BEETLE BATTLE

Infestation control is an industrywide concern that requires the cooperation of all stakeholders.

By George Gay

About 100 participants took part in an infestation control conference (ICC) in Bangalore, India, in March, a figure that seems to indicate the seriousness with which the tobacco industry approaches the task of trying to protect stored tobacco and tobacco products.

ICCs, which are training workshops open to anyone associated with the tobacco industry, are held in conjunction with the approximately annual meetings of the Coresta subgroup on pest and sanitation management in stored tobacco (PSMST), which was created in 1993 under the aegis of Coresta's Agronomy and Leaf Integrity Study Group.

To a certain extent, defending tobacco against insect infestation can be seen as little more than self-interest. After all, one figure I saw recently put the value of the stored tobacco lost to insects at $400 million a year—and I've seen higher figures in the past. But as has been demonstrated many times, self-interest often dovetails with wider interests, especially, in this case, those to do with the environment. As with other crops, tobacco is produced at a cost to the environment, so it is counterproductive from a number of points of view to allow such tobacco simply to be destroyed by insects.

And it goes without saying that it would be doubly counterproductive to allow the emergence of insects resistant to phosphine fumigation, which, partly because of fears about residues, is the industry's only fumigation defense. But this is what happened. Of course, having just one chemical defense was never an ideal situation, and so it probably didn't cause that much of a surprise when phosphine resistance was first reported with regard to the cigarette beetle in 1995—when the first ineffective field fumigation was recorded in India. And given the international nature of the tobacco industry, it need be no surprise that, since 1995, incidences of failed fumigations and phosphine-resistant beetles have been documented with increasing frequency worldwide.

That these developments were no surprise can be inferred from the fact that the PSMST was founded in 1993, with objectives defined as:

- to educate about and promote best integrated pest management (IPM) practices for post-harvested tobacco worldwide
- to conduct collaborative studies on pest control and sanitation practices for post-harvested tobacco
- to investigate new technologies and issues related to infestation control in post-harvested tobacco

Vital contributor

I have emphasized the role of Coresta here because almost everybody I spoke with in researching this piece talked about the vital role this organization had played in ensuring that the control of insect infestations in stored tobacco had been researched thoroughly and that sound methodologies had been devised and agreed upon.

And because of this work, the industry today is in a position where Coresta has produced three guides for insect control in stored tobacco. Guide No. 2 sets out the parameters that need to be in place for the effective fumigation of tobacco with phosphine. Despite the fact that resistant insects have developed, all of the people I spoke with said that such fumigation worked as long as the Coresta guidelines were followed to the letter. And, of course, phosphine fumigation offers a relatively inexpensive method suitable for treating large volumes of tobacco, though costs can rise if, as happens, tobacco has to be treated more than once.

However, for one reason or another, the Coresta guidelines

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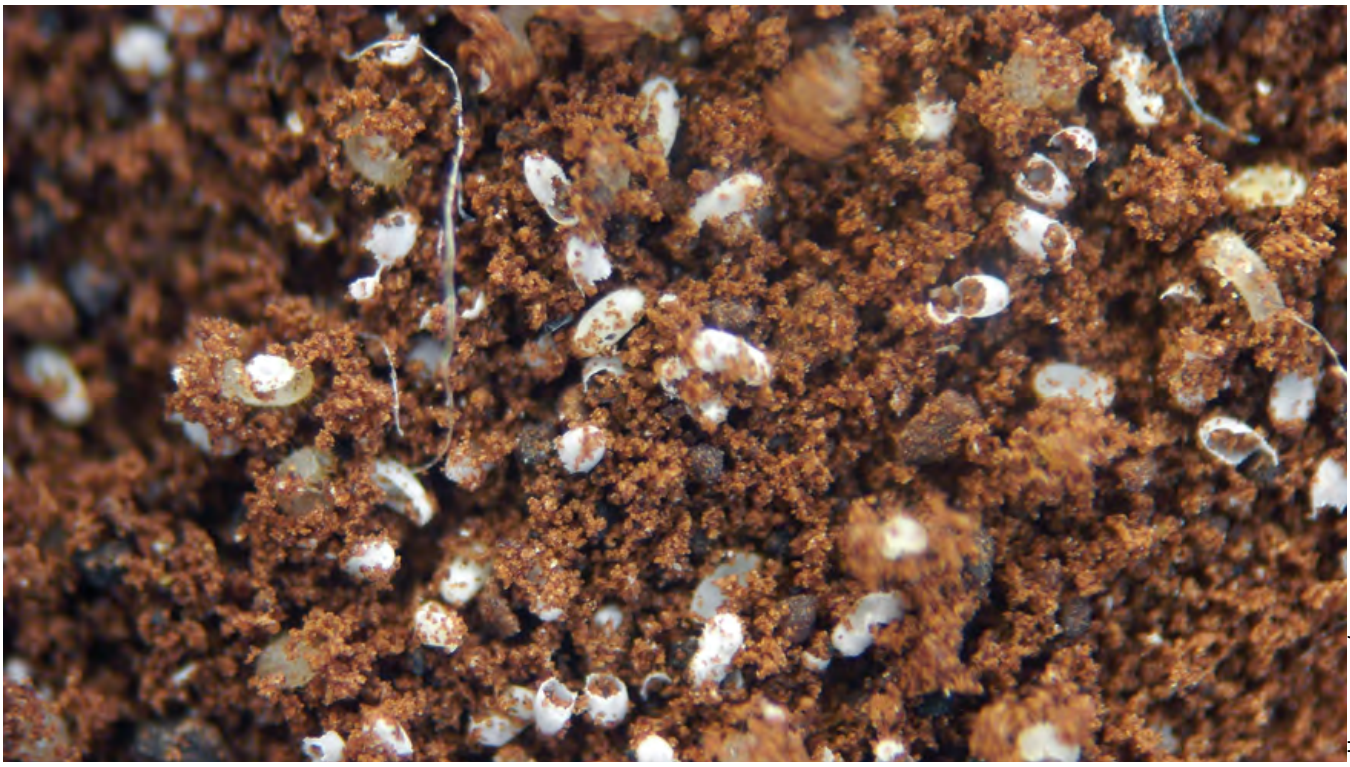

