 10%, berry weight by 7.6% and per-acre yield by 41%.



In the same year, through the University of Arizona, Seawin Biotech conducted a field trial of Alga 2008 on corn. A one-time furrow fertilization during sowing at the use of 1-2qts/acre could increase yield by above 20% versus conventional fertilization. In the meantime, it was noted that corn applied with Alga 2008 performed distinctively against high temperatures and waterlogging during crop growth.

Alga 2008 has so far been sold to more than 50 countries, being widely applied to various fruit trees, vegetables and field crops. Its excellent product performance has brought about a satisfactory output-input ratio.



*Products of Alga2008*

**AgroPages:** We have noted that Seawin Biotech provides a series of product portfolios to clients, such as seaweed extracts, seaweed water-soluble fertilizers and seaweed functional fertilizers. Can you give an introduction to the product development idea of Seawin Biotech, with some examples regarding the market performance of these products?

**Shan:** Seawin Biotech has focused on researching and processing of algae resource-based seaweed fertilizers for nearly 20 years. By consolidating the rich living marine resources of Shandong Peninsular, Seawin Biotech has set up its production base for processing a key master batch.

Seawin Biotech has fully utilized research platforms such as the National Green Algae Research & Application Center, applied the enzymatic degradation technology to green algae enteromorpha and brown algae kelp, which are the key raw materials, thus enabling the acquisition of high-purity fucoidin and oligosaccharide, as well as green algae polysaccharide and oligosaccharide. The 2 kinds of algae extracts are organically combined, which makes their ingredients complementary to each other and, meanwhile, more nutritional. The greatly enhanced effect carries the seaweed fertilizer forward towards a new era of "dual seaweed utilization". This process contains a lot of pioneering techniques, which have greatly elevated the technical level of seaweed fertilizer production in China.

The 5 key proprietary technologies of Seawin Biotech are

domestically at the leading position, while being internationally advanced. These 5 technologies include the green algae disposing & recycling technology, algae functional factor specificity-based enzymolysis & preparation technology, algae oligosaccharide directional modification & separation/preparation technology, algal polysaccharide & medium trace element chelating preparation technology and the algae plant resistance inducer targeting preparation technology.

So far, Seawin Biotech has turned its focus to the research of some cutting-edge technologies, such as preparation of algae-degrading enzymes, preparation of marine engineering bacteria, optimization of high-efficient fermentation processes, molecular weight determination of the biostimulants polysaccharide and oligosaccharide required for seed coating and seed dressing and preparation of the algae plant growth hormone. The focus of the research is laid on key technologies, such as determination and identification of the polysaccharide content of novel fertilizers made from new-source raw materials, as well as expeditions on the formulation of industry standards.

As a seaweed fertilizer industry leader, Seawin Biotech is the first in China to bring forward a whole-course crop nutrition solution within the industry, as represented by its Seawinner seaweed fertilizer series. The Seawinner series has become a distinctive solution which fulfills the whole-course nutrition requirement and soil remediation requirement, being currently widely used in a manner of complete product portfolio and total solution in over 20 provinces of China for application to the greenhouse vegetable region, southern/northern fruit tree region and northwest commercial crop region.

After a year-long nation-wide promotion in China, the Seawinner series has achieved remarkable results in respect of improvement of crop quality, soil remediation and enhancement of fertilization effect. It is worth mentioning that in commercial crop growing areas, the product applications have been highly recognized by farmers. With the use of the Seawinner series, a large number of high-quality farm products are produced, which enjoy good names such as Citrus King, Apple King, Glycopeptide Watermelon, Glycopeptide Kiwi and Glycopeptide Grape. The application of the Seawinner series has enabled the achievement of China's crop farming objective of "field crop for quantity and commercial crop for quality", being highly praised by all users.

**AgroPages:** Seawin Biotech successfully launched a branch and initiated the running of the business in the US in 2017. Can you tell us about the progress of the business there, so far? What is the message you would like to pass to your US partner and growers?

**Shan:** Seawin Biotech began the expedition of overseas markets in 2004; products have been sold to over 50 countries





*Seawin Biotech conducted a potato field trial in the US*



*Seawin Biotech and its customer in Australia*

and regions, so far. Its 15-year international marketing experience has provided a solid foundation for the globalization process of the company. With continued growth of production and sales over recent years and according to the strategic plan of the company, Seawin Biotech set up a branch in the US in 2016, followed by the establishment of a subsidiary in Australia in 2017. The subsidiary employs local staff experienced in agricultural material supply to engage in the localized business operation and marketing development. After product trials and promotion efforts in the early stage, product performance and adaptability to local market needs have been verified. Preliminary collaboration has been established with several local partners in the different regions of Australia. Seawin Biotech is committed to bringing higher economic benefits and farming experience to overseas partners and growers by providing quality products and efficient service.

**AgroPages: On many occasions, President Shan has called for formulation of the international seaweed fertilizer standard. Can you take this opportunity to talk about the research and testing standard accepted and implemented by Seawin Biotech? And what are the reasons for Seawin Biotech to call for the formulation of seaweed fertilizer standard?**

**Shan:** Faced with the lengthy, disorderly and fierce competition in the Chinese seaweed fertilizer market and being confronted with competition from imported seaweed fertilizers in the Chinese market, it is our long-term and firm strategic goal to capture the international market and to play a part in the international market. A good business entity ought to have global insight, follow international standards and make use of its localization advantage to compete in the international market. We are not looking at only the Chinese market, but want to build a world-famous seaweed fertilizer brand from China.

As some enterprises are conducting more in depth research of seaweed fertilizer and have extensively promoted it, more and more farmers are starting to accept seaweed fertilizers, so various algae products are being released to the market. Now, there needs to be a clear national standard to govern the seaweed fertilizer industry, as well as to verify the product grade of the seaweed fertilizer. Growers are not only requesting regular seaweed fertilizers, but business entities also need an industry standard for regulation of the seaweed fertilizer market.

At present, seaweed fertilizer testing methods are very different in each country. Due to the lack of completeness and accurateness, quite a number of testing methods could not preclude interference of other nutrient elements on the detection of alginic

acid. A few years ago, Seawin Biotech made a breakthrough in the development of testing methods in collaboration with special agencies such as the Chinese National Fertilizer Supervision & Testing Center, China Ocean University, as well as other Chinese prime seaweed fertilizer enterprises. We are currently pushing forward the establishment of a national seaweed fertilizer standard, which is expected to be a guideline to the technical progress and sound development of the seaweed fertilizer industry. The future trend of the Chinese seaweed fertilizer industry will be that the volume of export of seaweed fertilizer will inevitably become larger than imported seaweed fertilizer or other novel fertilizer varieties. This is a common vision of the Chinese seaweed fertilizer industry. Seaweed fertilizer not only serves Chinese agriculture, but will be sure to go global to serve the green agriculture of the world using the technical strength and production capacity of Chinese enterprises.

**AgroPages: After 18 years of trying hard, Seawin Biotech has promoted its algae biostimulants to a number of countries and regions across the globe. Can you give a systematic overview of the core competence of Seawin Biotech? Is it your high-quality product? Outstanding management system? Accurate market positioning? First-class customer service? First-class supply chain management? Also, please share with us the future business plan of Seawin Biotech.**

**Shan:** Key technology is the cornerstone of any business, as well as an access key to the global market. Via comparative testing by professional agencies, the algal polysaccharide and alginic acid contents of many imported seaweed fertilizers are not as high as that of quite a lot of domestic products. The product quality and the quality assurance system of domestic enterprises have overtaken that of imported products, being also technically advanced among the industry.

The technical center of Seawin Biotech acts concurrently as a National Green Algae Research & Application Center, and also, we have established the Shandong Provincial Academician Workstation and Shandong Provincial Postdoctoral Innovation Base within Seawin Biotech.

At present, we have achieved biological enzymolysis of enteromorpha, kelp, sargassum, chitosan and fish protein, which are all up to an international advanced level.

We are now in possession of over 40 national invention patents covering seaweed fertilizers and marine biological products. Seawin Biotech has conducted research to successfully derive high-efficient active ingredients from algae, chitosan and fish protein via biological enzymolysis, which are used by our product development team for formula design and product development of seaweed fertilizer, fish protein fertilizer and chitosan fertilizer, according to the nutritional needs of crops.

A high-activity microbial agent is developed with emphasis being laid on genetically engineered bacteria, naturally screened bacteria and mutagenesis enhancement bacteria, depending on the nature of the bacteria group and function. The existing Culture Collection contains more than 1,000 functional bacterial strains, which include functional enzymes and strains with various functions.

The "818 Home of Precision Fertilizer" project has facilitated promotion and application of soil-testing and fertilization technologies to crop field and farming jobsites, which has helped precision farming achieve agrotechnical service. Till date, we have tested more than 10,000 soil samples across the whole of China. In terms of overseas service, we have tested over 1,000 soil samples in New Zealand, Australia, the United States and Malaysia. A soil database has been established in different regions of the globe, which provides comprehensive data support to the formula design of fertilizer, precision farming and smart agricultural development.

The Agricultural College of Seawin Biotech takes charge of the efficacy test and demonstration of the products of Seawin Biotech, being also responsible for product promotion and technical service at home and abroad, as well as conducting training of technical and marketing staff with regard to soil nutrition, fertilization, crop protection and agricultural material sales. Through these efforts, we have established a strong and professional service team working at the forefront of agricultural production.

In order to speed up the group development, we have commissioned the 200,000-ton production capacity in Jiaozhou and the 150,000-ton capacity in Weihai; our Zhongyuan Production Base is under construction and scheduled for completion by the end of the year. In around 2020, production deployment will be made in northwest China and south China. For international market development, based on existing overseas deployment, we will establish our overseas production base and research center, which will shorten transportation, cut down cost and bring our product and service closer to clients and to the best interest of our partners and users.

Coming up next, Seawin Biotech will continue its expedition of marine technology, promote the Seawinner marketing platform, enrich the marine organism-oriented biological industry chain and make continuous improvements to the health-oriented ecosystem towards the objective of becoming an internationally advanced business entity specializing in marine organism-based health protection.

We will continue our efforts to undertake international deployment to refine our overseas marketing and service systems, which will ensure the continued yearly growth of our seaweed fertilizer exports.

# Biopesticide and Biostimulant Growth Prompts Need for Registration



**Dr Lars Huber**  
Head of Biostimulants,  
Fertiliser, IPM of SCC.

*Scientific Consulting Company (SCC) is a dynamic regulatory consulting company with currently more than 130 employees in the global. Till now, SCC has become the leading independent regulatory expert in Europe, supporting its global clients with all their registration needs in agrochemicals, biopesticides, biocides, chemicals/REACH, consumer products, cosmetics, feed and food additives, pharma pre-clinical and archiving. Recently, AgroPages had the opportunity to chat with Dr Lars Huber, Head of Biostimulants, Fertiliser, IPM of SCC.*

**As an independent regulatory consulting company, what kind of services can SCC provide in the field of biopesticides and biostimulant? Compared with other competitors, where do you think are the advantages of SCC?**

SCC of course offers all services relevant for the registration of biopesticide a.s. and products as well as biostimulants including study monitoring, dossier preparation, submission and follow up. In addition to this registration work, SCC experts are involved in various R&D projects for biopesticides, biostimulants, IPM and precision farming including technical and scientific steering of research projects and academic co-operations, also in regards to guideline development. Therefore, SCC experts have in-depth knowledge exceeding the normal requirements for a.s. and product registrations. SCC's clients benefit from this additional knowledge e.g. for development of suitable registration strategies for their biopesticides and biostimulants including precise and intensive use of literature data, study waivers and scientific rationales.

**How is the SCC's performance in the past few years? What do you think is the main driving force behind the growth of the company? And could you share what are the goals of the SCC in the next five years?**

In the last years SCC has steadily grown, both in regards to the scope of our services and the number of clients we service as well as the number and fields of knowledge of SCC's employees. The growth is partly due to permanent requests from our clients for SCC's services also in non-European countries. Thus, in

March 2018 Dr Hans-Josef Leusch (former head of the biocide department) has been appointed as head of SCC's new functional area 'Corporate Development'. In close cooperation with SCC's various business units, he is exploring SCC's opportunities in key markets outside the EU. The focus is on services related to the registration of plant protection products, chemicals, and biocides to offer SCC's clients constant regulatory support in key markets such as Asia, Australia and the Americas.

**Biopesticides and biostimulants have been in full swing in recent years. What do we need to pay attention to when registering these products compared with traditional chemical pesticides?**

The political will and consumer demands have become quite clear in the last few years, fostering sustainability and low risk plant production methods. Thus, it's not necessary for manufacturers anymore to consider if it is economic to register biopesticides or biostimulants in EU from the sales side of view, the demand for such products is high and constantly increasing.

Today it is more important to pay attention to the registration strategy, especially considering the currently still ambiguous regulatory status of biostimulants and products on the borderline between biostimulants and biopesticides. In addition, the experience with the registration of low risk plant protection products, including authority evaluations is still very limited. Thus, it is for the applicant to develop a registration strategy employing all of the possible benefits the regulations and guidelines set out

for low risk biopesticides. Such a registration strategy, on the one hand, has to consider the regulatory relevant aspects including national incentives for biopesticides such as authority fees or any type of green deals. On the other hand, studies have to be conducted and respective dossiers have to be prepared in a way providing the relevant scientific evidence for scientific justifications and study waivers to authorities. This includes for example the use of public literature. The benefits which can be gained by a suitable scientific-based registration strategy and the savings in costs and time are the biggest difference compared to chemical pesticide applications.

