

ABIM Breaks a Record Attendance!



The 2017 edition of the world's most prestigious event on Biocontrol welcomed 1,046 attendees in Basel during 23-25th October: A record for ABIM, which also gathered more than 400 international companies. Business discussions were intense in the exhibition that gathered 69 exhibitors but activity was also intense in the conference room, with an opening paper by Paul Koppert who told the delegates how the Koppert success story was built over 50 years! Politics were also on the agenda, with a proposal of IBMA to its members to merge with the European Biostimulants Industry Council (EBIC)! Marianne Loison reports.

A BUNCH OF INTERNATIONAL INITIATIVES TO BOOST BIOCONTROL

Bringing biologicals to row crops is certainly a goal for the industry. The European Biocomes project which links 13 industrial partners and 14 research institutes, is a good example of added value brought by a consortium coordinated by Wageningen University in the Netherlands. Jurgen Kohl, who leads Biocomes, recalls that Biocomes started in 2013 and that the results will be presented by the end of this year. The consortium concentrated on 11 main pests and diseases in arable crops, vegetable, fruits and forestry. In preview for ABIM, three results were revealed for new BCAs. Massimo Benuzzi (CBC Europe) pointed out that the cooperation with other companies was interesting to build the development of a seed treatment with *Trichoderma harzanium* on maize. Daniel Zingg (Andermatt Biocontrol) reported that Biocomes was a success story, allowing him to develop and register a virus-based product against tomato pest *Tuta absoluta*. Ralf-Udo Ehlers (E-nema), introduced with the support of Biocomes a genetic technology to produce a new strain of bionematicide against maize worm *Diabrotica*.

Outside Europe, other cooperations on Biocontrol have been set up around the world. Ulli Kuhlmann from CABI, showed his global concerns on food safety and plant health. CABI is a non-profit inter-governmental organisation established by a United Nations-level

agreement. It is owned by 48 member countries which have an equal role in the organization. Plantwise CABI's programme is a global initiative aiming to work together with national and international plant health stakeholders to increase food safety. National networks of plant clinics give regular advice to farmers and facilitate pest surveillance. Plantwise impact can be measured : 79% of the farmers report yields increased after using advice from plant clinics, as the use of pesticides decreased by 30%. A recent Plantwise study includes an extension service for the uptake of biological control. Ulli Kuhlmann pointed out that: "the number of registered biocontrol products for insect pests in the studied countries vary from 2 to 19. Some countries such as India and Kenya have the biggest range of products available, due to their registration process. There are huge potentials in other African countries, by creating a database, in order to facilitate identification and sourcing of Macrobiales and Microbiales products", concluded Kuhlmann. Other initiatives for introducing biocontrol on minor crops can be a great help. Krista Coleman described the US IR-4 Initiative which supports American growers by making pest control products available for use on specialty crops. "We have been a major resource by developing research data to

support new EPA registrations." said Coleman. Everyone has access to this database. In the European Union, Kristen Sukalac (EBIC) explained how the new registration of biostimulants in Europe could clarify biocontrol products status. Registration in Europe still raises problems and delays, as Refit pesticides evaluation is going on. "Is it going to deliver anything?" asked David Cary, IBMA Executive Director.

NATURALS AND BIOCHEMICALS: THREE NEW PRODUCTS INTRODUCED

This session introduced 3 products but also mentioned the barriers to beat for Naturals extracts in the biocontrol markets. Jose Angel Talavera (SEIPASA) pointed out various difficulties for Naturals and Biochemicals. Though many Naturals are available, few go to the market in Europe. "What will happen with these new technologies in the EU?" J.A. Talavera finally asked, who thinks that legislation brings these biocontrol solutions out of Europe, although among the new Naturals and Biochemicals, the potential is high as bioinsecticides and biofungicides.

Tim Johnson (MBI) described Grandevo, a microbial tested against San Jose Scale and other major pests. The active substance comes from a new species of bacteria, *Chromobacterium subtsugae*.

This strain was isolated from US forest soil by the USDA-ARS. Dead bacteria plus associated compounds produced in their cells, show activity against different pests. The effect is a rapid cessation of feeding and reproduction of many sucking insects, mites and flies. MBI had a first registration for Grandevo by EPA (US) in 2013. This bioinsecticide shows a high level of activity against Sans Jose Scale. MBI patents also expand to whiteflies, thrips, diabrotica, nematodes, or Citrus rust mite in South Africa. "There are many key pests targets for this compound and it is very safe on non-target insects and honey bees" according to Tim Johnson. Grandevo admissibility as a biopesticide was completed in the European Union in 2017 and EFSA conclusions are expected for end of 2018-early 2019. So MBI expects a product authorization in Europe by early 2020. Grandevo will also expand international registrations in Asia, Latam, Oceania. "Five years after an initial registration, we are still in the very early stages of exploiting the bioactivity of *Chromobacterium subtsugae*," concluded Tim Johnson. "Continued manufacturing process and formulation improvements should yield additional products for new markets segments including seed treatments and nematocides."

