

2nd Biocontrol Latam industry meeting

Finding the right formulation for Latin American markets

The second edition of BIOCONTROL LATAM took place 14-16 November 2018 in Medellin, Colombia. More than 350 delegates, from around the world and in particular from 20 countries of the Americas came to Medellin. This was the first time that a NewAg International conference was hosted in Colombia, co-organized by 2B Monthly, in conjunction with IBMA and with support from the host association Asobiocol.

The LATAM region is projected to see the highest growth in biological control looking out to 2025. For 2020-2025, the region is forecast to see growth of just under 18%, according to Dr Mark Trimmer, Managing Partner in DunhamTrimmer and editor of 2BMonthly, the JV publication with New Ag International.

The presentations covered investment, regulation, production and formulation. Overall, they highlighted how important the biocontrol industry has become in Latin America.

LATAM: THE MOST BIODIVERSE CONTINENT IN THE WORLD

One of the themes to come out of the conference was how consumers are driving the growth in biocontrol with a desire to purchase food free of pesticides and chemical residues. This is coupled with the move towards integrated pest management (IPM) and, however to a lesser extent with the expansion of the organic farming area.

There was also the more regional theme of sustainable development to protect the biodiversity in many countries in Latin America. A less well-known fact that was mentioned by keynote speaker Dr Cesar Augusto Corredor Velandia, from the Ministry of Agriculture and Rural Development for Colombia, is that 50% of the country's land area is protected. Seven out of the 19 countries in Latin America have ecosystems that are described as 'megadiverse'.

The president of Asobiocol, Nicolás Cock Duque, said jokingly that Colombia is more diverse than Brazil on a square metre basis!

The 'Colombia Bio' project was referenced by Dr Corredor Velandia. This project aims to transform the Colombian economy into a bioeconomy, namely one based on green growth and the sustainable use of its biodiversity. Other drivers include the United Nations 2030 Sustainable Development Goals (SDGs). However, as one of the questions elicited in the session, R&D is currently less than 1% of GDP, while Dr Corredor Velandia said the goal was to reach 1.5%.

Other questioners raised the issue of getting registrations for products for import. Dr Corredor Velandia said that the Colombian Agricultural Institute ICA (Instituto Colombiano Agropecuario), which jointly implements





government policy along with Ministry of Agriculture, was working with the National Environmental Licenses Authority ANLA to facilitate the registration and importation of products from foreign suppliers.

Dr Corredor Velandia also added that Colombian government was working towards ratifying

the International Treaty on Plant Genetic Resources for Agriculture (ITPGRFA). Colombia is currently a signatory but is not a contracting party and remains to ratify the treaty.

In October 2018, the IISD (International Institute for Sustainable Development) reported that Ministers of Agriculture of Argentina,

Brazil, Chile, Paraguay and Uruguay signed a Ministerial Declaration reaffirming their commitment to the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.

All of the above countries have signed the treaty and are contracting parties. The ITPGRFA is seen as a vehicle for the achievement of several sustainable development goals (SDG), such as agricultural productivity, sustainable food production, the maintenance of genetic diversity in seeds, plus fair benefit-sharing.

GROWING INVESTMENT IN BIOCONTROL IN LATAM

The conference presentations transmitted the message of how much investment is happening in LATAM in the biocontrol sector. But it should be noted that biocontrol is not new – Cenicafe introduced *Beauveria bassiana* in the 1990s to combat the coffee berry borer.

In Colombia alone, 166 companies were registered with ICA (Colombia Agricultural Institute) in 2016, to either import or produce biological/bioprotection products, according to figures from Nicolás Cock Duque, President of Asobiocol. By product type, 47 companies have registered microorganisms, 35 have registered plant extracts, 21 in microbial inoculants, 8 beneficial insects, 12 trichoderma and 7 mycorrhizae.

In Brazil, biocontrol products are used on 10 million hectares, according to the CESIS consultancy. One reason for the growth in biocontrol is that Brazil has two

crops per year, and the climate allows for a variety of crops and therefore a variety of pests. There are approximately 180 commercial brands from 68 national/multinational companies. In terms of registrations, there were just under 80 products registered in 2017 from around 20 in 2013, according to co-founder of CESIS Ms Maria Luiza MP Castro. Growth projections for biocontrol in Brazil are 15-20% CAGR.

Ornamentals have been a big driver in Ecuador and Colombia. These two countries, along with Kenya in Africa, are the world's key producers of roses. Colombia is the world's number one producer of ornamentals and exporter covering 7,500 ha, according to figures from the Ministry of Agriculture.