**Can you tell us about the current large-scale biopesticides and biostimulant companies that have chosen SCC's services? What do you think are the main reasons that they choose SCC but not others?**

I'm sorry, but regrettably this is not possible as, of course, SCC handles all customer-related information strictly confidential. To answer your question I would like to refer to your second question and politely ask the reader to read between the lines of this interview and perhaps have a look at SCC's homepage at which he will find certain evidence of SCC's expertise e.g. by the publications in the "News" section. This should answer these questions, at least to a certain part. According to the feedback from our biopesticides and biostimulant clients they have chosen SCC mainly for SCC's competence and experience in successfully registering and defending also very complex substances, strictly keeping the agreed time lines or regulatory deadlines. The special scientific expertise which our experts have, not only from regulatory projects but also from several R&D projects in which they participate, e.g. in the field of IPM or precision farming, is of huge interest for our clients. These are some points why these clients have chosen SCC.

**Europe and North America are the mature markets for biopesticides and biostimulants. However, in recent years, biopesticides and biostimulants have developed rapidly in emerging markets such as China and Brazil. Is there any business related to SCC in these regions? What do you think is the biggest challenge for biopesticides and biostimulants in these places compared to Europe and North America?**

Of course we are also involved in projects in countries outside EU such as China and Brazil. In our experience, we see the biggest challenge in the acceptance of such products by authorities, especially in regards to biopesticides in Brazil. There are several problems in biostimulant and biopesticide registrations in countries outside Europe and North America which are often linked to missing definitions as well as handling and implementation of existing regulations. But, as grower demand

for such products constantly grows, the pressure on authorities to approve such products has also increased. Some changes can already be observed as evident by increasing numbers of such products in these markets. In addition, national regulations in certain countries, such as the new Chinese Regulation on the Management of Pesticides of 2017, more and more include provisions explicitly giving preference to low risk products or biopesticides, similar to the provisions in EU. The new Chinese Regulation for example states that the State shall gradually reduce the use of pesticides by promoting biological controls, physical controls, advanced spraying devices and other measures (Article 32) as well as that extremely toxic and highly toxic pesticides shall not be used to prevent sanitary pests on vegetables, fruit, tea, fungi and Chinese herbal medicines for the control of aquatic plant pests (Article 34).

In regards to SCC's own business in these regions, SCC is currently exploring the additional opportunities in these key markets. In regards to China for example, in 2018 SCC will have at least two new cooperation managers in China, managing biopesticide and biostimulant registrations in China as well as supporting Chinese clients with the registrations of their products

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in EU. This will be handled in very close cooperation with the Chinese plant protection registration consultancy BIOREG.

**Recently, U.S. Farm Bill Draft defines plant biostimulants for first time. What impact do you think this will have on the biostimulant industry?**

To have clear and detailed definitions and separation of related topics, as in the case of biostimulants and certain biopesticides, is always helpful, at least for regulators. Thus, increase in clarity in the frameworks regulating this market should provide industry with a good basis for decision making and placing of investments. As a scientist and regulator, I have certain reservations in regards to the definition chosen. Similar as in Europe there is a clear separation of abiotic stress, ascribed to biostimulants, and biotic stress, ascribed to biopesticides.

But several of these biorational active substances act against both, biotic and abiotic stress. Thus, this may cause certain uncertainties and problems in registering a substance or product under the most suitable framework. In addition, this regulatory separation may lead to the loss of substances and products for plant protection purposes.

**Can you share with us the latest developments in European legislation in the field of biostimulant? What impact these developments have on SCC's business?**

End of last year, draft EU fertiliser regulation which will also regulate biostimulants was debated in the European Parliament whereat 404 amendments to the upcoming EU fertiliser regulation were discussed which already gives an idea on the status of this draft. Several amendments were adopted by the

plenary, others not and the draft proposal was referred back to the Committee on Internal Market and Consumer Protection, opening up the interinstitutional negotiations with the Council again after the original publication of the regulation was scheduled for 2015... Thus, central themes as well as the entry into force of the regulation are still unclear and the framework for business decisions and registration strategies are still unclear.

This still unclear regulatory situation of course also impacts SCC's business and instead of helping our clients to register products we have a lot of requests explaining the draft and possible implications. At the moment, the major interest of our clients is how to bring products on the market using national registrations, using also mutual recognition for fertilisers and biostimulants, and preparing their portfolios for eventual entry into force of the new regulation.

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## Novagro-ag SAC: Biopesticide Provide for Sustainable Agriculture in Peru

### Could you please talk a bit about your company, Novagro-ag SAC's work with local and multinational companies, and how you got started?

The vision of Novagro-ag SAC has always been focused on offering and providing solutions for the protection of crops against plagues and diseases, guaranteeing the production of crops free of chemical waste since the export of fruits and vegetables go to demanding markets in Europe, Asia, United States, Canada, among others. That is why the company Novagro was founded in 2007 in the city of Trujillo, Peru assisting the Agro Industries which are part of the Chavimochic Special Project. We are currently providing our service and products throughout the Peruvian coast and jungle which have sowing areas for export purposes.

Our goal in Peru is to provide our portfolio with solutions and assistance to agricultural companies which sow and export products. At present, we are focused on assisting companies in the protection of blueberries because it has greater growth in the exports of agricultural products

### Could you please introduce NOVAGRO-AG SAC's key biologicals-based products in its portfolio and key markets?

We focus on offering our portfolio of products to companies which have and sow crops to be exported to Europe, Asia and United States market. But we are also developing our products in conventional crops markets. Regarding our biopesticide portfolio, we have three categories:

#### Bioinsecticides:

LAOJITA SC, Bt-NOVA WP, PAL'GUSANO SC, all based on different Strains of (*Bacillus thuringiensis*).

WONDER-AG (*Capsicum oleoresin* + Garlic oil), PRO PHYT-AG(Garlic Oil), PA'LARAÑITA (*Cinnamon oil* + citrus oil), LEMURIA-AG ÁCAROS (*Lemon oil* + olive oil), L'SUKHA-AG (*Matrine 0.5%*), LEMURIA-AG ÁCAROS (*Lemon oil* + olive oil) and ( PRO PHYT ÁCAROS (*Garlic Oil* + *Sophora flavescens* oil).

#### Biofungicides:

BREVIBAC WP, SUBTILEX WP, all based on *Bacillus subtilis* of 1x10<sup>11</sup> ufc/g. POLYMAX WP (*Polyoxin B 10 %*), LEIZU (*Polyoxin 3 %*).

#### Growth bio regulators.

L'TERUS-AG BOOST (*Brassinolide 0.1% SP*), GREENFOOD-AG FULL

VITAMINAS-AG (b1 B2, B6, B12, C, d3, e Vitamins).

### What growth plans would you like to share for your company's future? Any up-and-coming markets?

For the next 5 years, the company has set out to expand internationally, starting with the Colombian and Bolivia markets. In Colombia, we started the commercial operations in May 2018. There, we have already registered 4 products. In Bolivia we have registered 5 biological products and we expect to start the commercial operations by the year 2019. Likewise, the company is open with alliances in other countries to continue developing records and selling our products, since our company has complete dossiers.

### What do you think are the main advantages of NOVAGRO-AG SAC compared with competitors in the bio products industry?

We can firmly ensure that at present the main competitive advantage of our company is our current process of quality

control. However, at the beginning we used products formulated and imported from China and other countries. At that time we considered that it was a good strategy in order to get a competitive position in prices in the market. Unfortunately, we had great losses due to the importation of these products that were not guaranteed with the expected quality of some suppliers. This experience impelled us to develop the formulation of our own products in Peru and in this way we have nowadays better control for the quality of raw materials in order to guarantee the "Safety" to our customers. These experiences taught us that what is most important for the development of aerobiological products is the trust that can be offered to a client with two basic aspects:

- EFFECTIVENESS IN THE CONTROL OF PLAGUE / DISEASE
  - THE SAFETY OF THE PRODUCT.
- In this sense, each batch of product that we offer and deliver to our customers, has multiresidual analysis and its respective quality certificate.

### What do you think are the main challenges for bringing bio-products to market and how to deal with them?

The biggest challenge is still the current legal regulations regarding the free sale registration for the Ministry of Agriculture. The rules to develop records in the last 10 years have been changing and currently the records are only valid for 5 years, while for chemicals the registration is indefinite. This means that every 5 years, the company has to re-develop the product registration process, which reduces time for advertising and sale.

### As more major multinationals have entered the biopesticides arena in recent years, how do you think these M&A in the biopesticide industry? And how does this affect NOVAGRO-AG SAC's business?

We see it from the positive side. If we have more competitors, they inspire us to be better. If there are more competitors, the customers have more options and benefits. Competition is definitely good for everyone.

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Baicao No.3 (compound matrine ME)  
Baicao No.6 (6% rotenone ME)

## NATURAL SOURCES FUNGICIDE

Anvir (1% fungous proteoglycan AS)  
Bipro (Terpinen-4-OL + Matrine)  
Baiclean (3% oligo saccharin AS)  
Viki (5% kasugamycin AS)

## GREEN INSECTICIDE

2.5% 5% Spinosad SC  
0.5% Emamectin Benzoate ME  
5% Emamectin Benzoate WDG  
1.8% Abamectin EC  
10% Nitenpyram AS  
95% Abamectin TC  
70% Emamectin Benzoate TC

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(powder, flake, liquid and granula)

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Organic - Inorganic  
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Website: www.chinabaicao.com Email: info@chinabaicao.com

柏杨  
BAICAO

## Q&A: Biolchim's Biostimulant Development Road



**As the leader of special fertilizers in the world, what do you think is the future development trend of specialty fertilizers? What are the opportunities and challenges for this kinds of products?**

The growth trends for the next 5 years according to market reports and literature are all double digit, meaning the importance of biostimulants and specialty fertilizers is growing very fast at the global level. Biostimulants and specialty fertilizers represent a great opportunity for agriculture, as they address the issue of increasing crop yield with scarce natural resources. These products represent a valuable tool in handling abiotic stresses, which are a major cause of yield loss and are gaining importance due to climate change and land depletion. The challenges are from the regulatory side, where Europe is shaping a new harmonized framework for biostimulants that has to secure a fair market maintaining innovation in the industry. From another side, the industry and stakeholders need to explain and create trust in the products that are still hardly known in some markets.

**In the past few years, Biolchim has acquired West Coast Marine Bio Processing, Mat é csa Kft, and Ilsa S.p.A to develop the international markets. Could you share with us the achievements you have made in the international market over the past few years? And how is the future planning?**

Biolchim bases its growth strategy both on internal growth and external acquisitions. The integration of these three companies

allows the Group to control each step of the production of the biostimulants, from the production of key raw materials to the processing technologies. Of course the acquisitions boosted our international growth. We are present today in more than 75 countries, we have 7 subsidiaries and 4 representative offices and we are continuing to expand and consolidate our markets.

**What do you think causes Biolchim to stand out from many competitors and become a leader in the specialty fertilizer industry?**

It is the passion we put in our work that makes it outstanding. And our commitment to bring innovation into the hands of the growers everywhere in the world. Thanks to the experience acquired in 40 years of activity, the strong relationship with the greatest worldwide producers of raw materials, and the collaboration with important Universities and Research Centres, Biolchim offers a complete portfolio of biostimulants that maximize the performance of any crop, anywhere in the world.

**Could you please describe the relationship between micronutrients and biostimulants and the use of the two product types together?**

In many situations biostimulants improve the performance of micronutrients as they can improve their uptake and their assimilation.

# Global Biostimulant Market Enters A New Stage of Development



**Nicolas Lindemann**  
Global Executive Director of Tradecorp

*AgroPages recently had the chance to chat with Nicolas Lindemann, Tradecorp's Global Executive Director, about some exciting biostimulant questions on the frontier and his views on market and development trends.*

**In recent years, many biostimulant companies have emerged in the market. What do you think is the biggest difference or advantage of Tradecorp compared with these companies?**

Biostimulation opens a whole new world in crop management. You are right to mention that many new companies have entered into this industry. That is very good for the market! Let's hope regulations allow it for many years to follow because, at the end of the day, farmers and consumers are the ones receiving the benefits of biostimulation: better and tastier fruits, increased harvests with greater quality, easier to manage, etc.

There are 2 main entry levels in this industry:

- On one hand, we have large companies entering from the top end of the market, very often acquiring technologies or product lines, and proposing their biostimulant offer as a complement to their existing offer.
- On the other hand, we have small or very small companies coming from the innovation field or university research that bring a singular offer in biostimulation.

Tradecorp has the two-way entry: we propose novelties out of pure innovation or applied research, as well as a specific offer to complement our extensive range of products. Besides, Tradecorp has a great advantage: over 30 years of experience and nearly two decades helping the management of crops at a global level. As such, our offer is complete, integrated and adapted case by case. In this way, our bio-nutrition offer is unique.

**Which stage of development do you think the global biostimulant is at and where are the market opportunities and challenges?**

We are not in the very beginning, but we are still in the early days. The global biostimulant market is on the road to maturity and consolidation, with action and innovation taking place. Farmers and consumers are keen on using biostimulants, but they are not simply going to take a nice label or buy out of the pressure from their local dealer. They want to know what the product is about, and companies need to explain and prove how their product performs as well as how the crop can be better managed. This is the knowledge phase.

