

Phytopathology Study Group

In the last three issues of TJI we summarised in turn the achievements of the CORESTA Smoke Science, Product Technology and Agronomy Study Groups. Here, we focus on the fourth Study Group, Phytopathology.



Photo: Colin Fisher UK, USA

Hornworm

The Phytopathology Study Group deals with all aspects of pests and diseases, and with breeding and genetics – both traditional and molecular. One of the most important issues facing the Phytopathology Study Group is sustainability of production, in particular the use of pesticides. The group approaches the issue from three angles: breeding for resistance, study of disease / pest organisms, and integrated pest management (IPM).

Sub-Groups or Task Forces are established to address particular issues confronting the Study Group. Task Forces normally have specific goals and are result-driven with defined timelines. Sub-Groups are long-term collaborative initiatives that are created when there are multiple related objectives, and it is anticipated that the work will be considerable and evolve over time. It is only under the auspices of CORESTA that such international collaborative studies are performed.

Many of the Phytopathology Sub-Groups are collaborative studies testing a range of genotypes for resistance to a disease or pest. The objective may be to test the

durability or stability of a resistance gene (i.e. whether the resistance has broken down anywhere in the world) and/or to evaluate the resistance of various genotypes. Most collaborative studies of this nature include a constant set of checks and a changing set of test genotypes that are tested at all locations. In addition to evaluating genotypes, some Sub-Groups set out to answer specific questions. For example, there were conflicting reports in the literature about the mode of inheritance for bacterial wilt resistance – some researchers reported that inheritance was dominant, others that it was recessive. This is an important issue for breeders and can have an impact on the breeding strategy. The bacterial wilt collaborative study eventually demonstrated that inheritance is in fact additive, and was also able to explain the inconsistencies that had led to the former contradiction. This was possible only because we had a large dataset from many different countries.

All the Sub-Groups and Task Forces have a number of collaborators collecting data on a voluntary basis. The data are collated by the coordinators and incor-

porated into reports. Collaborators find the interaction and participation as valuable as the shared data and the answered questions. Belonging to a CORESTA member organisation is mandatory for participation in a Sub-Group or Task Force, but in some cases contributions may come from outside experts.

Since its inception, the Phytopathology Study Group, in common with other Study Groups, has dealt with many topics and issues. Some of the groups have completed their objectives and have been disbanded. Some have evolved, following research findings and/or regulatory requirements and trends. Others are still active, as the need for continuous follow-up and investigation remains necessary. All active groups present annual reports at CORESTA meetings and congresses.

Collaborative Study on Blue Mould Sub-Group

Initiated in 1964, this is the longest-running active Sub-Group, although its function has changed somewhat since its inception. The name was changed from “Blue Mould Pathogenicity” to its current definition in 2003, and in 2006 it was expanded to include the European Blue Mould Early Warning Service, now the Blue Mould Information Service.

The Blue Mould Study Group deals with four topics: the Collaborative Experiment on Varieties (field trials and molecular markers), the Study on Blue Mould Populations (molecular markers), the Study on Metalaxyl Sensitivity / Resistance (bioassay and molecular markers) and the Blue Mould Information Service. The first three

studies involve all countries affected by blue mould, whereas the Blue Mould Information Service has been transferred to AERET (European Association for Tobacco Research and Experimentation) in association with CORESTA's network, and the information is shared within the European Mediterranean zone. In addition to annual reports at CORESTA congresses and Agro-Phyto meetings, this Sub-Group also produces written reports that are available on the CORESTA (<http://www.coresta.org>) and AERET (www.aeret.com) websites.

Pest and Sanitation Management in Stored Tobacco Sub-Group

This highly active Sub-Group was initiated in 1993 and performs a valuable training service for the industry. They produce training videos, circulate newsletters and organise workshops, among which the Infestation Control Conference (ICC) is a well-attended event. The ICC is held every year in a different part of the world, allowing stakeholders to share experiences and information on methods for controlling pests in stored tobacco. The group also runs collaborative studies on pest control and sanitation practices, and investigates new issues, control methods and technologies related to infestation.

The group has also produced two CORESTA guides - *Phosphine Fumigation Parameters for the Control of Cigarette Beetle and Tobacco Moth (CORESTA Guide No. 2, 2004; revised 2009)* and *Freezing Parameters for the Control of Cigarette Beetle and Tobacco Moth (CORESTA Guide No. 9, 2009)*.

Genetically Modified Tobacco Proficiency Testing Sub-Group

With zero-tolerance for GMOs (genetically modified organisms) prevalent in the tobacco industry, testing for GMO contamination is very important. A Task Force was set up in 1998 to establish a methodology for the detection of GMOs in tobacco. Once this methodology was

established and a report written (*Detection Methods*, published in *Bulletin 1999-4*), the Task Force was converted to a collaborative study Sub-Group in 2000 to test these methods in a series of ring trials. These ring trials ended in 2004 and several reports were produced and made available to members (*Final Report (2002) Proficiency Testing Trials; Report (2003) Proficiency Testing Trials using Real-Time PCR; Final Report (2004) Proficiency Testing on Polymerase Chain Reaction-Based Methods for the Detection of Genetic Modifications in Cured Tobacco Leaf*). Work then continued with the new objective of proficiency testing to enable participants to monitor their laboratory performance.