Photos courtesy of Franz Rappl

A new crop of tobacco beetle larvae hatches from its eggs. The cigarette beetle is one of the two most difficult insect pests to deal with—the other being the wood borer.

are not always followed—perhaps because the equipment being used might be inadequate or faulty, the guidelines might be misinterpreted or shortcuts might be attempted.

And it has to be remembered that, in recent years, questions have been raised about the use of toxic compounds that are linked to health issues in humans and environmental concerns.

So, to ensure the sustainability of the industry, a plan B was necessary for the control of what, essentially, are two tobacco pests: the cigarette beetle and the tobacco moth.

In one way, the tobacco industry is fortunate in dealing with a raw material that includes nicotine, which is toxic to most insects. In the case of food grains, the list of insect pests can reach 50-plus, rather than two. But, on the negative side, once the beetles and moths are ensconced within tobacco, the presence of nicotine tends to ensure that they are safe from predators. Additionally, I'm told, cigarette beetles have been around for about 250 million years, their reproduction rate is heroic and they are very adaptable. All in all, the cigarette beetle is one of the two most difficult insect pests to deal with—the other being the wood borer.

Nevertheless, both the beetle and the moth can be controlled by freezing, which is covered by Coresta Guide No. 9. While freezing is effective, it doesn't take too much thought to realize that it has certain drawbacks. Given that most tobacco is grown in regions where the ambient temperature might typically be 25–35 degrees Celsius, and given that for effective treatment of the tobacco the temperature within the treating chamber has to be reduced to about minus 20 degrees Celsius, it is clear that the energy use is going to be considerable, and this is something that

gives rise to questions about costs and the security of energy supplies in the country where the tobacco has to be treated.

Additionally, once the freezing treatment has been completed, condensation can be a problem in respect of both packaging and tobacco, leading to changes in the moisture content of the tobacco and even mold.

In any case, it is another plan B that has been causing the greatest interest. This plan B involves the eradication of beetles and moths through the use of controlled-atmosphere (CA) techniques and is the subject of Coresta Guide No. 12. I think that most tobacco people are now aware of this technique, so, suffice it to say this involves placing tobacco into an airtight chamber in which the temperature is regulated and the oxygen level is reduced to below 1 percent for the requisite time.

As with the freezing technique, CA involves a considerable investment, and it, too, is fairly demanding—though not as demanding—of energy. Nevertheless, depending on the layout of the system, costs per CA treatment can be comparable to those of chemical fumigation.

And CA has a number of major advantages, the most significant of which is that in practice it doesn't allow for the buildup of resistance in insects. In addition, CA does not create any residues, since it involves the application of no chemicals, only the reduction of oxygen, so it can be used for the treatment of leaf and tobacco products. And, as its name implies, it is a controlled system for which there is a detailed record of treatments.

Given all of this, it is not surprising that interest in the technique has been high and that this interest is now, with the Coresta guide in place, being converted into installations.

Ongoing battle

But CA is by no means the end—or the start—of the story. For the foreseeable future, phosphine will have an important role to play, and freezing will be used. And other techniques, mostly peripheral, have come up, are coming up and will come up. If praise for the work of Coresta was one of the themes of my conversations, so was the mantra that prevention was better than cure.

One sort of prevention or early warning technique has long been the pheromone trap. Highly sophisticated traps that are now available contain the pheromone attractant for both beetles and moths, which means that the number of traps can be halved and the labor needed to check them reduced. Airflow through the traps has been improved so that the pheromones are more evenly distributed than they were in the past, and the catch glues are able to hold the insects fast but not deter them from entering the traps.

The prevention of reinfestation is also important, and different methods have been and are being developed. Already, the layout of CA installations is carefully considered so as to avoid the tobacco being reinfested after treatment.

Traps can be applied to transport containers, space and surface sprays that do not come into contact with the tobacco can be applied within structures, and insecticidal net technology has been developed specifically to protect warehouse-stored tobacco from cigarette beetles and tobacco moths. And CA and vacuum packaging has been and is being developed for shipments of leaf tobacco, cut rag and expanded tobacco.

And where prevention has failed, treatment can be extended to primary and secondary machinery. One method isolates the machines to be treated in such a way that production on other equipment is not affected. The isolation area containing the machines to be treated is then gently heated using ovens to 50 degrees Celsius, a process that kills the insects in all their life stages without damaging the machinery. Such a system is a last line of defense against the risk of that *bête noir* of all tobacco manufacturers—the customer complaint.

I started this piece by noting how many people had attended the ICC session, which was held alongside the PSMST meeting in Bangalore. This was because these events are vital, now and in the future. ICC training is key to ensuring that pest management works efficiently now, and it is important that experts from around the world come together at PSMST meetings to share their different experiences and set out strategies for the future. Infestation is a serious matter that isn't just about brands or companies; it is about the industry. TR

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