There are so many market opportunities at the moment... One must think how to serve the farmer and the final consumer and the result will be a success.

**At present, many biostimulant companies choose to cooperate with pesticide and fertilizer companies. How do you see such cross-border cooperation?**

Biostimulation alone does not do everything. Nutrition and protection are also needed. By adding biocontrol, you have a completely different dimension in the new game. However, I do not only see this as cooperation, it is a natural move. In the case of Tradecorp and the Sapec Agrobusiness Group, we have been offering crop management solutions in many countries for several

years. We often cooperate with pure biostimulant and biocontrol companies and integrate our approaches among nutrition, protection and biostimulation. We truly believe that this integration is vital.

The main challenge now is the interpretation of the interactions amongst biostimulation, nutrition, protection, biocontrol, and adjuvants. Using one molecule without worrying about the other may lead to results that are really challenging to interpret. This is why integration is natural and essential.

**Currently, global agriculture is in a downward cycle. How do you deal with future market challenges?**

I don't really see a downward cycle in global agriculture. The demand to produce better, safer and even more nutritious food is on the rise and, thus, crops management challenges are growing. Asia has to guarantee food security. Africa, although growing slower than expected, needs more food. South America is gearing towards supplying Europe and North America with any crop year round. Our worry today is focused on the technicality of crop management, which demands more knowledge, competence and transparency.

To deal with these challenges, we have developed our own model: Tradecorp University. This concept also works as a tool that allows for the exchange of information, gathering of knowledge and innovation within our own knowledge management

platform. However, our biggest investment is people. Great people everywhere.

**Currently, a number of European biostimulant companies such as Valagro and Biolchim have established operations in China. How do you view the Chinese market and can you talk about the Tradecorp's planning for the next five years in the Chinese market?**

China is transitioning at a fantastic pace. Biostimulants were not a hype on the market 5 years ago, but they are a must today. Chinese farmers are able to challenge you technically in every field! The next five years in China will be extremely interesting! There is a demand for high quality and organic production that is growing fast. This can be observed in large megalopolises, such as Shanghai, where the demand of top level vegetable and fruits is already a reality. In this context, the local offer has to adapt and it is evolving very fast! I reckon they will be producing and exporting high added value biostimulants faster than we expect.

As for Tradecorp, we have been working in China since 2001, where we rely on fantastic local partners. We have been careful and precise in our setup. Now, the right time has come, and this year we are opening our fully owned affiliate. Although we have quite aggressive plans, we are confident that our team and colleagues on the ground will fulfill the objectives.

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# ORO AGRI: After the Acquisition Opens A New Development Journey



**Carol Pullen**  
General Manager of Oro Agri Europe

*Since its inception in 2002, Oro Agri has developed, manufactured and distributed a range of agrochemical and biological products for global distribution. In this year, Oro Agri was acquired by Omnia Holdings Limited, entering a new development stage. Carol Pullen, General Manager of Oro Agri Europe, recently received AgroPages' interview to give us a comprehensive introduction to Oro Agri's past development success and future plans.*

## Could you introduce Oro Agri to us, including main business, products line and major markets?

Oro Agri is an international company involved in the research, development and production of a unique range of patented agricultural biological ("AgriBio") solutions. The key formulation ranges include biopesticides, adjuvants, and soil conditioners for professional agriculture applications, including row crops, stone fruits, pasture and other crop types, as well as smaller lawn and garden applications in the amateur category.

AgriBio are eco-friendly alternatives for crop protection, crop enhancement and crop nutrition without the use of hard chemicals and comprises of biopesticides, biostimulants and fertilizers. The use of AgriBio formulations can replace or increase the viability of conventional chemistry based pesticides, without developing any resistance from insects and diseases. The Oro Agri range of formulations provides solutions either to address crop inhibiting diseases and factors that stunt growth and reduce crop yield, or to increase nutrient and water uptake efficiency through high performance environmentally friendly formulations.

In 2002 PREV-AM® was registered as the first product of Oro Agri and sold as a bio-pesticide in the agriculture market. Over the past two decades Oro Agri has expanded its global footprint across six continents and continued to develop a unique range of innovative products that include brands such as OROWET®, TransPhloem®, TRANSFORMER®, WETCIT®, OROCIT®, VINTRE®

and OROBOOST®.

Oro Agri operates in four major regions in the world, namely Brazil, Europe, South Africa and the USA. Oro Agri owns and operates three in-house production facilities, and four research and development facilities across the globe.

Oro Agri has a well-developed global sales and distribution network in more than 80 countries with an established network of distributors, agents and directly employed staff to market and sell its formulations.

Oro Agri Group of companies was recently acquired by Omnia Holdings, an international player in the AgriBio and water soluble nutrient markets, based in Johannesburg South Africa and listed on the Johannesburg Stock Exchange.

Since 1953, Omnia has had its roots in the fertilizer and the agriculture industry and has built up an in-depth understanding, not only of its core markets in South Africa, but also in mining, manufacturing and agriculture in Africa. Today, Omnia has operations in 18 countries in Africa, and six countries outside of Africa.

Omnia's Agriculture Division is a market leader in plant nutrition products and services in South Africa and southern Africa, and it works closely with customers to improve the performance of their crops. Its product range is manufactured in South Africa and Australia and is currently sold into twenty-eight countries globally.

**We know Oro Agri is the sole notifier and premier source of the active substance Orange Oil. As a natural biological pesticide, which crops it is mainly used for, which diseases are controlled, and what advantages are there?**

Orange Oil, within the reference formulation PREV-AM in Europe, provides a unique botanical active substance with a very broad spectrum of activity to professional and non-professional users. Acting by contact, it combines fungicide, insecticide and miticide modes of action all in one.

The main market for PREV-AM has been grape, peach, apple, citrus, kiwi, fruiting vegetables, carrot, onion, leek, cabbages, berries and ornamentals and ORO AGRI is actively working on label extensions. Globally, the PREV-AM label is far more extensive with strawberries being one of the top crops in USA.

Unlike most of the conventional chemistries, Orange Oil is MRL exempted and can therefore be used throughout the growing season and the short pre-harvest interval allows applications very close to harvest to secure the quality of the production. The PREV-AM formulation is also compatible with Integrated Pest Management (IPM) practices and is eligible for organic farming in many countries.

PREV-AM is particularly efficient to control external pathogens such as powdery mildews and soft bodied insects like whiteflies, aphids, thrips or scales and especially has very good miticide/acaricide properties.

Since pests are able to develop resistance to pesticides that target single biochemical pathways, these pesticides must be managed carefully to prevent the development of resistance. As PREV-AM has a physical mode of action, it offers an alternative method of control to that of conventional pesticides. Therefore, PREV-AM is ideal for inclusion in resistance management strategies on a rotational basis as a "resistance breaker" to reduce the cycle of resistance build-up to conventional pesticides.

PREV-AM has a beneficial friendly profile and has been tested on many beneficial organisms showing very low mortality ratings of 1 (harmless) and 2 (slightly harmful) on the IOBC (International Organization of Bio Control) scale. In every test performed to date, favourable predator prey ratios have been restored using PREV-AM thus making it an ideal tool for IPM programs.

PREV-AM has efficacy within 24-48 hours and this fast-acting mode of action is often used in combination with conventional chemistries to increase efficacy by providing immediate curative action when used with fungicides, or immediately reducing pest population in order to reduce economic damage caused by pest while the chemistries may take effect a week or two later.

**In recent years, Oro Agri is actively exploring the international market and has made remarkable achievements. Can you share how to choose the right markets and how to develop these markets? Is setting up a branch office or a distribution partner in the local area required? How do you choose a good distribution partner?**

This truly has been one of ORO AGRI's strong points and currently we have distribution into more than 80 countries. We choose our markets based on where we have people to service those countries efficiently. We will often hire someone to be in charge of several countries, then as a specific country's business grows, we will add a second person to reduce travels. Today ORO AGRI has more than 160 people globally and we pride ourselves on our excellent talent we have been able to recruit. A company is only as good as the people working for it, and in ORO we believe our people "bleed orange" as they are committed to the core. Having a passion for what you do is also important, and we believe in working as independent teams. We are only as good as our weakest link, and therefore ensure we give our people the tools to succeed.

Internally, our 4 main regions all operate independently, with different languages, cultures, agricultural practices, products and registrations. Management style and teamwork varies substantially from region to region and even within regions, and as a result, General Managers for each region has to operate profitable independent units within the framework of the group. General Managers and their Regional Managers manage their operations within the framework of local laws and cultural methodology. Specialists in certain fields become Team Advisors within the group in addition to heading up such positions in their own regions.

Regarding finding distributors, often distributors will approach us by e-mail, but by far the most successful has been meeting with distributors at tradeshow, and visiting their facilities to see if they are value added service providers and if they have the team, drive and passion to provide the necessary focus.

ORO AGRI has learned that areas where we do not provide direct sales support, the value-added service needed to succeed is often lost. Many biopesticides today, when used correctly, can provide better results than many of the conventional chemistries. New modes of action are often more complex and application techniques and monitoring more important. We pride ourselves on an excellent support team of agronomic engineers globally, who assists with marketing trials, training, supporting documentation in the various countries.

Registrations has also been a major challenge as we often relied on distribution to assist with registrations. Today we have boosted our registration team significantly, as well as our legal team who will help in setting up local entities to hold our own registrations where possible. We have learned many valuable



<p><b>BIOFERTILIZERS: LIQUID / GRANULE/ POWDER:</b></p> <p><b>Nitrogen fixing: Soil &amp; foliar application</b></p> <ul style="list-style-type: none"> <li>•Azotobacter chroococcum</li> <li>•Azospirillum brasilense</li> </ul> <p><b>Phosphate solubilizing: Soil application</b></p> <ul style="list-style-type: none"> <li>•Bacillus polymyxa</li> </ul> <p><b>Potassium Mobilizing : Soil application</b></p> <ul style="list-style-type: none"> <li>•Bacillus licheniformis</li> </ul> <p><b>Zinc solubilizing : Soil application</b></p> <ul style="list-style-type: none"> <li>•Acinetobacter calcoaceticus</li> </ul> <p>also available in N-P-K consortia</p>	<p><b>BIOPESTICIDES:</b></p> <ul style="list-style-type: none"> <li>•Bacillus subtilis KTSB 1015* 1.5% A.S.</li> <li>•Bacillus thuringiensis var. kurstaki 0.5% WP</li> <li>•Pseudomonas flourescens* 0.5% WP</li> <li>•Beauveria bassiana* 1.15% WP</li> <li>•Metarrhizium anisopliae 1.15% WP</li> <li>•Verticillium lecanii* 1.15% WP</li> <li>•Trichoderma viride* 1.00% WP</li> <li>•Trichoderma harzianum 1.00% WP</li> <li>•Paecilomyces lilacinus 1.15% WP</li> </ul> <p>Registration dossier available</p>	<p><b>SOIL HEALTH MANAGEMENT:</b></p> <p>Speedkompost (Decomposing culture) For efficient on farm recycling of organic wastes - aerobically</p> <p><b>BIOSTIMULANT:</b></p> <ul style="list-style-type: none"> <li>•Gibberellic acid (Microbial fermentation extract)</li> </ul> <p><b>SEED TREATMENT:</b></p> <p>Liquid/ powder*</p> <ul style="list-style-type: none"> <li>• Bacillus sp.</li> <li>• Bradyrhizobium japonicum* also available in P-K consortia</li> </ul>
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## Best partner for quality microbial inputs based on decades of R & D



lessons along the way.

ORO AGRI has plans on expanding our reach even further, in both distribution and registrations, and with ORO AGRI becoming part of the Omnia group we feel confident that we will be able to provide even better service than before using the latest agricultural technology which is a big focus within Omnia and forms part of their vision to provide trusted performance using innovative solutions for a better world.

**How is the Oro Agri's performance in the past few years? What do you think is the main driving force behind the growth of the company? And could you share what are the goals of the Oro Agri in the next five years?**

ORO AGRI was started by a very energetic Mr. Erroll Pullen during his retirement in 2008 and the company was sold in 2018, 10 years later, with a global annual turnover of close to 50 Million Dollars. For 2012-2016 our five year compounded annual growth rate (CAGR) for the group was 17% before being acquired by Omnia Group for 100 million US Dollars.

Mr. Pullen is known for his motto "GO-GO-GO" and he has been the driving force behind the company and strives to double turnover by 2020. With current registrations and new developments, we feel this goal quite achievable.

ORO AGRI, now part of the Omnia Group, will be focusing on providing solutions incorporating a myriad of technologies including soil and biostimulant formulations, biopesticides, microbial solutions to mention but a few. We have several products in the pipeline awaiting patents which we believe could be even bigger than PREV-AM once commercialized. These products fall into the low-risk category and will provide solutions to not just the organic grower, but all growers facing serious issues like Huanglongbing (HLB).

**Can you share your R&D team's experience in biopesticide development? What do you think are the main challenges in the field of biopesticide development?**

ORO AGRI Europe has placed a major emphasis on R & D and spends approximately 13% of our turnover on R & D.

Our R&D procedure follows a biorational process of scouting / discovery and screening over lead development, formulation and scale-up, to application development, manufacturing and commercial introduction.