Ilaria Pertot – IOBC introduced a promising vegetal extract: This new

extract 100% vegetal comes from a Fabacea plant, *Clitoria ternata* also called Butterfly pea, which is a totally edible species. It is known to have pharmaceutical properties. Recent studies indicate that *Clitoria* has insecticidal effects. Several molecules inside this plant are involved, and mainly cyclotides and flavonoids. "The mode of action is complex, but we know it is effective by ingestion and partially by contact." reports Pertot. The University of Trento made different trials with *Clitoria* extracts on *Trialeurodes*, *Drosophila suzukii*, aphids, showing a good activity on these insect pests. This extract is promising, as it has good persistency, no phytotoxicity and no toxicity for mammals.

Andy Leader - Dow presented a nature-based solution against septoria on cereals: Inatreq™ Active (fencopicoxamid) is an innovative fungicide for the control of key diseases in cereals with additional development in banana. The active is of natural origin, coming from a soil sample containing the fungi *Streptomyces* sp 517-02, isolated in Japan in 1996. The product isolated UK-2A, has a broad spectrum activity in vitro. It inhibits energy production in mitochondria, with action on complex III in the plant. The active ingredient derived from UK-2A is produced by fermentation by Dow. "The process of fermentation improves stability and efficacy of the natural product." explains Leader. "This modification does not impact the environmental or toxicology profile compared to UK-2A." Inatreq converts back to the natural product UK-2A inside fungi and plants. It is further degraded to naturally occurring carbon based compounds and has very low toxicity to birds, honeybees and soil organisms. The mode of action is novel: Inatreq is a Qil inhibitor fungicide. It is active at the inner side of the mitochondrial membrane. The first target of this fungicide is septoria leaf blotch, a major disease of wheat, that may cause yield losses of 20%. Inatreq efficacy



against septoria was compared to other conventional fungicides in 22 trials, "It is providing a strong solution to cereal for disease control." declared Leader. Dow is also testing Inatreq on bananas main diseases: black Sigatoga (*Mycosphaerella fijensis*).

SEMICHEMICALS: DELIVERY PROBLEMS BEING SORTED

The issue for companies developing Semiochemicals is to improve delivery of the products, as well as trapping and the efficiency of dispensers.

Christine Pilz (Pessl Instruments) discussed on a multiple trapping system, iScout. "The idea is to combine hardware and software systems. iScout is a Lure trapping system, which includes a main unit and a camera, a control unit and a web portal". At the trap entry, there is a green cross where bugs can land. They climb up and are caught by insect glue on a white plastic or a

sticky metal plate, where a camera is able to take a high-resolution picture. Images are sent via GPSR to iScout platform once a day. Detection and analysis of insects are automatically made. And results are visible on web or mobile devices, with an alert system. Target insects for iScout are olive fruit fly, Mediterranean fly, *Drosophila suzukii* and many others.

Andrea Iodice - CBC Europe, introduced a new dispenser, Isonet T, a pheromone dispenser for greenhouse crops used against the major pest *Tuta absoluta*. The pheromones lead to mating disruption and stop reproduction of *Tuta* on the crop. The new dispenser is a capillary tube kept constantly impregnated by specific pheromones (yl-acetate from Shin Etsu). "We apply the technology a few days before transplanting, at the rate of 80-100 dispensers/1000 m²", detailed Iodice. "To have a good result, it is also important to introduce other prac-

tices against *Tuta absoluta*, such as insect-proof nets, destruction of infested plants and host plants". This dispenser Isonet T is registered in Italy and on the way of registration in other European countries.

BUMBLE BEES: A SMART WAY TO DELIVER BIOPESTICIDES

Christophe Lehnen - Bee Vectoring Technology (BVT), introduced what he calls "a logical conclusion of pollination"

