

# SMALL CAPSULES WITH A BIG IMPACT

If you grow maize, from the end of May onwards you will not only be keeping an eye on the weather app, but also on the forecast for the European corn borer flight. However, when the first warnings appear on the digital map, you can remain calm. You are prepared, because you have already ordered your most diligent seasonal workers from your agricultural supplier – *Trichogramma* parasitic wasps!



» Biocare stands for effective biological plant protection products that enable farmers to secure their yields without compromising biodiversity. «

Dr. Elisa Beitzen-Heineke

Fig. 1: Sebastian Beitzen-Heineke and Dr. Elisa Beitzen-Heineke – Managing Directors of Biocare.

The drone flies over your maize fields and distributes around 100 small white capsules per hectare. In about four minutes, one hectare of land is covered with these capsules and thus treated. You walk into the field, pick up a small capsule and wonder how the *Trichogramma* parasitic wasps actually get into this capsule and, above all, how they get out again.

Who could answer this better than the siblings Sebastian Beitzen-Heineke and Dr. Elisa Beitzen-Heineke (see Fig. 1). The two young entrepreneurs are the second generation to run Biocare GmbH. Biocare produces and conducts research on

biological plant protection products. Its main product targets the most important insect pest in maize cultivation: the *Trichogramma* parasitic wasp has been used by Biocare for 30 years to combat the European corn borer.

## Trichogramma produces on grain moth eggs

The origin of *Trichogramma* is the grain moth egg. Parasitic wasps are egg parasitoids, i.e. they cannot reproduce without host eggs. In production, adult *Trichogramma* parasitic wasps are therefore provided with grain moth eggs, which they parasitise. These eggs are then packaged in capsules (see Fig. 2) or as tags and delivered to customers throughout Europe.

To guarantee the availability and quality of grain moth eggs, they are produced fresh on site. The production of beneficial insects is complex: the grain moths are bred under controlled climatic conditions in large halls at Biocare. In the climate-controlled rooms, light conditions, temperature and humidity must be precisely adjusted to the insects' development cycle.

The basic material, the eggs of the grain moth, is scattered on grains of cereal. Their larvae then hatch and bore their way into the grain until they pupate.



Fig. 4: Application by drone: the capsules are filled with eggs from which the *Trichogramma* parasitic wasps hatch.



After pupation, the adult insects hatch and are then taken to lay eggs in order to obtain host eggs for the parasitic wasps. The *Trichogramma* must be available in fresh quality within a relatively short period of time for the flight of the European corn borer. The basis for this is the sufficient availability of grain moth eggs. The production cycle of the grain moth takes six to eight weeks, so Biocare begins production as early as March to prepare for the season - at a time when the maize has not even been sown yet.

## Targeted deposition in the moth

Despite having wings, *Trichogramma* mainly move around by running and jumping. They tirelessly scan the surface of plants with the fine hairs on their legs. As soon as they find European corn borer eggs, the females lay their own eggs inside the moth eggs (see Fig. 3). This results in competitive behaviour, which ideally favours *Trichogramma*. In this case, the pest is killed and after about 10 days a new generation of beneficial insects hatches in the field. A new cycle begins. In Biocare products, eggs at different stages of development are mixed together to extend the hatching period of the beneficial insects in the maize crop as long as possible, thereby increasing protection for the harvest.

## Success factor: application timing

*Trichogramma* act only as egg parasitoids. If they are distributed too late in the field, the



**Fig. 2: TRICHOSAFE®capsules are distributed across the field. Trichogramma parasitic wasps then hatch from them, preventing the development of European corn borers right from the start!**

beneficial insects can no longer do any good. The Trichogramma must therefore be in the field shortly before the main flight phase of the moth takes place. This is also the time when the European corn borer lays its eggs. The timing of application is monitored and determined by the plant protection services of the federal states. Once the official advisory service has issued a warning, retailers, Biocare and drone pilots coordinate the shipment and application of the products. Farmers can order these from retailers with or without application. If they opt for drone application, they act independently after the warning call (see Fig. 4). An efficiency of 75% compared to insecticide is required to bring the European corn borer population below the damage threshold of 30%.

However, treating beneficial insects is not the only component of effective European

corn borer control. Stubble cultivation after harvesting should always be the first measure taken to keep the initial pressure as low as possible.

### Only certified quality in the maize field

The quality of Trichogramma products is tested annually by the Agricultural Technology Centre Augustenberg (LTZ) in Baden-Württemberg. The LTZ examines the parasitisation rate, the number of parasitised eggs per parasitic wasp, the hatching rate and process (period in which the animals hatch; target time: at least 14 days) and the proportion of females. The next generation of Trichogramma parasitic wasps hatches in the field from the parasitised eggs, which can parasitise European corn borer eggs again, so that an effective period of three weeks can be assumed. The optimal dosage depends on the maize variety and the infestation pressure in the respective region and can range from 220,000 to 660,000 insects per hectare. However, quality is also checked in internal laboratories. For example, the Biocare laboratories have developed their own software that can count Trichogramma using algorithms.

### Positive for users and the environment

The use of the European corn borer's natural enemies poses no health risk to users and has no negative impact on ecosystems or other (non-target) organisms. The Tricho-

gramma do not spread further and die after completing their work. There are no residues in the process and there is also risk of resistance developing. No expensive spraying technology is required, and no soil compaction is caused.

### Conclusion

At a time when more and more chemical active ingredients are losing their approval, attention is turning to effective biological plant protection products. Here, the focus must be on effectiveness, practicality and cost-effectiveness as well. That is why Biocare is investing in the further development of its existing products, in new technologies, control concepts and, of course, in research into new beneficial organisms. For example, they are currently working on a project to develop possible control measures for the polyphagous planthopper. In Bavaria, Baden-Württemberg and Rhineland-Palatinate, farmers receive financial support for the application of Trichogramma. The method has become established in Germany and Europe over the last 30 years and has proven its effectiveness. It would send an important signal to farmers if other federal states were to follow suit and focus more on biological control of the European corn borer.

And if you are still standing in the field looking at the small white capsule between your fingers, don't worry: the parasitic wasps will come out of the capsule and know what to do, even without training.



**Fig. 3: Trichogramma searching for the perfect place to lay its eggs on European corn borer eggs. Instead of European corn borers, new Trichogramma parasitic wasps will later hatch here.**

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