As discussed earlier, the key to our success is in our people. We have assembled a world class research and development team within our 4 main regions. ORO AGRI assisted some of our team members to further their careers and also sponsored external

students to get their masters and PhD with many of the students becoming full time employees after graduating.

Very often it is the team who will come up with an idea for a new product and/or new use and then we will discuss within the R & D team to prioritize which projects to pursue. In each region the R & D is different, as each has its own set of challenges. In Europe we are very driven by registrations and have to be more selective in the projects we support as 1 crop/pest combination on a label could require a minimum of 36 trials over 2 years. At approximately €4,000 per trial you can see it quickly adds up. This does not even take the active registration into consideration, which often runs in the millions of Euros.

Because of the growing demand for bio solutions, ORO AGRI Europe has focused on finding soft chemistry solutions, and a large focus will be on new Omnia AgriBio solutions which we hope to launch in Europe.

In our in-house development trials we not only observe and note the obvious, but also note the "not so obvious" which has prompted many new registrations for existing solutions. If you're running a trial through a CRO who is paid to monitor whitefly on zucchini, generally, unless instructed, will not take note that there is also a drastic reduction in powdery mildew. Our in house technicians observe and monitor all parameters and this is then further explored. This is how we keep coming up with new pest/ crop combinations.

Each region has its own traditional agronomic practice and our products have to fit into the local program or the product will not be successful. Our team of agronomists in the various regions assist with developing the product for their specific region. Once we feel comfortable with the program, we will contract with CRO's to do registration studies. This is of course a very pricey endeavour, but a necessary one for registration purposes, and admittedly has also helped the bio industry in general differentiate from "snake-oil" companies showing before and after pics with no concrete independent data verifying the results. When studies are done in house by small organizations showing magnificent results, often the results have been "too good to be true" so having independent CRO's confirm the results has helped increase biopesticide visibility and more credibility.

We are also exploring new and improved versions of our current formulations, as well as new formulations which will provide some residual efficacy when combined with alternate Mode of Action bio products providing some residual efficacy.

Another focus going forward will be on expanding our product offerings into other market segments like biocides, post-harvest applications, home and garden etc.

# Advanced Microbial Technology Provider to Modern Agriculture



**Sandeepa Kanitkar**  
Chairperson and Managing  
Director of Kan biosys

*Kan biosys is the leading manufacturer of microbes based in India and has been working with microbes for over two decades. It offers advanced microbial technology from seed to harvest, and an array of selective and efficient strains of microbes are formulated for biopesticide, biostimulant and biofertilizer, using award winning and patented processes into hi-tech products. Recently, Sandeepa Kanitkar, Chairperson and Managing Director of Kan biosys shared her professional knowledge on biopesticide in an interview by AgroPages.*

## Could you please introduce Kan biosys to our readers, such as history of development, main business and future plan?

Kan biosys is an agricultural biologics company engaged in discovery, development, production and commercializing products containing beneficial microbes. We help farmers to improve yields of crops sustainably and make farming economical. We work with the farmer to reduce residues and grow healthy food for all. Our R and D is harnessed through SMART Bioplatfrom. This platform churns out microbial technologies/ products in record time which help to manage nutrients, pests and soil health. We have the largest state of art fermentation facility in India at Pune near Mumbai in India to produce more than 1 million litres of liquid inoculants and 1000 tons of powder and granule based microbial inoculants.

Kan biosys has been working with microbes for over two decades. We have a culture repository of more than 5000 microbes and innovative SMART Bioplatfrom – SMBF to formulate microbes into marketable products. Being pioneers in this field it enables us to consistently be ahead of our competitors as our tried and tested SMBF reduces time to market considerably.

Kan biosys offers advanced microbial technology from seed to harvest. An array of selective and efficient strains of microbes are formulated, using award winning and patented processes into hi-tech products. Kan biosys is the best agricultural microbial company in India and would like to make a mark globally. Starting from first patent in Liquid biofertilizers in 1993 which enabled us not only to increase the shelf life and shelf-stability but also work on MCLF technique or more popularly known today as "Consortia approach".

16 products have been registered in India and are certified for organic [ NOP- USA, NPOP -India, BFA- Australia and EU – Europe] and conventional residue free farming in 5 countries. Our products also have OMRI -USA listing. Future belongs to sustainable agriculture and we believe Kan biosys has a significant role in realizing the full potential and be the largest player in this field globally. Innovation is in our DNA which is the basis of our unique logo which encompasses the microbiome in all 4 spheres of our Mother Earth [ lithosphere-hydrosphere-agrosphere-atmosphere].

## I noticed that most of Kan biosys' products derive from microorganism. What are advantages for growers and public by using these products?

Kan biosys works with almost 42 distinct types of microbes which have been formulated into 16 products for –

1. On-farm dressing seed, precoating seeds, foliar biofertilizers, granular inoculants for nitrogen fixation, P solubilization, K and Zn mobilization.
2. Biofungicides based on *Bacillus subtilis*, *Pseudomonas fluorescens* and *Trichoderma viride*, Bioinsecticides based on *Bacillus thuringiensis*, *Verticillium lecanii*, *Metarrhizium anisopliae* and *Beauverria bassiana* and bionematicides based on *Trichoderma harzianum*.
3. Recycling of crop waste – accelerated On-farm rice straw and sugarcane straw utilization.

The main advantages of the products –

- a. Functional seed dressing by microbes which enable a healthy plant stand
- b. Increase the fertilizer use efficiency of chemical fertilizers which directly impact the yield of crops and get more value for money
- c. Stimulate plant growth by implanting plant growth promoting bacteria on foliage and root zone
- d. Increase the efficiency of chemical pesticides which can increase the market life of pesticides. This has been done using thousands of compatibility tests which enable us to recommend our products in the tank-mix concentrations with chemical pesticides.
- e. Reduce residues by using biopesticides in the pre-harvest interval.
- f. Improve the soil carbon by accelerated recycling of crop residues. This imparts sustainability by conserving all resources used for farming – water, fertilizers, pesticides and favourably impacts biodiversity by reducing the carbon foot print.

Lately, Kan biosys is also venturing into public sanitation sector by formulating products for solid waste management of Municipal Urban Waste and management of vectors specially mosquitoes which cause notorious diseases like Malaria, Chickungunya and Dengue.

## What are main country markets for Kan biosys now? And how do you think the rapidly development phenomenon of biopesticide in emerging markets like China and Brazil?

Kan biosys is expanding its foot print in domestic markets. Right now we are working in 10 Indian states directly and indirectly through some bulk partners in 18 states. In 2 years we shall have a pan-India presence. Initially we were working with export-

oriented crops like grapes, pomegranate but last 3 years we have diversified our crop base to include cotton, soybean, sugarcane, wheat, rice and vegetables.

We were the first Indian company to be able to export microbial inoculants. Right now, we are exporting to 5 countries. Kan biosys is in process of establishing its first off-shore office in the United States for reaching out to the rapidly developing markets in countries in North and South America. We are monitoring the scenario closely in Brazil where we shall be focusing on various field crops like sugarcane and soybean.

## Do you have any products registered in USA or Europe? If yes, do you think what are the main challenges to register biopesticide in these developed regions?

We have registered our nutrient management and soil health products in some states of United States and in Australia. We are monitoring the biopesticide market closely in USA and Australia. In Europe we are exploring several options. The procedure for EPA-USA and APVMA-Australia has commenced. The main challenges are data harmonization hurdles which results in duplication of work to some extent.

Indian chemical crop protection companies and pharma companies have created a good name for generics. Their foray into specialized branding has just started in the last five years or so. This is because India provides competitive manufacturing capacities which are further encouraged by "Make In India" initiative of the GOI. Kan biosys wishes to make its mark as the largest producer of quality biologics and enter into strategic relationships in different countries for expanding its horizons.

## Do you sale your products directly in India? If yes, do you think what are the main challenges to bring these biopesticide to growers's hands?

Use of biologicals by the masses is growing due to yield stagnation observed in wheat-rice systems, cotton and soybean. In situ rice straw utilization is helping farmers rise to their full potential by maximizing fertilizer uptake and management of water judiciously. The success has also fuelled farmers interest in microbial seed dressing for soybean with PSB/Rhizbium inoculants. Zinc mobilizing inoculants are becoming popular in wheat -rice systems. Biofungicides coupled with microbial biostimulants are increasingly finding place in the farmers practice in cotton. Thus, slowly but surely biologicals are commanding their own rightful place in the inputs used by classes as well as by masses.

Biologics in my opinion may supersede the projected CAGR of 15% and use may double in 3 years in some markets.

## Seipasa: Developing Natural Solutions to Meet Global Demand

*Seipasa is a pioneer Spanish company in the development, manufacturing and marketing of environmental friendly agro-inputs. During the last years Seipasa has specialized itself in biologicals and biostimulant products, suitable to meet the current and future requirements for the most demanding markets. Recently, Mr. Pedro Peleato, CEO of Seipasa received AgroPages' interview to share his opinion on the biological industry.*



**Pedro Peleato**  
CEO of Seipasa

### As CEO of Seipasa, how much do you think bio solutions will change agriculture as we know it today? How will it look five to 10 years from now?

Chemical products dominate 95% of the global market dedicated to crop protection, while companies that have opted for bio solutions as biopesticides represent just 5% of the market. Although the difference between these two scenarios is still huge, there are signs of significant changes that are already transforming the market structure.

In the short and medium term, this 5% of bio control companies are expected to continue to grow and gain in strength in this market where chemical products currently prevail. There are some very obvious reasons for anticipating this change. Increasingly, consumers are looking towards natural alternatives that look after their health, help preserve our planet and care for our future generations. There is a strong global trend towards organic alternatives and everything to do with "eco", "bio" or "green" concepts.

Our society is clearly committed to a healthy, residue-free diet. Consumers have transmitted this message to the market and now it's up to us as companies to meet this demand.

### What about Seipasa specifically – what can we expect from you guys in the next 5 years?

Seipasa's goal is to lead this growing 5% of the market where companies committed to the use of biopesticides for crop protection are competing. For this purpose, last year we put in place a strategic development and investment plan that is going to give us the capacity we need to pursue this commitment to natural technology. Work on enlarging our production facilities is almost finished and it will give us an extra 3,000 square meters. This, along with the reorganization of our solids lines and the new biopesticide formulation plant, means that our production capacity can now adapt to the needs of the international markets where we already operate and the new markets that we are beginning

to work with. Our short-term plans also include stepping up our international presence in new markets.

In qualitative terms, Seipasa has taken a great leap forward by winning the Best Formulation Innovation award at the Agrow Awards 2017. This is really important as an acknowledgement of all the R+D work that goes into our products and, more specifically, all the work that has gone into developing Fungisei, our biological fungicide already registered in the US, Peru and Morocco. Very soon, Fungisei will obtain the phytosanitary certificate for the Mexican market, but also for some of the most important markets in Europe.

### Can you talk about some of the biggest challenges for the biopesticide or biostimulant industry right now and how you are addressing them?

Agriculture is undergoing constant transformations. Climate change is a global challenge. With it new pests emerge along with new resistances, and it is essential to carry out research into new formulas and to come up with new strategies to combat them effectively. It is of fundamental importance to provide solutions that adapt to the specific needs of each country and market.

Seipasa has worked non-stop to obtain products with plant protection registrations. We have 15 years of experience of regulatory requirements and this has helped us to obtain phytosanitary certificates in more than 10 countries, amongst which are the United States, Mexico, Peru, Spain, France, Italy, Portugal.... Very soon, when our applications for registration are approved in countries such as Turkey, Israel, Chile or Ecuador, our international presence will be even bigger.

The specific knowledge and definition of the components of microbiology and botanical extracts allowed us to register plant protection products in each territory. In the US we have done it under the EPA standards, and in Europe we have worked within the framework of the regulation 11/07 but always very close to latest specific guidelines the European Authorities are developing for the new type of products the new agriculture is demanding (low

risk, microbial, botanical extracts...).

In this context, we consider the harmonization of international regulatory requirements with regard to the process of plant protection product registration to be of utmost importance. Companies like ours, that place great importance on this channel, have to deal with numerous difficulties and processes that are entirely different from one country to another. In the end, it is the market that loses out because the whole process of developing and providing new solutions for farmers is slowed down. In this respect, Seipasa took part in the annual BPIA (Biological Products Industry Alliance) assembly in March and led a paper on the subject, in defense of the importance of international harmonization.

Developing bio solutions that can work more efficiently in conjunction with the use of synthetic products is very hot. Does Seipasa have the same solutions combining a Biopesticide with a Chemical pesticide? What do you think of this phenomenon?

Seipasa is a company committed to natural solutions. This concept has been in our DNA since we set up in business 20 years ago. We research, formulate and produce biopesticides, biostimulants and fertilizers. We develop natural treatments for residue-free agriculture. Integrated pest management strategies are an alternative that farms are increasingly choosing. Using

biopesticides in IPM enables the application of chemical plant protection treatments to be reduced. In the case of Pirecris, the biopesticide that Seipasa launched onto the Spanish market last October to control aphids, whitefly or thrips, along with other species of insects, it allows a reduction in the use of conventional plant protection treatments of 20 to 50%. We are talking about key strategies to obtain zero-residue harvests and to provide our society with healthier foods.