"Seven out of the 19 countries in Latin America have ecosystems that are described as 'megadiverse'"

DR CESAR AUGUSTO CORREDOR VELANDIA,
DIRECTOR OF INNOVATION,
TECHNOLOGICAL DEVELOPMENT
AND HEALTH PROTECTION
MINISTRY OF AGRICULTURE
AND RURAL DEVELOPMENT
(COLOMBIA)

However, conventional pesticides still dominate in Colombia. With 96-97% of crop protection products sold as agrochemicals, said Nicolás Cock Duque.

A statistic that some would like to change is Colombia's low organic ranking. Colombia is only 24th in the LATAM ranking as a percentage of organic hectares over total hectares used for production.

A point was also made that to underpin industry it is necessary to have a foundation of researches



“Let’s avoid leaving for Mars”

**NICOLÁS COCK DUQUE,
PRESIDENT OF ASOBIOCOL**

and universities, described as human capital.

Agrosavia serves as a good example of a commitment to investing in human capital. Formerly Corpoica, Agrosavia changed its name in May 2018. Agrosavia is a Colombian governmental, non-profit organisation that receives funding both from the government budget and from partnerships in the private sector. In 2010, the organisation had 184 researchers, and this has grown to 381 in 2018, according to Dr Juan Lucas Restrepo, Executive Director, Agrosavia.

The enlargement in personnel is one thing, but Dr Restrepo emphasised that a change in mindset was also important. A more market-orientated approach has been adopted and the words ‘market demands’ have even been written into the organisation’s literature. This did unsettle some researchers at first said Dr Restrepo. Agrosavia can take fundamental research through to scaling up and production for bioproducts.

The end-product is also a key metric – Agrosavia has launched 68 new cultivars in the period 2010-2018.

Growing human capital is obviously necessarily to encourage R&D in biocontrol sector. This can then be combined with the lower cost of developing biocontrol products. A clear comparison was presented by Dr Mark Trimmer, Managing Partner in DunhamTrimmer

and editor of 2BMonthly, the JV publication with New Ag International. A traditional pesticide could take 11 years and \$286 million to come to market, while a biocontrol product could take 3-5 years and \$25-50 million. Dr Trimmer commented that people used to think you would need \$100 million in sales to cover R&D costs.

This point was also supported when considering the cost of registering products for the European Union market. The fees tend to be lower, said Dr Alison Hamer of consultancy ERM, because there are fewer documents to present compared with a synthetic active ingredient.

So what’s the best way for attracting investment and growing as a company?

A systematic approach to developing start-ups was expounded by Dr Maier Avendaño from Flagship Pioneering (USA). With



“If the science is strong, it’s going to have a market.”

**DR. MAIER AVENDAÑO,
FLAGSHIP PIONEERING (USA)**

this approach, a lot depends on the scientific offering. “If the science is strong, it’s going to have a market,” said Dr Avendaño. The approach is broken into four stages, ending with the formation of the spin-out company, appointment of CEO, and growth plan. As well as providing structure, the Flagship Pioneering approach is to search for the unforeseen opportunities. As with most research, this often starts with a question. The results of this approach have so far led to the development of compa-

nies such as Indigo Ag, a provider of natural microbiology and digital technologies.

LATAM LEADING THE GROWTH OF THE GLOBAL MARKET

The LATAM region is projected to see the highest growth in biological control looking out to 2025. For 2020-2025, the region is forecast to see growth of just under 18%, according to Dr Mark Trimmer. Noting that the climate and crops grown in LATAM were well adapted to use of biocontrol, Dr Trimmer is forecasting the global market to reach \$11 billion by 2025 from an estimated value in 2017 of \$3.8 billion.

Dr Trimmer pointed out that bioherbicides are a small share of the biocontrol market and could be as low as less than 1%.

At present, biocontrol products represent around 5% of the crop protection market, with 80% of usage on fruits and vegetables. Dr Trimmer emphasised that the sector is important: Despite being only 5% of the total global crop protection market, biocontrol forms 17% of the fruit and vegetable market. This confirms one of the drivers of the biocontrol market – namely, the drive from consumers wanting no chemical residue (or very little) on the food that they consume. But as pointed out, maximum residue limits (MRLs) are not too often exceeded, but the idea of residue and risk have been firmly planted into the minds of the consumer.

There was also a generational driver. Quoting from a 2016 report by Rodale Inc and Food Marketing Institute, Dr Trimmer said that millennials (born between 1981-1995) are more likely to buy organic food than older shoppers.

This idea that biocontrol can contribute to brand value was explored by René Rüter, Director – Horti, Koppert Biological Systems (Netherlands). When considering the global market for cut flowers and potted plants is forecast to grow by 50% 2017-2027 reaching a market value of \$100 billion, the

ability of retailers to demonstrate their environmental credentials could be vital in securing market share.

Two German supermarkets Aldi and Lidl have set limits on the number of different residues found on crops. Aldi has introduced a blacklist of chemicals for ornamental crops. Koppert has started training the employees working in the supermarkets of German retailer REWE so they talk to customers about what crop protection has been used on the food on the shelves.