Based in Canada, BVT has developed since 2012 a disruptive sustainable crop production tool with bumble bees. The company has 60 patents applications worldwide, covering 5 technologies areas. "Commercially reared bumble bees used for pollination can carry 5 or 6 biopesticides or biostimulants on the flowering crops." explains Lehnen. This is an alternative to spraying. The flower is the primary portal of entry for many diseases and pests. And flowers are also the

best place for the active ingredient to inoculate the plant. "The technology shows many benefits. It minimizes waste of active ingredient and does not need water or machinery. Bees deliver control agents continually throughout the blooming period. They can be more efficient than spraying programmes which may miss many blooms in between sprays." How does it work? The reared bumble bees walk across the Vectorpark tray, which is filled with BVT's patented and organic carrier agent that bonds with stacked biocontrol microbials. The bumble bees fly to the crop and deliver the beneficial microbe on the right spots. BVP used these natural vectors to carry a beneficial endophytic fungus, *Clonostachys rosea*, in order to control botrytis. The trials were successful on strawberries in open fields, with an improvement of marketed yield by +3% to +15% compared to the standard fungicide treatment. It also improved the control of botrytis and shelf-life of strawberries. Other results on sunflower showed a reduction of sclerotinia incidence by -36% and increased yield by +8%. This technology is in commercialization phase, expected in 2018. BVT is also building partnerships with other companies.

MACROBIALS: NEW RELEASE SYSTEMS

Improvements on delivery systems are also a key to better use of Macrobiols. New dispensers allow for a long-lasting release and strain-selection can improve the efficacy, especially in the open fields. Another natural technology seems very promising, by delivering biocontrol products carried on commercial bumble bees visiting a flowering crop.

Tom Groot – Koppert introduced slow release sachets: Year after year, Koppert works to improve the release of their beneficials predatory mites. The new slow-release sachets – Ulti-mite concept – allows an extended period of efficacy. They are also easier to



TREMOS Product From CBC Europe Wins the Bernard Blum Award

From left to right: D. Cary, W. Ravensberg, V. Veronelli (CEO of CBC Europe) and JP Leymonie

There were twelve entries this year for the third edition of the prestigious Bernard Blum award for Novel Biocontrol Solutions. Three products were finalists: TREMOS a digital electronic system product from CBC Europe, LIFEWARD, a new microbial product from Certis USA and ULTI-MITE SWIRSKI, a biocontrol system from Koppert Biological Systems. The 2017 Bernard Blum award went to the product TREMOS from CBC Europe, the Italian subsidiary of the Japanese CBC Group. The award ceremony took place in the presence of W. Ravensberg, IBMA President, David Cary, Executive Director of IBMA, Owen Jones, chairman of the Award committee, and Jean Pierre Leymonie, Managing Director of New Ag International & Editor of 2B Monthly in the conference hall of the Basel (Switzerland) Congress Centre on the occasion of ABIM 2017. TREMOS is a digital electronic system used to disrupt leafhopper species. By broadcasting vibrational signals, TREMOS disrupts leafhopper location and mating in a similar way to pheromone mating disruption used for Lepidoptera. The unique aspect of TREMOS is it accomplishes this without any chemical input into the environment making it a truly zero residue pest control system.

distribute, and leave no material residue in the crops. "Containing 250 *Ammoblyseius Swirskii* by sachet, this packaging has become the preferred mite release system by growers", said Groot. "The Ulti-mite sachet involves resistant foil and improved hook, new functional box; it is certified totally biodegradable", concluded Groot.

Sebastien Rousselle – Bioline, discussed how to increase the efficiency of trichogramma in open field crops: Bioline started a research programme in 2001 with INRA in France to improve the rate of destruction of *Ostrinia*, one main pest in maize. "Our objective is a better rate of destruction of *Ostrinia* eggs." said Sebastien Rousselle. The first step was to select and mix the best strains of *Trichogramma*, a beneficial that lay its eggs in *Ostrinia*. With the help of molecular biology methods, 26 strains of *Trichogramma* were isolated and compared on *Ostrinia* eggs. The response was positive. Bioline managed to increase the rate of destruction of *Ostrinia* by +50% with the best strains. Another improvement was made by better distribution and optimal field coverage. "We managed to improve the rate of *Ostrinia* eggs destruction. We are validating a new production programme of *Trichogramma*. Other selection projects are underway to improve Bioline commercial products" added Sebastien Rousselle.

Felix Wackers - Biobest is investigating new paths to enhance beneficials presence on row crops. As their value is often low, these crops expect economical solutions and adapted release technologies. The use of semiochemicals offers indirectly possibilities to attract beneficials on the crop, to provide resources as food or shelter for beneficials and to release MBA with limited mobility. "We look at synergies between induced plant resistance and BCAs" noted Felix Wackers. "We also had the idea to use special sprays or sugar spray to attract beneficials on crops that don't deliver nectar." Starting from

this concept, Biobest formulated Nutrimate, a food supplement for beneficials that must be sprayed before the arrival of pests. Biobest also explored another concept: the ant diet. The idea is to provide alternative food to ants and to turn them away from the crops.