### Any words that you want to say or share with biopesticide and biostimulant industry colleagues?

We have mentioned the changes taking place in the biopesticide industry where it is gaining greater weight in the market compared to chemical product solutions, but this is also a breakthrough moment for biostimulants. The new European legislation on fertilizers will define this type of product for the first time and will clearly set out the limits for plant protection products. As a member of the EBIC (European Biostimulant Industry Council), Seipasa actively works to support the authorities of the Member States, in this case Spain, and to help in this dialogue. I guess you could say that we are at a crucial moment for the agricultural industry. It's certainly thrilling to be part of it and to participate actively in this change.

## Combining Nutrition and Biostimulants is the Future



**Erik van den Bergh**  
Managing Director of Van Iperen International

*Van Iperen International is the leading producer of Specialty Fertilizer solutions for fertigation and foliar application. In recent years, the Company has made rapid progress, especially in overseas expansion. AgroPages recently interviewed Erik van den Bergh, Managing Director of Van Iperen International, to talk about Iperen IPE® Technology and company development.*

**Could you please introduce Iperen IPE® Technology? What are the advantages when using the technology and how can it benefit growers?**

Efficient Phosphate management is of extreme importance for an optimal root and bud development and eventually a good harvest. Only a small percentage of the total Phosphate in the soil is available to the plants the rest is unavailable, bound to the soil particles or precipitated in the soil solution. This is where Iperen IPE® Technology helps the farmer to Increase Phosphate Efficiency. Iperen IPE® Technology overcomes fixation of phosphates and helps to release the phosphates that are bound to the soil particles resulting in a better Nutrient Use Efficiency (NUE). A similar effect on trace elements is experienced. Science no magic. The effect of the Iperen IPE® Technology is proven by an



extensive range of scientific trials with different soil and climatic conditions. The technology was tested for example in corn, lettuce, carnation, tomatoes, onion, green beans and soya. In most of these trials, the total applied mineral Phosphate was reduced by up to 30% compared with the farmers' practice. It demonstrated an increased NUE. By now, many Growers around the world have experienced the effects.

Iperen IPE® Technology is available in WS NPK formulations and liquid formulation for open field fertigation with single straight fertilizers.

**I noticed that Van Iperen also has some mineral nutrition and biostimulant combination products. As a Specialty Fertilizers producer, how/what do you think about the market prospect of biostimulants? And does Iperen have any plan to expand the market position in the biostimulant industry?**

At Van Iperen International we are convinced that combining Nutrition and Biostimulation is the future. We use our expertise in Nutrition, we benefit from the knowledge of our local agronomists who are in the field on daily basis, and we invest in R&D. Biostimulation is not only the future, we already offer these products today. Our FoliaStim® range and Iperen WAKE-up Liquid

are two great examples of our vision: "Van Iperen International, Where Nutrition meets Biostimulation™".

**Van Iperen International is a worldwide player, in last month, Iperen opened Van Iperen America. Therefore, could you please share your company' overseas development status and development planning?**

Van Iperen International is part of the Thesis Group, a family owned business with about 100 years of experience in supplying Dutch growers. We operate worldwide with our headquarters and factories in The Netherlands and subsidiaries in France, Serbia, China, Lebanon and our newly opened office in Miami USA. Van Iperen International is a worldwide player, but not a multinational. We work together with local partners and operate close to our clients in about 100 countries. We have our feet on the ground in many countries all over the world with local agronomists and regional offices. Altogether we speak 20 languages, which allows us to communicate closely with our customers.

In the next 3-5 years we expect to double our turnover by introducing many new innovative products from our factories in The Netherlands as well as with our marketing platform we represent other manufacturers that have interesting novelties.

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# HYT Platform to Deliver Innovative Products for Modern Agriculture



**Kevin Helash**  
CEO of Agrinos

*Agrinos is a global biological crop input provider committed to improving the productivity and sustainability of modern agriculture. Agrinos' range of products based on the company's proprietary technology help growers to practice profitable agriculture by providing increased crop productivity and quality, improved efficiency of conventional fertilizer and a reduced environmental footprint. Recently, Kevin Helash, CEO of Agrinos received AgroPages' interview to introduce its HYT platform and views on the industry.*

## Could you please introduce High Yield Technology (HYT) platform?

Agrinos' proprietary High Yield Technology (HYT®) platform has pioneered the development of both microbial and biostimulant crop input products. HYT products have been proven to drive consistent yields and quality improvements. Today, products developed through the Agrinos HYT platform are registered for commercial agricultural sales in over 13 countries and currently sold in the U.S., Brazil, India, China, Indonesia, Malaysia, Mexico, Spain, Russia and Ukraine.

Agrinos focuses on two platforms of products—microbials and biostimulants. Agrinos microbials enhance crop nutrition by improving the soil microbiome to support plant health and yield. Agrinos biostimulants deliver complex nutrient solutions which support and promote healthy plant function across a variety of crops and growing conditions.

- HYT A is a soil-applied proprietary liquid solution that promotes a highly productive microbial system in the soil to support plant health and yield. It promotes absorption of nitrogen and critical minerals to increase the level of bioavailable nutrients to the crop root system. In the United States, HYT A is marketed under the brand name iNvigorate®.

- HYT B is a unique nutrient solution that increases the activity of critical metabolic plant pathways. It contains carbon, nitrogen, true protein, amino acids and essential metabolic micronutrients. In the United States, HYT B is marketed under the brand name B Sure®.

- HYT C is a nutrient-rich powder derived from organic, biologically extracted chitin and other crucial nutrients that improve

plant nutrition. Applied to the soil, it creates a more robust soil microbial environment and interacts with the plant to support faster field establishment and high nutrient uptake. In the United States, HYT B is marketed under the brand name Agrinos 5-0-0.

Once integrated into a grower's practices, Agrinos products are proven to perform consistently across a broad range of crops, soils and environments. Agrinos products are compliant with organic production standards, are OMRI listed in the United States and recognized by several regional certification organizations. They are also highly compatible with common application methods.

Please describe Agrinos' R&D capabilities that supported the development of HYT.

Agrinos' Global Biological Innovation Center is located in Davis, California. This state-of-the-art research and development facility houses the Agrinos R&D team and provides the infrastructure necessary to enhance current Agrinos' technologies and set the stage for the development of new products.

The Agrinos global team of scientists and agronomists is conducting cutting-edge research to harness the power of the HYT platform to deliver innovative products to improve the health and productivity of the soil and crops worldwide—to help deliver prosperity to growers and our partners.

Ground-breaking innovation that enriches the soil microbiome is helping to shape the potential of modern agriculture—and Agrinos is a leader in delivering on that potential. Our research team is dedicated to creating opportunities for improved plant health. We're rapidly uncovering new insights about how to leverage the oldest and most abundant form of life known to scientists: soil microbial communities.

## What advantages do microbials and biostimulants offer growers? And what challenges stand in the way of widespread adoption of these new tools?

Healthy soil is the critical foundation for successful and sustainable agricultural yields. Agrinos aims to increase agricultural output by simply restoring microbial health to the soils farmers use. Ultimately, Agrinos' mission is to provide solutions for several interconnected problems related to agriculture—soil degradation, food security and environmental sustainability of farming operations. Agrinos microbials and biostimulants provide growers with innovative new tools that are proven to improve plant health, crop quality and yields while supporting agricultural sustainability.

The biggest challenge will be helping growers understand the need and value of evolving from the decades old model of heavy reliance on chemical inputs such as fertilizers, pesticides and herbicides to a production model that includes natural, biologically-derived crop inputs and new technologies. The development of reliable probiotic solutions for agriculture, which are based on a detailed understanding of the functional of natural microbial communities, is comparatively new to the industry. It will take time and continued education to bring this knowledge to farmers around the world.

## Could you please introduce your company and future development planning?

Agrinos is a global leader in biological crop input solutions and is committed to improving the productivity and sustainability of modern agriculture. Agrinos AS was founded in 2009 with global headquarters located in Oslo, Norway. Today, a significant portion

of our key team members and strategic initiatives are based in North America to foster alignment with leading centers of biological and agricultural technology innovation.

We have production facilities in Clackamas, Oregon, and Sonora, Mexico, which supply Agrinos products to meet worldwide demand. The microbial production facility in Oregon was added in 2016 to meet increasing demand from growers and distribution partners.

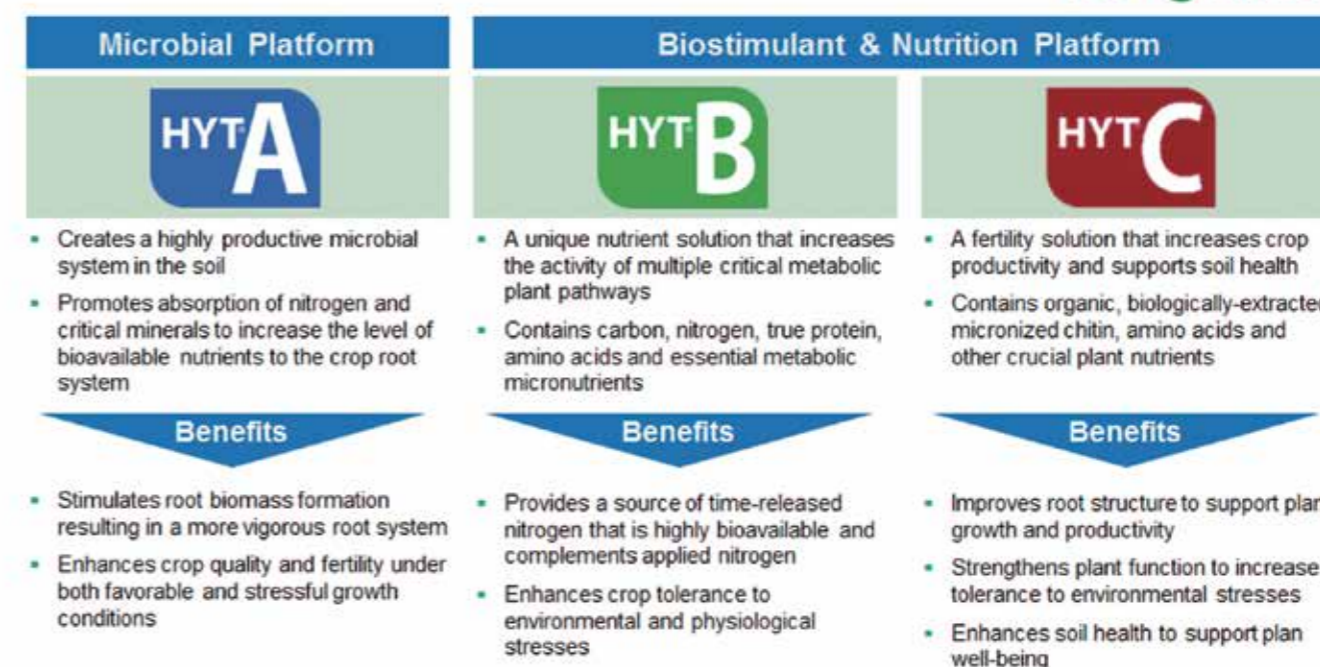
Internationally, Agrinos operates regional hubs in Brazil, India, and China.

## How do you believe your industry will evolve over the next 5–10 years?

We anticipate double-digit growth for biological crop inputs over the next 5-10 years, and continued validation of the production and sustainability benefits that will accompany increased adoption by farmers.

To improve the productivity and sustainability of the 21st-century farmer, Agrinos is helping shape the future of modern agriculture. The world needs innovative and sustainable solutions to increase agricultural output while reducing inputs to meet the needs of our growing global population.

Agrinos' global research, development and agronomy team is putting our innovative products at the forefront of microbial and biological crop input innovation. We are in the midst of an incredible revolution in human, animal and plant biology that has rapidly emerged due to advances in DNA sequencing and bioinformatics—and our team is passionate about translating this revolution into innovative, sustainable biological crop solutions.



# EU Fertilizing Product Regulation for Biostimulants

## - Current State of Play & Next Steps



By Rob Cannings

Commercial Director EMEAA Plant Health Care & Head of UK Task Force for European Biostimulant Industry Council

*“Things are about to change with the implementation of an updated fertilizing products regulation that will cover the full range of fertilizing products, including plant biostimulants.”*

Until now, European biostimulant manufacturers have been faced with a fragmented European market, forcing them to navigate different sets of national rules and regulations to penetrate each local market individually. Mineral fertilizers and liming materials were only covered in the 2003 regulations, so other fertilizing materials like biostimulants, organic fertilizers and growing media could only be placed on the market according to national rules. However, things are about to change with the implementation of an updated fertilizing products regulation that will cover the full range of fertilizing products, including plant biostimulants to be sold under one set of rules across 34 countries.

### The right regulatory framework will open market access and boost innovation and competition.

Over and above creating a single market, an agile and adaptable fertilizing products regulation is essential. This updated regulation will promote innovation and create incentives for manufacturers to invest in research and development. If the right regulation is implemented, the biostimulant industry will be set to contribute significantly to a circular economy. The industry will be able to promote renewable resources, create jobs and enable farmers to increase the quality and quantity of their yields to meet consumer demand for sufficient good quality food and reduce the impact on the environment.