“Bioinsecticides and biofungicides form 90% of the market. Bioherbicides form only 1%; could be even less.”

**DR. MARK TRIMMER,
MANAGING PARTNER, DUNHAMTRIMMER & 2B MONTHLY**

NOT ONLY FOR LARGE SIZE FARMS

The largest rose farm in the world is a 500-hectare business in Ethiopia, but one speaker highlighted that it was small holder farmers in Guatemala that were driving biocontrol use in this Central American country.

Popoyán trained 8,000 farmers, according to Ignacio Viteri, Technology Catalyst Manager of Agropecuaria Popoyán on a microbial product that could be used on 13 crops. The microbial biocontrol product was packaged in a tailor-made dosage. From the 8,000 trained, 20% adopted the product within two years, and has shown an income benefit for farmers for a range of crops, with tomatoes out in front as top performers. Viteri referred to



this as a shared-cost model and said Popoyan were looking to replicate in other countries. After two years, this product has gained 16% market share.

The importance of training farmers was also highlighted by Dr Deepak Singhal, President, International Panaacea, India. The efficacy of conventional crop protection products has been a problem in the state of Punjab, where the resistance of the whitefly has been damaging.

Dr Singhal framed the problem that farmers will make 3 applications with 3 different products. But if the second application is a repeat of the first product, then already the efficacy goes down.

FINDING THE RIGHT FORMULATION

Even before you can take a product to farmers, there is an all-important stage of perfecting the formulation. Different options were explored in the presentations.

Finding the right formulation is the objective. This means finding the right combination of active ingredients and excipients to produce stable, effective, safe and easy-to-use biopesticides, according to Dr Martha Gomez, Manager of Bioproducts, Agrosavia in Colombia. Excipients are any solid, liquid or gaseous substance that is added during the formulation of the product. However, the problem to

be solved is how to refine and perfect the production process when making the granules.

Dr Gomez said biopesticides are usually used as liquid-based formulations, water-dispersible granules (WDG) and wettable granules (WG), wettable powders or pellets.

She described the process of making wettable granules, which can be done by a dry or wet granulation process.

The drying (or desiccation) process needs to be adjusted for different active ingredients, according to Dr Gomez. The response of microorganisms to the drying processes depends on their metabolic status when water is removed, she explained. The response to desiccation can be improved through strain selection; by adding trehalose (a sugar consisting of two molecules of glucose) to the growth medium; the use of adjuvants; and the manipulation of cell metabolism.

When the production process has been perfected, there is then the question of whether it is cost effective. The need to find cost-effective production processes was emphasised by Dr Paula Garcia-Fraile, a researcher from Grupo Agrotecnología and the University of Salamanca.

The tolerance of bacteria to salt is also important. *Pseudomo-*

nas fluorescens PS05 has a NaCl tolerance of 5%, while *Bacillus subtilis* BS03 has a salt tolerance of 7-15%. Dr Garcia-Fraile told NewAg International on the sidelines of the conference that salt tolerance was increasingly an important factor for biocontrol, given that some soils are showing

compatible? The short answer was yes, from Mr Camilo Chacon, R&D Manager, Ecoflora Agro (Colombia). The work he presented described how plant extracts can help predator mites establishment in ornamentals, and increase the exposure of the phytophagous pests. Mr Chacon suggested that it was better to apply ellagic acid (EA) plant extracts before the predator mites are released rather than apply at the same time. He also made three other points: EA plant extracts do not kill the predators (that is because the predators have thick cuticles); they do not affect the predator's feeding; and they can stimulate predator egg laying.

In India, biological solutions for sucking pests (such as aphids, whitefly, thrips, mealybug, and jassids) were foliar spray of *Verticillium Lecanii*, and *Beauveria Bassiana*. However, Dr Singhal said results could be inconsistent. That was the problem they were looking to solve. His company's solution is a strain selection, high concentration, stable product with long shelf-life. This is combined with training farmers. His company uses combination of its proprietary product Wipe Out with *verticillium lecanii*. Wipe Out is described as a consortium salt of fatty acids which acts on the exoskeleton and cell membrane of insects.



"Koppert is working with German supermarket REWE, teaching its staff about the biocontrol products used on the produce being sold."

RENÉ RUITERS,
DIRECTOR – HORTI, KOPPERT BIOLOGICAL SYSTEMS (NETHERLANDS)

increasing levels of salt.

And then beyond the production process, Dr Garcia-Fraile outlined that it helps to develop a product that does not require any special storage conditions, as well as being compatible with conventional pesticides.