Minsha Ansari – Bionema, introduced a soil conditioner for nematodes: A number of nematode products are available on the market, but their delivery raises different questions: temperature, moisture conditions, compatibility with fertilizers and with other plant protection products, poor dispersion. As compatibility and dispersion are a recurrent problem, Nematrident was formulated with a soil conditioner by Bionema. "This Tri-component system ensures maximum dispersal into the soil or growing media by the nematodes, which then hunt out larvae and kill them quickly. With the conditioner, the volume of treated soil is bigger and efficacy is higher", says Ansari.

MICROBIALS ISSUES

This session has updated Bt food contamination and also described 4 new technologies. The topic of Bt (*Bacillus thuringiensis*) residues in food is quite controversial. Andrew Brown - IBMA Microbials chair- and Denise Munday presented the facts and interrogations. Are Bt, or eventually strains of Bt, really responsible for a potential food problem? After a German family suffered from toxicity problem, Bt spores were found on lettuce coming from the same production as the lettuce eaten by the family. Then EU Commission mandated EFSA for an opinion on the safety of Bt on food in 2015. Later, EFSA published their opinion in July 2016, advancing that Bt pathogenity was strain-dependent. But IBMA considers there have been no confirmed adverse effects with any of the commercial Bt on humans, animals and on the environment. IBMA asked Ben Raymond from Exeter University (UK) to study Bt possible effects on human health. In particular, the

proximity of Bt (*Bacillus thuringiensis*) and *Bacillus cereus* is a crucial question. In food microbial contamination, *Bacillus cereus* is one pathogen regularly screened. But *Bacillus cereus* is not used in biocontrol. And *Bacillus thuringiensis*, which is one of the most used biocontrol microbials in the world, has a different profile. "Multilocus sequence typing show that Bt is different from *Bacillus cereus*", according to Raymond, who thinks there is no evidence that Bt can be involved in health problems.

These questions around Bt have not stopped research and development for Microbials. The session dedicated to these biocontrol agents pointed at different aspects.

Maria Isabel Trillas Gay (Biocontrol Technologies) explained how the communication works between plants and soil fungus *Trichoderma*. Many *Trichoderma* strains are active on the crop roots. "We found an induced systemic resistance triggered by *Trichoderma* that can activate plant defense by priming".

Birgit Miller - AIT, presented a new delivering technology on seeds: Endoseed™, an endophyte improved seed. The principle is to introduce beneficial bacteria on crops before harvesting their seeds, so they will be colonized very early. All AIT trials showed that bacteria can colonize maize during flowering. They locate in seed embryo. "90% of the treated seeds analyzed where infested by the bacteria", adds Miller. This research objective is to "change Plant trade." in order to get an earlier emergence on cereals.

Gisela Brand – Andermatt Biocontrol – explained the use of Baculovirus in IPM strategies. Baculovirus are of special interest as they don't hurt beneficials and the don't leave residues. And their mode of action is very different from other bioinsecticides. "That's why baculovirus formulations (Helicovex, Loopex) are useful in IMP strategies", noted Gisela Brand.

Mike Dimock - Certis USA introduced LifeGard. This microbial is for-

mulated with endospores of *Bacillus mycooides*. "This is a common bacterium in soils and plant samples, worldwide" says Dimock. The mode of action is to trigger immune response in plants." The response starts within 3 hours after spraying and primed state lasts 18-21 days.

NEW TECHNOLOGIES INCREASINGLY USED

IBMA members also shared a new session on innovations and implementation of biocontrol. The idea was to gather representatives of growers, advisors and biocontrol companies. The farmer Hubertus Paetow Vice-president of DLG thinks that biocontrol is a "champion" to motivate farmers, but that they need to make sure that a technology has no-risk in the way they use it. Marc Trapman (RIMpro) mentioned the interest of models for optimal timing of application. And Antoine Bonhomme (Bioline- France) described how robotic systems will help biocontrol precise delivery. He concluded: "robotics and digitalizing are a key for our future." Ingeborg Klingen (NIBIO- Norway) gave an overview of The Smart crop project on cereal crops, that combines several technologies to improve management and beneficials action by natural means.

The most outbreaking technology at ABIM 2017 was certainly described by Vittorio Veronelli (CBC Europe) with Tremos mating disruption system. Very innovative (see separate box), Tremos is based on insects selected vibrations and frequency signals: these are used to stop grasshoppers landing and reproduction on crops. Not surprisingly, Tremos received the Bernard Blum award for this innovation, and it will certainly open the field of Biocontrol to new physical protection systems. With one more advantage over existing products: no need for lengthy and costly registration procedures! Congratulations to Vittorio who leaves his position of IBMA VP and goes to retirement on a very high note! ■