### Current state of play

In March 2016, the European Commission published its proposal to replace the 2003 fertilizing products regulation. Since then, the European Parliament (EP) and the Council (representing the 28 Member States) have been preparing their negotiating positions. A draft text was proposed for the new regulation, through the work of several committees within the Commission. In early 2018, the EP and the Council entered into

negotiations brokered by the Commission (known as Trilogue) to reach an agreement on the final text. If the process goes to plan and a consensus is achieved by the end of this year, the regulations on biostimulants should become fully operational from 2020/21 onwards.

### Fertilizing Products Regulatory Timeline

A stable regulatory framework that favours the development of the European biostimulant industry is beginning to emerge. An example of this is the umbrella definition of plant nutrition products that has been revised by the Parliament, acknowledging that all products under the regulation contribute to increasing yields and plant vigour. This is essential in enabling biostimulant manufacturers to promote the added value that their products bring to farmers and reinforce the credibility of these products in the eyes of the farming community.

EBIC has been working with the EU officials, national authorities and related industries since 2012 on a clear definition of a Plant Biostimulant which is:

‘plant biostimulant’ means a product containing ANY substance or micro-organism (or any combination thereof) stimulating plant nutrition processes independently of its nutrient content, with the sole aim of improving one or more of the following characteristics of the plant or the plant rhizosphere:

- (a) nutrient use efficiency
- (b) tolerance to abiotic stress
- (c) crop quality

A global consensus is growing around the essential points of this definition, which was included in the U.S. House of Representatives 2018 Farm Bill. The draft law also proposes a Federal Standard for the regulation of Biostimulants in the USA.

### Improving the draft proposal

As the negotiations continue, it is essential that several priority issues are included in the final text to create a well-functioning market that distributes safe, effective and affordable biostimulant products.

To prevent the misuse of the legislation to pass Plant Protection Products off as biostimulants, it will be crucial that a clear boundary is drawn between the claims of fertilizing products (abiotic stress) and plant protection products (biotic stress).

By signing EBIC’s Code of Conduct, all EBIC members have committed to never make unauthorized plant protection claims and to be able to demonstrate the validity of their biostimulant claims with empirical data.

The new regulations are an integral part of all the EU farming, safety and environmental legislation. All fertilizer products will be regulated:





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•On their safety both at the component material and product level.

•Their claims (to be demonstrated at the product level).

Safety criteria will be developed and complemented by global harmonized standards, to allow the safety of biostimulant products to be evaluated by conformity assessment bodies in a cost efficient and timely manner.

To avoid the creation of new regulatory bodies to manage the identity and safety of inorganic or organic substances that biostimulants contain, the safety criteria approach will build on existing evaluations, such as Europe's chemical legislation (called "REACH"), the EU Animal By-Products Regulation or others, as relevant.

Biostimulants and other fertilizing products that conform to the requirements in the regulation will bear the "CE" mark, which will allow free market access to all EU Member States. In contrast, products placed on the market under national rules, which not be able to cross borders easily. A new set of Standards is being developed under CEN/TC 455 to cover "how" to support label claims, obtain a positive listing for microorganisms, safety studies and labelling. These standards will be incorporated into the EU Fertilizing Products Regulation and should be in force 2-3 years

after the regulations come into force. The rules to manage a wide range of animal and industrial by-products which are used as raw materials and active substances are currently under negotiation.

Negotiations are just one step, and the industry needs to stay engaged. There is no doubt that the technical nature of the legislation and the complexity of the products has made this topic extremely challenging for all the policy makers and regulators involved. It is critical that the text is finalized before European elections in May 2019, or the legislation could be stalled indefinitely. While there is every reason to believe that negotiations will be finalized before the end of 2018, the biostimulant industry continues to be proactive to advocate for progress. Agreement on the legislative text is not the end of the road as implementation depends on the harmonized standards that define analytical methods, claims justification and other critical aspects of biostimulant commercialization.

The European Biostimulant Industry Council (EBIC) represents the majority of players in the EU biostimulant market including dozens of SMEs as well as multinationals. EBIC engages actively with the EU institutions, farmers and other stakeholders to promote biostimulants and their contribution to more sustainable agriculture.



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Clothianidin	Cyproconazole	Clodinafop-propargyl	Matrine
Dinotefuran	Difenoconazole	Clomazone	Ningnanmycin
Emamectin Benzoate	Dimethomorph	Cyhalofop-butyl	Oligosaccharins
Fipronil	Famoxadone	Dicamba	Paecilomyces lilacinus
Imidacloprid	Fluazinam	Ethoxysulfuron	Rotenone
Indoxacarb	Fludioxonil	Glufosinate-ammonium	
Lufenuron	Propiconazole	Glyphosate	<b>PGR:</b>
Methoxyfenozide	Prothioconazole	Imazethapyr	Brassinolide
Nitenpyram	Pyraclostrobin	Nicosulfuron	Cyanamide
Pymetrozine	Tebuconazole	Penoxsulam	Ethephon
Thiamethoxam	Trifloxystrobin	Pyribenzoxim	Gibberellic Acid
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# Biocontrol Products and Their Data Requirements in Costa Rica



By Rosa Maria Criollo Cueva de Staal  
Global Registration Manager  
at Dr. Knoell Consult GmbH

Latin America (LATAM) is a growing and increasingly attractive region for biocontrol products. From an European perspective, it is interesting to see what those countries that are exporting food and animal feed to Europe have set as a national regulatory framework for biocontrol products.

In countries like Costa Rica, the influence of the US Environmental Protection Agency plays an important role when defining the national data requirements and procedures to registration. Costa Rica is here used as an example and its data requirements for microbial and botanical pesticides will be briefly presented.

The national regulations in Costa Rica define "Biopesticide" as "natural pesticides derivate from: plant extracts, microorganisms or substances released by them". In this context, bioactive substances produced by microorganisms are included in the definition.

While the National Law 7664 of 1997 and the Decree N° 33495 of 2007 covers the conventional pesticides in Costa Rica, the microbial and botanical pesticides have been considered to be an individual type of pesticide in Costa Rica, and have their own regulation. Invertebrates and nematodes also represent a separate category of biopesticides in the country. Beneficial arthropods and nematodes for agricultural use as plant protection products are regulated by the National Technical regulation N° 33103, which exists since 2006.

## Biopesticides registered in Costa Rica

In 2018, around 137 "bioactive substances" have been registered in Costa Rica. From the biopesticides registered for crop protection purposes: 56 are microbial pesticides, 36 are botanical products, and 45 are invertebrates. USA is the main provider for microbial and botanical pesticides in Costa Rica. Bacillus species are the most commonly registered in the country.

The biodiversity law, the phytosanitary law, the conservation and wildlife law, and related legislation are part of the regulatory framework for biopesticides in Costa Rica. The registration of a biopesticide product is valid for 10 years in the country and needs to be renewed after that period.

The regulations for biopesticides in Costa Rica have set up the data requirements for the different biopesticides. Some requirements (studies) are clearly difficult to present and, as in Europe, technical-scientific justifications should be submitted to the authorities. Costa Rica has recognized the lack of international guidelines for these "kinds" of pesticides and encourages the applicants to use a case-by-case approach in such situations.

The registration process for biopesticide products was established based on the assumption that less data is required when compared to a conventional pesticide, while keeping the risk assessment approach. The dossier is to be submitted in Spanish, along with national

efficacy data and other national regulatory forms, and is comparable to any other registration of a Plant Protection Product.

## Botanical pesticides

The regulation for botanical pesticides is the Regulation N° 346-2014 which entered into force in December 2014. This Regional Regulation, and its annexes, is a joint effort of the Central Latin-American countries – Guatemala, Honduras, El Salvador, Costa Rica, Nicaragua, and Panama – to established more harmonized data requirements for botanical pesticides in the region.

This regulation has been applicable for all dossiers submitted since December 2014.

The identity of the botanical active (Point 5.2.1 of the regulation) request:

5.2.2 (a) common name and synonym of the plant used for "extraction"

5.2.2 (b) scientific name and variety of the plant used for "extraction"

One particularity for botanicals in the country is that the botanical extract used to formulate the plant protection product should be first registered by the national competent authority in Costa Rica (SFE, Servicio Fitosanitario del Estado), as established under point 4.20 of the regulation N° 346-2014. This should be done prior to importing the active substance.

## Microbial pesticides

In 2017, also in the framework of Guatemala's Protocol, the Regulation 383-2017 was signed by the same central Latin-American countries which signed the Botanical Regional Regulation (Regulation N° 346-2014). The new law sets up the registration requirements for microbial pesticides for agricultural use, but only for the active ingredients. The Regulation 383-2017 repealed the Regulation N° 297-2012 (COMIECO-LXIV) from 11 of December 2012 (Decree N° 37561-MAG-MEIC-COMEX (in force since 2013).

All technical sections are addressed, studies at the strain level are requested, and there is only a reference to the American guidelines (OCSPP). This new law entered into force from 28th July 2017 onwards.

For the identity of the microorganism, among others, the life cycle, the history of the microbial agent, and information of the presence of the microorganisms in Costa Rica should be addressed.

The toxicological section is comprised of mainly acute routes of exposure and data on the acute pathogenicity properties of the strain in non-target organisms (OPPTS 885.4000).

Examples of some of the data requirements requested for biopesticide registration in Costa Rica are summarized in the table. OECD requirements are listed as a reference for comparison purposes:

Table 1: Data requirements – experimental studies

	Botanical pesticides		Microbial pesticides
	OPPTS	OECD	OPPTS
Acute toxicity effects in birds	850.2100	N/A	885.4050 885.4100
Short term toxicity effects in birds	N/A	N/A	N/A
Long term toxicity effects in birds	N/A	N/A	N/A
Acute toxicity in fish	850.1075	203	885.4200
Short term toxicity effects in fish	N/A	N/A	N/A
Long term toxicity and growth rate effects in birds	N/A	N/A	N/A
Bioaccumulation in fish	N/A	N/A	N/A
Acute toxicity in fish Daphnia magna	850.1010	202	885.4240
Chronic toxicity in Daphnia magna	N/A	N/A	N/A
Growth rate effects in algae	850.5400	201	885.4300
Acute toxicity on bees (oral and contact)	850.3020	213 214	885.4380
Toxicity on earthworms	850.6200	207	N/A
Toxicity for soil microorganisms	N/A	N/A	N/A
Degradation processes, rates and paths in soil	N/A	N/A	N/A
Absorption and desorption	N/A	N/A	N/A
Lixiviation	N/A	N/A	N/A
Rates and paths of degradation in aquatic environment and sediment	N/A	N/A	N/A
Hydrolysis	N/A	N/A	N/A
Photolysis	N/A	N/A	N/A

N/A: Not Applicable  
<http://app.sfe.go.cr/SFEInsumos/asp/Insumos/ConsultaRegistroPlaguicida.aspx>  
 2 Reglamento Técnico Centroamericano (RTCA) 65.05.62.11 Plaguicidas Botánicos de uso Agrícola. Requisitos para el registro  
 3 Reglamento Técnico Centroamericano (RTCA) 65.05.61.16 Plaguicidas Microbiológicos de uso agrícola. Requisitos para el registro  
 4 Guidelines issued before April 22, 2010, refer to "OPPTS" because the office name changed from "Office of Prevention, Pesticides and Toxic Substances" and "OPPTS" to "Office of Chemical Safety and Pollution Prevention" and "OCSPP." This name change does not otherwise affect the Guidelines.



# Spotlight on the Crop Protection Regulatory Landscape in Brazil



By **Maria Luiza M. P. Castro**  
BSc, MSc, Director, Cesis Ltda,  
Brazil

The Brazilian regulatory system of pesticide registration has the purpose of identifying whether a product presents any potential danger, to reduce risks to the users, consumers of foods, and to any non-target organisms. Brazil allows the production, exportation, importation, sale, or use of pesticides only if previously registered in compliance with the directives and requirements of the government. (Law 7,802/89)

When considering pesticides regulation in Brazil, three government entities are involved for establishing registration standards.

- The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) evaluates physical-chemical, environmental fate, toxicological and ecotoxicological data.

- The National Health Surveillance Agency (ANVISA) is the responsible for toxicological and genotox evaluation and also defines the maximum residue limits to be fixed in foods based on data submitted by the registrants.

- The Ministry of Agriculture, Livestock and Supply (MAPA) evaluates products agronomical efficacy granting the Registration Certificate after receiving Health and Environment manifestations.

Due to increasing crop production each year, the Brazilian pesticide market cannot produce enough to satisfy its own demands. Some interesting forecasts have shown that for soybeans (which accounts for 47% of pesticides consumed), the production to 2017/18 will result in 117,4 million tons, consolidating this sector in Brazil, together with the biggest in the world. (Globo Rural Magazine April.2018). Brazil's grain production is expected to total 229,7 million tonnes, according to the National Food Supply Company – CONAB. These numbers represent the development of productivity and the progress of the harvest in 2017/18 for soybean, corn (the second-largest crop produced in Brazil), followed by cotton and beans. Still according to Globo Rural Magazine, products used in coffee, sugar cane, soybeans, maize and cotton are the main drivers for the sector's growth representing 82% of the agrochemical sales, with rises also highlighted in the wheat, potato, fruit and vegetable sectors. US and China are the main pesticides providers to the Brazilian market where herbicides and insecticides represent the greatest part of the sales.

## Biocontrol Products

Among the reasons for the growing interest for Biocontrol Products in crops are the exhaustion in search for novel chemical molecules, enhanced by their high costs of financing, in addition to pest and disease increasing resistance to the effects caused by the use of such molecules.