One question posed was – are plant extracts and predator mites



Elsewhere, Dr Sathy Veeravalli of Procelys, Lesaffre Group (France), was looking into how yeast can be used for the growth and sporulation of *Bacillus amyloliquefaciens*. Dr Veeravalli told NewAg that the sporulation ratio was varying with different yeast extracts, and could be linked to the yeast extract and fermentation process.

And sometimes the problem to be solved is a pest that is so prevalent that the consequences of inaction could be very costly. In the organic banana growing region of Piura in Peru, nearly 45% of crop was affected by red spot thrips in 2017. An infestation also occurred in 2014, and reports at the time said that some growers were even considering no longer being organic.

Another problem to overcome is the effect of ultraviolet (UV) light, which can have a degrading impact on the active ingredient. Pyrethrins are well-known active ingredients that attack the nervous system of an insect. Grupo Agrotecnología has developed a product called Tec-Fort that has a micelle arrangement that deflects the photons (particles of light), which can degrade the pyrethrin inside.

Dr Noemi Herrero, R&D Manager, Grupo Agrotecnología (Spain) presented details of an efficacy trial of Tec-Fort against aphids in lettuce crops.

LOOKING FOR HARMONISATION OF REGULATORY ENVIRONMENT

So, you have the right formulation, but how to get the product to mar-

ket? What are the regulatory hurdles that need to be cleared and are they different for conventional pesticides? One of the threats to the emerging industry in Latin America is an inconsistent regulatory environment.

From a national level in Latin



America, some countries have special regulations for biopesticides and some do not. Colombia, Paraguay, Peru and Central America are covered by their own special regulation for biopesticides. Brazil has special regulations in the form of a decree for all biological products and a Joint Normative Instruction for each kind of biopesticide.

Countries without a special regulation for biopesticides are Argentina, Chile and Ecuador, according to Ms Silvina Iglesias, Latam&CentAm Registration Manager, STK Bio-Ag (Argentina).

In Central America, Colombia,

Paraguay and Peru the requirements for approval of biopesticides (botanicals and microbials) are fewer than for registration for conventional pesticides, with the exception for microbials in Paraguay, according to Ms Iglesias. Apparently, a new regulation for biopesticides in Colombia is in process and is expected in mid-2019. In Peru, there is a reduction in fees to 50% from the price to register a conventional pesticide.

Given that only a few countries have separate regulation for pesticides, it is not surprising that recognition is still at an early stage. However, it did emerge in the Q&A session of Ms Iglesias' presentation that there is harmonisation in Central America.

Ms Iglesias later told NewAg International that this includes Dominican Republic even though it is not part of COMEICO (Council of Ministers of Economic Integration of Central America). In practise, this means that there is one piece of legislation covering all the countries. But to be registered in one country does not mean automatic registration in the other countries. It is necessary to go through the registration process for each country, and the requirements can still be different under the legislation.

An example that came out in the Q&A was El Salvador. Companies there have the option of requesting the 'Recognition of registration' from other Central American countries by submitting a few documents. Ms Iglesias said this is the only example that she knows of and it is still necessary to go through the registration process, just a shorter one.

To the objective of greater harmonisation, there was the first meeting of the Inter-America Institute for Cooperation on Agriculture (IICA) for Latam Regulatory Authorities in November 2017. There was a meeting in April 2017, according to a statement from IICA, at which the "participants shared different regulatory approaches to the establishment of maximum

residue limits (MRLs) for pesticides in agricultural products; they also discussed various challenges associated with the establishment of MRLs for minor crops."

When trying to get a product registered for the European Union (EU), Dr Alison Hamer of consultancy ERM emphasised that a good rule to keep in mind was 'make what you test and test what you make'. The technical specification was the foundation stone of any approval. There was also a need to understand how the activity of the substance is dependent on its component parts. For microbial substances, it is necessary to be aware of any taxonomy changes over time.

For the EU, Dr Hamer noted that of new actives between 2011-2018 approximately half were biologicals. She said there is a focus on hazard characterisation rather than risk.

This theme was picked up by Mr David Cary, Executive Director, IBMA (Belgium). The precautionary principle – the guiding principle for EU regulations – needs to be re-evaluated, according to Mr Cary. This was the view in the IBMA's White Paper released September 2018. The IBMA is an active participant at OECD level for the harmonisation of biopesticides, although Mr Cary did warn: 'Harmonisation only works if working towards something worth harmonising.' Activities will be handed over to BioProtection Global (BPG) which is a federation of industry associations representing biocontrol and biopesticides. Mr Cary's presentation noted that BPG needs to be at the table and take a lead. Asobiocol of Colombia and ABCBio of Brazil are members. Argentina's Biocontrol Association is in the process of joining.

By the time Biocontrol LATAM returns in 2019 to Brazil, an interesting discussion point will no doubt be the further developments made in this process towards national regulations and wider harmonisation. ■