Integrated Pest Management (IPM) Task Force

Initiated in 2005, this is the largest working group in the Phytopathology Study Group, with 125 members from 22 countries. With the increasing emphasis on reduced pesticide residues and environmental responsibility, there is great interest in integrated systems of disease and pest control that minimise the impact of tobacco growing on the environment. However, people at the field level often need guidance with such systems, and so the IPM Task Force aims to provide a global field guide for growers and agronomists, structured by disease / pest, outlining viable IPM strategies. Because the intent is to produce a global document applicable in all tobacco-growing areas, every effort was made to recruit members from as many countries as possible. These are recognised specialists, bringing their expertise in writing, illustrating, reviewing and editing to each chapter on a specific pest or disease. Not all of these specialists belong to a CORESTA member organisation.

The group has its own working website for draft chapters and work in progress. The complete guide, with eighty chapters in five sections, is still in preparation, and the final document will be presented as a downloadable PDF on the CORESTA website.

Collaborative Study on Virus Diseases Sub-Group

The Collaborative Study on PVY (Potato Virus Y) was initiated in 1995 to study PVY epidemiology and to characterise PVY strains using biological, serological and molecular methods. In 2007, the scope of the Sub-Group was extended to include other viruses and was renamed "Collaborative Study on Virus Diseases" with a revised set of objectives, including the study of useful sources of resistance to different viruses, as well as evaluating the occurrence of other viruses such as CMV (cucumber mosaic virus), TEV (tobacco etch virus), TMV (tobacco mosaic virus), TSWV (tobacco spotted wilt virus), TRV (tobacco rattle virus) and TRSV (tobacco ringspot virus). A comprehensive Sub-Group report covering the last 10 years was presented at the 2011 Joint Agro-Phyto Study Groups meeting.

Past achievements

Once a working group's objectives have been completed, it is disbanded and a final report is submitted. Many of these groups were set up over the years, most of them dealing with a variety of diseases and pests, from the parasitic weed Orobanch (Broomrape) to insects, and from bacterial wilt to nematodes. The summary of disbanded groups below demonstrates the extent of the Phytopathology Study Group's activities.

The Blue Mould Early Warning Service ran from 1963 to 2005 before merging with the Collaborative Blue Mould Study. The Powdery Mildew / White Mould Collaborative Study evaluated genotypes for resistance to powdery mildew and monitored the stability of several sources of resistance. These sources were found to be very stable - there was no reported resistance breakdown during the 20-year duration of the study. A collaborative study on black shank was active from 1990 to 1999, and a Task Force studied the typology of black shank fungal isolates in the early 1990s. The Host Plant Resistance to Insects Collaborative Study evaluated a range of genotypes with varying levels of resistance to different in-

sects, both chewing and sucking, from 1995 to 2005. The Broomrape Collaborative Study ran from 1995 to 2006, evaluating methods of control.

To assist breeders looking for tobacco germplasm, a *Nicotiana* catalogue was created to list the accessions of *Nicotiana* in as many collections as possible. The list includes cultivated *N. tabacum* of all types, primitive *N. tabacum* and other *Nicotiana* species. The catalogue has been updated to include new collections and is available on the member-only area of the website.

In addition to evaluating genotypes for resistance to bacterial wilt, the Bacterial Wilt Collaborative Study was set up in 1995 to resolve several controversies. There were conflicting reports about the mode of inheritance – data collected from the collaborative studies showed that the resistance is additive. There were conflicting reports of resistance breakdown, but the CORESTA Sub-Group

showed that it was the result of the wrong seed being used. It also showed that there was little or no genotype x environment interaction; disease severity changed with environment, but the relative ranking of the genotypes did not. In 2002, when the initial objectives were accomplished, the objective of the Sub-Group was changed to evaluating burley genotypes; work continued until 2008.

The Collaborative Study on Nematodes was disbanded after 15 years in 2011, when the group decided that no new information could be expected (although it can be reactivated if necessary). A CORESTA guide will be released to help agronomists with nematode identification.

Collaborative work in CORESTA

The valuable work of the CORESTA Sub-Groups and Task Forces is only possible

because members are willing to contribute their time and expertise. As the pool of tobacco experts shrinks, these contributions become increasingly important. International collaborative studies offer a unique opportunity for data collection, and one that is not feasible unless performed under the auspices of an organisation such as CORESTA. We have been able to collect much valuable information and answer many questions only because we have access to all these data – a single dataset has very limited value. The results of all these studies are shared with CORESTA members, which benefits the tobacco community as a whole. Indeed, the industry has benefited greatly from this work, and it is vital that the industry continues to support CORESTA.

In the next article of the series, the focus will be on the activities of the Agrochemicals Advisory Committee (ACAC). **TJI Report**

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