Biocontrol Products global Market was estimated at US\$3,09 billion in 2017 and should reach US\$6,01 billion in 2022, growing interannually about 14.21%. The benefits regarding agriculture and environment associated with the use of such products are the factors that contribute to the growth of this global market. (Agrolink -Leonardo Gottens May 2018)

Latin America, is a perfect, growing and active region that offers new opportunities to expand the market of Biocontrol Products as a good option to control pests and diseases. Regarding Brazil, an interesting forecast is the annual growth at about 15 per cent, since according to the Ministry of Agriculture, Livestock and Supply - MAPA, the proportion of approvals for biocontrol products improved from 7% to 60% from 2010 to 2016 in relation to chemical conventional pesticides.

## CESIS Ltda

Despite Brazilian production numbers and growth of the national agricultural economy, the bureaucracy of registration processes, became more complex and laborious, making access to the pesticides market restricted and costly. A scenario that might worsen the situation with the lack of knowledge about the local regulatory landscape and local procedures to be followed.

CESIS is a Consulting Company based in Brasilia/Brazil that has been working offering regulatory support for 13 years, helping clients to understand how to present each companies knowledge in a registration dossier in the ever-changing regulatory landscape. Our regulatory team come from diverse backgrounds with most of our consultants holding senior positions in government and industry before joining CESIS.

Together with a Network of Latin American partners, CESIS offers regulatory support for chemical and biological pesticides, as well as fertilizers, biostimulants and plant amendments.

CESIS also works with biocides and veterinary products. These services expand each one of the companies' ability to provide scientific and regulatory expertise, harmonized registration strategies and technical guidance in different countries.

With the world's largest and growing agricultural market, Latin America offers new opportunities for market expansion. CESIS, a Brazil-based corporation, together with Latin American partners, constitute a multidisciplinary team of experts providing support to clients with high-quality services that offer the best outcome in each project meeting deadlines while also being responsible and nimble assisting companies in monitoring complex regulatory programs and obtaining registrations to commercialize their technologies. Our success is based on our experts having a clear understanding and knowledge of local procedures, culture, and excellent bilingual skills in the jurisdictions that present challenges to our clients. The company entirely maintains the commitment to professionalism and

respect for the confidentiality established since its inception 13 years ago.

CESIS services include:

Strategic regulatory guidance:

- Assessory in Pre-registration meetings
- Data gap analysis according to current requirements following country local specifications
- Data compensation
- Assemblage and submission of dossiers
- Study design and monitoring
- Efficacy assessment
- Chemistry evaluation
- Toxicology evaluation
- Ecotoxicology evaluation

Application/Dossier preparation and follow up of:

- Technical active ingredients
- Manufacturing-use products
- End-use products

## Risk assessment

Regulatory support throughout Latin America

**CESIS**  
SOLUÇÕES EM REGULAMENTAÇÃO E REGISTRO DE PRODUTOS

**STRATEGIC REGULATORY GUIDANCE**  
The quality of our assistance is the key to potential solutions in the ever changing regulatory landscape.

Latin America  
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**Russell IPM**

Russell IPM is a leading manufacturer of biorational pest control technologies. With over 30 years' experience the company has developed an innovative product portfolio that protects each stage of the food supply chain using safe and sustainable solutions.

The company's latest innovation is Recharge, a soil enhancement solution that is based on microbial technology. The formulation contains natural and beneficial microbes that enhance plant health, crop vigour and yield - to maximise growth and provide increased protection against pathogens and disease.

Russell IPM provide over 150 pheromone lures for the non-toxic monitoring and management of insect species. With a steadfast commitment to research and development Russell IPM maintains a position at the forefront of pheromone-based insect monitoring and control technology on a global scale.

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**Novagro-ag SAC**

Agrynova is a company dedicated to the production import-export and local distribution of agro-chemical (mainly biological insecticides, fungicides and growth plant regulators). The reputation of its products has allowed it to locate quickly in the first place in share market as suppliers of biological insecticides in Peru.

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**Scientific Consulting Company**

SCC is a privately owned and independent regulatory consulting company. Since 1989, we have been supporting our international customers with cost-efficient solutions for their scientific and regulatory needs. Our expertise extends over a broad range of areas, including agrochemicals and biologicals, chemicals and biocides, feed and food additives, food contact materials, cosmetics and consumer products.

Our long-standing expertise in plant protection includes successful defence of more than 75 chemical and biological active substances and more than 500 national registrations for biological and chemical products under Directive 91/414/EEC and Regulation 1107/2009. In addition, we have filed a multitude of national registrations /authorisations for biostimulant-related products such as plant strengtheners, plant and soil aids as well as fertilisers.

SCC stands for meeting every single deadline: we are the experts for regulatory challenges - large and small. More than 130 highly skilled, team-focused employees, mostly academics, form the backbone of our company.

Alongside with Headquarters in Bad Kreuznach and the second German office in Berlin, SCC has been running Liaison Office Japan for 10 years.

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**A****AgriTecnó Fertilizantes, S.L.**

AGRITECNO is an international company, based in Spain, specialised in biostimulant and plant nutrition products. Founded in 2001, the company currently continuously exports to more than 50 countries worldwide. AgriTecnó's mission is to provide plant origin solutions that are competitive and adapted to the needs of our customers, taking into account the agricultural characteristics of each country, to improve the productivity and quality of their crops, with a commitment to sustainability with the environment.

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**Agri 2000 Net Srl**

Agri 2000 Net since 1985 your partner in Europe to support the development of your business in plant protection and nutrition products.

We provide a qualified support to your needs, along the complex pathway from the field to the market, thanks to our:

- Biological Specialists Team
  - Regulatory Specialists Team
  - Market Research Specialists Team
- We provide a full range of services:
- FIELD TRIALS WITH PLANT PROTECTION, BIOCONTROL AND BIOSTIMULANT PRODUCTS • LABORATORY AND GREENHOUSE EFFICACY TESTING (WEEDS, PESTS, DISEASES) • PHYTOTOXICITY TESTING • REGULATORY SERVICES • TAIN TESTS AND QUALITATIVE

ANALYSIS STUDIES • GLP STUDIES (GOOD LABORATORY PRACTICES) • SERVICES FOR THE MARKET DEVELOPMENT OF CROP PROTECTION AND CROP NUTRITION PRODUCTS

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**AlgaEnergy**

AlgaEnergy is a biotech-based company exclusively focusing on the research, production and valorization of microalgae and derived products. The company consolidates over 4 decades of deep microalgae biotechnology knowledge generated by the main specialized universities, and has invested millionaire resources exclusively in research, positioning itself as one of the main international references in this field of science. It leads or participates in international algae related R&D Projects with over 120 top-level consortium members. The company collaborates closely with the most reputed Universities and research centers, as well as with the European Commission, who has recently selected AlgaEnergy as one of the very few SMEs with the highest growth potential in Europe.

In 2010 it started the research of microalgae applied to agriculture, and launched its first products in 2015, an innovative range of natural, sustainable and highly effective biostimulants named AgriAlgae®.

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**Andermatt Biocontrol AG**

Andermatt Biocontrol and its affiliated companies have key expertise in the development of new products based on baculoviruses, microorganisms and beneficial insects. Since 1988, the outstanding quality standards and the permanent focus on customer's satisfaction ensure the high performance of the provided solutions. With the aid of own R&D centers, products and knowhow are continually improved. Andermatt Biocontrol is distributing the own product range as well as a selection of other high-quality products all over the world to more than 150 distributors.

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**B****Beijing Multigrass Formulation Co., Ltd.**

Beijing Multigrass, established in 1997, aims to the development of high quality and effective bio-pesticides, seaweed fertilizer and organic fertilizers to promote sustainability, protect environment based upon their researchs and innovations. Beijing Multigrass strives to be the professional of understanding of pest, disease and crop nutrient requirements and offers farmers solutions to manage these with clean, non-toxic and low residue products, so that the crop and soil will approach its maximum yield and utilization. Beijing Multigrass is approved by ISO9001 and ISO14001 certificate, ECOCERT and OFDC certificate. Beijing Multigrass complete a new factory specialized for Spinosad research and production.

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**Biolchim**

Biolchim is leader in the production and commercialization of biostimulants and specialty fertilizers designed to optimize crop production and performance in every agronomic context. With more than 40 years of experience and the close collaboration with universities and research centres, Biolchim has developed a complete product portfolio of the highest quality based on actual market requirements. Based in Italy, Biolchim has seven global subsidiaries strategically located in Brazil, Germany, Hungary, Poland, New Zealand, Canada and China, and four representative offices in Russia, Turkey, Colombia and Lebanon, through which it builds close partnerships with local distributors and provides continuous technical and sales support on the territory.

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**Bio Huma Netics, Inc.**



Bio Huma Netics, Inc., is a global leader in providing sustainable solutions to the world's environmental challenges for agriculture (Huma Gro®); horticulture, turf & ornamentals (Huma Gro® Turf); and water & wastewater (Probiotic Solutions®) through its development of Micro Carbon Technology®(MCT). Used as a base in over 70 products, MCT is a proprietary blend of extremely small organic carbon-and oxygen-rich molecules that provides an ultra-efficient vehicle to move nutrients and agrochemicals through the soil and into plants—resulting in enhanced activity of beneficial microorganisms, improved soil structure, enhanced nutrient availability and uptake, and suppression of crop pests and diseases.

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**C**

**CESIS**



CESIS is a consulting company based in Brasilia/Brazil. Together with Latin American Consultant Companies CESIS offer regulatory support for plant protection (PPPs) such as chemical and biological pesticides as well as nutrition products such as fertilizers, biostimulants and plant amendments. CESIS also works with biocides and veterinary products. These services expand each one of the companies' ability to provide scientific and regulatory expertise, harmonized registration strategies and technical guidance in different countries.

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**D**

**Dudutech**



Dudutech is Africa's leader in Integrated Pest Management (IPM) with a wealth of experience in designing and delivering biological pest control solutions developed "By Growers for Growers". We research, develop and supply zero-residue biological control products for environmentally and socially intelligent farming. To further support the pest control needs of growers, we have an on-site diagnostics laboratory to accurately identify pests and a training department to promote their understanding.

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**E**

**Eurofins Agroscience Services Group**



Eurofins Agroscience Services brings together global, multi-disciplined research capabilities with market leading product development and technical support services to the crop protection industry. The ability to deliver a full range of regulatory research services and professionally managed scientific solutions sets us apart as the ideal partner for agroscience research. As a global service provider of field, laboratory and regulatory programs, we have proven expertise in managing global field studies, worker exposure studies, ecotoxicology, analytical services, physico-chemical property testing, and 14C / environmental fate laboratory .

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**G**

**Global Adjuvants Company Ltd**



GAC is an adjuvant manufacturer based in England but operating globally. Our mission is to simplify the use of adjuvants for agronomists and farmers, so they become a tool for environmental benefit and improved agronomy. GAC is also at the forefront of developing new generation adjuvants for use in IPM and organic (eco) farming.

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**Global Crop Improvement Company Ltd**



G Ci C manufactures speciality foliar fertilizers, biostimulants, and seed dressings, with a focus on cost-effective high-quality products that the grower can rely on to produce results every year. Our expertise in SC flowable technology allows us to produce high-strength soluble concentrates of Humic acids, NPK, Potash and various other combinations including custom mixes in small lots.

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**Groundwork BioAg, Ltd.**



Groundwork BioAg produces highly-effective mycorrhizal inoculants for commercial agriculture. Containing concentrated and vigorous beneficial fungi, Rootella™ inoculants significantly improve soil nutrient uptake in plants. Rootella™ increases crop yields, improves resistance to various types of stress, and reduces fertilizer requirements. Groundwork BioAg has demonstrated significant yield increases in several major crops, including corn, soybean, sorghum, tomato, and onion. Rootella™ is suitable for use in organic farming according to USDA National Organic Program (NOP) and European regulations (EC 834/2007).

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**Growcentia**



Growcentia was founded by a team of three Colorado State University soil microbiologists with PhD degrees that share a passion for enhancing soil health and promoting sustainable agriculture. Using innovative proprietary technology, this team developed an approach to identify and apply nature's very best microbes to improve nutrient availability to plants. Growcentia aims to help growers maximize the health of their soils or growth media to enhance plant health and yields, while minimizing environmental impacts of agriculture.

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**I**

**International Panaacea Ltd**



**International Panaacea Ltd.**

International Panaacea Ltd (IPL) is a leading company in the field of biological and bio-control solutions based on microorganisms. IPL has developed and commercialised the largest and most effective range of portfolio of over 50 products, offering solution for almost all crops, for most of their nutritional and protection requirement. Focused on research and technology, IPL has two R&D labs with world class infrastructure, scientists, microbiologist and agronomist. We have pharmaceutical-grade manufacturing plant where we produce our products in powder, liquid, granular and tablet formulation.

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**K**

**Kan biosys Pvt. Ltd**



Our company Kan biosys is an Indian biotech company engaged in the production of microbial inputs for agriculture. We have numerous patents to formulate microbes for agriculture. We are exporting inputs to various countries like USA, Spain, Australia, Turkey, Dominic Republic etc. Our products have organic certification in four countries.[ Ecocert Turkey, BFA Australia, OMRI USA and NOCA-APEDA India] They have also been certified under NPOP (India's National Program for Organic Production Standards) standards. The NPOP standards for production

and accreditation system have been recognized by European Commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation as equivalent to that of US.

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**Keyun Biocontrol**



Henan Jiyuan Baiyun Industry Co., Ltd., China's largest R&D and production base of baculovirus based insecticides, is a high-tech enterprise specialized in production of baculoviral bio-pesticides and invested by Institute of Zoology, Chinese Academy of Sciences in the year of 1998.

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**L**

**Leili Marine BioIndustry INC.**



Established in 1993, Beijing Leili Marine Bioindustry Inc (Leili Group) is the founder of China seaweed biological product for agricultural use industry, which has been keeping a leading position in this industry. Leili Group is a national high and new technology enterprise and innovative enterprise which integrated R&D, production and marketing together. Leili Group is also the pioneering and leading enterprise of seaweed biostimulants industry in China. Providing more than 80

countries with our original seaweed bio-stimulants and related services, including but not limited to the healthy crop cultivation solution and green agricultural input, crop nutrition deficiency diagnosis and tech, crop balance nutrition diagnosis and tech, and soil improvement and remediation tech.

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M

**Marrone Bio Innovations, Inc.**



Marrone Bio Innovations, Inc., strives to lead the movement to a more sustainable word through the discovery, development and promotion of biological products for pest management and plant health. Our effective and environmentally responsible solutions help customers operate more sustainably while controlling pests, improving plant health, and increasing crop yields. We have several products for agriculture on the market, including Regalia®, Grandevo®, Venerate® and Majestene®, and also distribute other companies' products in the USA.

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O

**Oro Agri International Ltd**



ORO AGRI®, a member of the OMNIA group, develops and manufactures agricultural products, ideally suited for organic, sustainable or environmentally friendly categories. The global distribution

network reaches over 80 countries. Labels include PREV-AM®, PREV-AM@PLUS biopesticide, TRANSFORMER®soil conditioner, WETCIT® and PREV-MAGNUM™ adjuvants, PREV-MAG™, ORIZONE™, and PREV-B2™ fertilisers.

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P

**PJ Margo Pvt. Ltd.**



PJ Margo Pvt. Ltd. is India's first and largest manufacturer and exporter of Neem Seed Oil and Azadirachtin Technical from Neem seeds and is a JV with Certis USA, LLC. MARGO product range includes Azadirachtin Technical, Neem oilm, Azadirachtin based bio-insecticides and bio-fungicides. The bio-insecticides have a Azadirachtin Strengths of 5%;3%;2%;1%;0.3% and 0.15% in the form of a ready-to-USE EC. MARGO range includes various microbial bio-control agents, Bio-active Humic Substance based Bio-stimulants. MARGO range also includes a spectrum of Bio-fertilizers such as VAM Granules and Azotobactor and Rhizobium based NPK and Moblizers/Solublizers in Liquid Form.

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**PT Prima Agro Tech**



PT Prima Agro Tech is a private limited company engaged in the field of agro-biotechnology. Our goal is to develop new innovations to support increased farming and plantation production to go towards a more environmentally friendly planting.

Therefore, we continue to develop and create healthier and cheaper supporting products in farming and plantations with advanced microbiology and organic based technology. The products we develop today are pure biological products without any chemicals mix. We are proud to have developed (1) Endophytic Microbes, (2) Microbes Isolates that are antagonistic against major diseases in agriculture and (3) Entomopathogenic microbes against pests & Insects. Our products can be applied to both organic and conventional farming.

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**Website:** [www.primaagrotech.com](http://www.primaagrotech.com)

Q

**Qingdao Seawin Biotech Group Co., Ltd.**



Qingdao Seawin Biotech Group Co., Ltd. focuses on the exploitation and industrial utilization of marine biological resources, and development, production and marketing of related products. SEAWINNER organic fertilizers are certified as organic agricultural input by ECOCERT with both EU and NOP standard. Being national level High and New Technology Enterprise, Seawin Enterprise Technology Center, composed by 63 experts, keeps on researching of marine materials and developing high value added products. Seawin has over 40 patented technologies. Having served global market for over 16 years, Seawin now takes the largest market share of seaweed fertilizer in China.

**Country:** China  
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**Website:** [www.seawin-bio.com](http://www.seawin-bio.com)

S

**Seipasa SA**



Seipasa is a leading company specialized in natural treatments for agriculture. Seipasa is pioneer in researching, manufacturing and marketing biopesticides, biostimulants and fertilizers. The company has been working for 20 years in natural protection of crops and plant biostimulation based on solutions of botanical and microbiological origin. From its headquarters in Valencia, Spain, and conducted by the R&D department, the company formulates and registers solutions of high technological value which are applied in the most demanding agricultures of the world. Seipasa is established in over 20 countries worldwide.

**Country:** Spain  
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**Website:** [www.seipasa.com](http://www.seipasa.com)

**SINO AGRO-CHEMICAL INDUSTRY LTD.**



SINO AGRO-CHEMICAL INDUSTRY LTD. is aiming better crop plant solutions, specialized in processing diverse types of formulations and various customized combinations, with high quality control and technical support. It can create new combinations and make enhanced recipes as per the requirements. Some recipes have the same or even better efficacy than that of Multinational Companies. Diversification and customization of small packages are our markable feature. We can supply various materials and shapes of packages based on the pesticide characteristics and requirements.

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**Staphyt**



Staphyt provides services in agrosiences to agro-chemical, biological suppliers and plant breeding companies for the development, registration and promotion of their products. Our areas of expertise are experimentation, regulatory consultancy, coordination of registration dossiers, seeds studies. Bioteam is a unique service dedicated to biologicals. Because the nature, mode of action of Biostimulants and Biocontrol products require specific expertise and a distinct approach. We help Biologicals suppliers to design their program, test their products and achieve registration in the most efficient way, everywhere.

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T

**Tradecorp**



Tradecorp are expert manufacturers in micronutrients, biostimulants and specialty fertilisers. Founded in 1985 in Spain, Tradecorp has gained broad experience in crop nutrition, which we offer our clients to improve their crops and their business.

**Country:** Spain  
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**Website:** [www.tradecorp.com.es](http://www.tradecorp.com.es)

V

**VIGNA BRASIL GROUP**



The Group Vigna Brasil has been working mainly through four Divisions: - Business Advisors - Regulatory Affairs - Field Management - Prophyto We usually work as a facilitator in Brazil, rendering services as "one stop shop". We've been working as a full services provider, where we can offer any kind of support regarding to these current segments since the companies' and product registrations (Regulatory Affairs); in strategic operational issues and market intelligence studies (Business Advisors); execution and management of field efficacy and residues trials for pre and post harvest products (Field Management) and then, at post-registration, keeping the company and products in full operation.

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**Website:** [www.vignabrasil.com.br](http://www.vignabrasil.com.br)



### AZADIRACTIN

From Neem Seed Kernels

We Produce Azadirachtin Technical Powder from Neem Seeds. Azadirachtin Technical Powder and Azadirachtin based Neem EC in 5.00%; 3.00% 2.00%, 1.00%, 0.30% 0.15% and Neem Oil Based Bio-Fungicide. We are also the Largest Exporter of Neem Oil from India.

### BIO-STIMULANTS

Humic Based Liquids and Granules

- Manages Biotic and Abiotic Stresses
- Works for all Field and Plantation Crops
- Low Dosage and Fast acting
- Improves Soil health
- Helps to clean the Drip irrigation lines
- Safe to handle - Non Toxic
- Acts like a Tonic for all Plants
- Works for all Plants, Vegetable/Fruits
- Can be used in combination with other Chemicals
- Improves Water holding capacity of Soil
- Suitable for Hydroponic pants
- Eight Variants

### ADJUVANTS

Liquids

- Super Spreader
- Wetting Agent

### MICROBIAL

Wettable Powders

- Trichoderma Viride WP -  $1 \times 10^8$  CFU /g
- Trichoderma Harzianum WP -  $2 \times 10^6$  CFU /g
- Pseudomonas fluorescens WP -  $2 \times 10^8$  CFU /g
- Verticillium chlamyosporium WP -  $2 \times 10^6$  CFU/g

### BIO-FERTILIZERS

Liquids and Granules

- Vesicular Arbuscular (Endo) Mycorrhiza - Granules
- Phosphate Solubilizing Bacteria (PSB) - Liquid
- Nitrogen Fixing Bacteria - Rhizobium - Liquid
- Bio - NPK - Rhizobium Based - Liquid
- Potash mobilizing Bacteria (KMB) - Liquid
- Nitrogen Fixing Bacteria - Azotobacter - Liquid
- Bio - NPK - Azotobacter Based - Liquid



“Innovation  
you can  
touch by hand”

A COMPLETE PORTFOLIO  
OF BIOSTIMULANTS  
FOR SUSTAINABLE AGRICULTURE





## Proven expertise that paves the way for your biorationals to international markets

Almost 30 years of comprehensive  
 regulatory consultancy for:

- Biopesticides
- Basic and low risk substances
- Biostimulants and fertilisers –  
 soil aids, soil conditioners or plant aids
- Organic farming and IPM

Our knowledge is the key to your success.



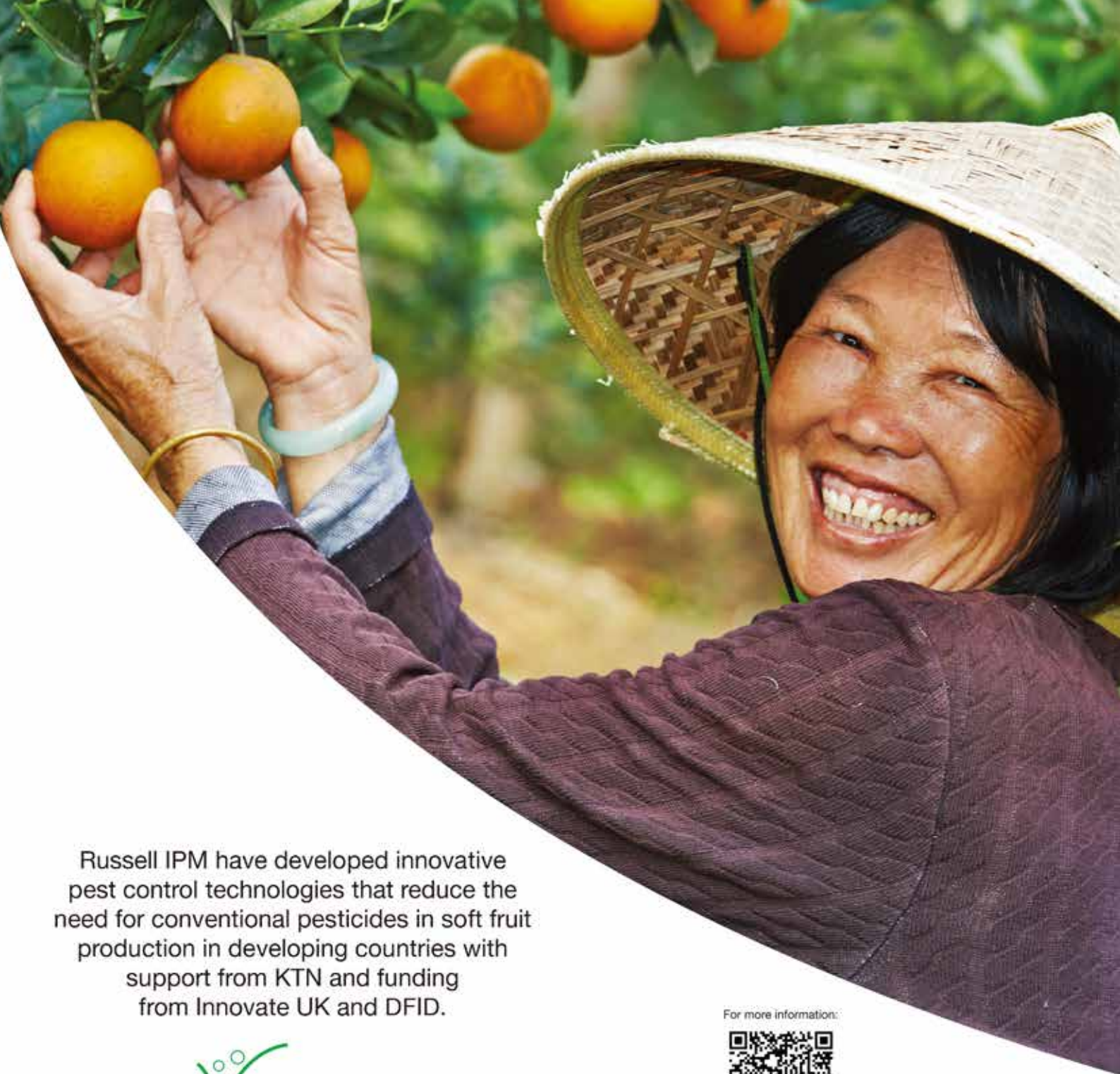
Strategic  
 Communication

Consultation  
 & Advice

Business  
 Development

Brand  
 Promotion





Russell IPM have developed innovative pest control technologies that reduce the need for conventional pesticides in soft fruit production in developing countries with support from KTN and funding from Innovate UK and DFID.



For more information:



Creating new opportunities for sustainable fruit and vegetable production in Asia and Africa

**Innovate UK**  
Knowledge Transfer Network

