IR-4 Global Capacity and Regulatory Activities: Building Partnerships for the Future

Michael Braverman, Dan Kunkel, Jerry Baron, Joe DeFrancesco, Edith Lurvey, Wayne Jiang and Jason Sandahl, The IR-4 Project and USDA-FAS

Tomato Residue Study Participants

Australia, Brazil , Canada, China, Colombia, Costa Rica, Egypt, France, India, Italy, Japan, Kenya, Korea, Mexico, Morocco, Nigeria, Poland, South Africa, Spain, Turkey, USA, Yemen

STDF Tropical Fruit Residue Study Training

Bolivia, Brunei, Colombia, Costa Rica, Egypt, Ghana, Guatemala, Indonesia, Kenya, Malaysia, Morocco, Panama, Philippines, Senegal, Tanzania, Thailand, Uganda, Vietnam

Biopesticide Training and Aflatoxin Management

Colombia, Ethiopia, Kenya, Morocco, Nigeria, Senegal

Global Capacity in Residue Data Generation: The Tropical Fruit Residue Project

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Background

Capacity development in pesticide residue data generation was a critical need identified at the first and second Global Minor Use Summits. To address this need, USDA/FAS and IR-4 partnered to initiate a global project that provides both training and actual experience in pesticide residue research. Though generous funding provided by the Standards and Trade Development Facility (STDF), implementing partnerships were established with the Association of South East Asian Nations (ASEAN), the Inter-American Institute for Cooperation on Agriculture (IICA), and the African Union (AU). This project aims to improve technical expertise in pesticide residue data generation, review and interpretation; explore ways to better support minor-use crops; enable developing country contributions to the Codex-MRL setting and adoption process; and strengthen national pesticide residue monitoring programs in collaborating countries around the world.

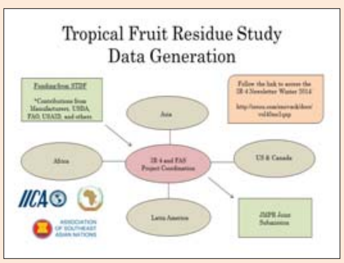
Two Global Minor Use Summits (2007 and 2012) identified the need for increased participation in priority setting and Codex MRL submissions from the areas where MRLs are critically needed: Africa, Asia, and Latin America.

Collaboration on Maximum Residue Levels (MRLs)

Pesticide residue data needed to establish Codex Minimum Residue Levels (MRLs) are rarely generated in developing countries – the countries that mostly rely on Codex MRLs to facilitate international trade of fresh fruits and vegetables. Few Codex MRLs are established for high-valued tropical crops grown in these regions. The lack of trade standards for these globally minor, yet economically major crops locally, limits export potential for farmers trying to participate in the global specialty crop market.

Capacity Development Background

Data generated under Good Laboratory Practices (GLP) is a limiting factor for countries with little experience in developing its own residue data. Initial workshops focused on project coordination, identification of crop/pesticide combinations, establishing national project teams, and creating funding mechanisms in order to carry out joint research across the three regions. In 2013, the Standards and Trade Development Facility (STDF) provided three program grants to initiate work; focusing on GLP training, establishment of residue field trials, and laboratory analyses for projects in 18 countries around the world.



Global Residue Data Generation Project Diagram

Conducting Coordinated Supervised Residue Trials

The national Study Directors develop protocols in collaboration with the pesticide registrants, the national registration authorities, farmers, and other organizations that may have done similar work in the past. These protocols define the test substance to be used, crop type, location and number of trials, substance rate and interval, analytical methods, etc. Once this is agreed upon, the national study teams coordinate efforts in the field application of the test pesticides and analytical methods for determining the remaining residues at harvest. Depending on the crop, six to twelve field trials will be conducted for each study. Six reduced risk pesticides were selected for the project, supported by their manufacturers: Spinetoram (Dow), Sulfoxaflur (Dow), Pyrproxyfen (Sumitomo), Azosystrobin (Syngenta), and Difenoconazole (Syngenta).

Project Assignments

<u>Spinetoram</u>

Thailand:	lychee
Thailand:	mango
Colombia:	avocado

<u>Pyriproxyfen</u>

Malaysia and Singapore:	mango
Philippines, Brunei, and Malaysia:	papaya
Costa Rica and Guatemala:	banana
Panama:	pineaple

<u>Azoxystrobin/Difenoconazole</u>

Indonesia and Vietnam:	dragon fruit
Egypt:	guava

<u>Sulfoxaflur</u>

Kenya, Tanzania, and Uganda:	passion fruit
Ghana, Senegal, and Morocco:	mango

Africa

Members of African Study Teams

Practicing sprayer calibration

Practicing quality assurance

Practicing how to construct field plots

Practicing how to prepare samples for residue analysis

Evaluating equipment for use in residue analysis

Asia

Members of ASEAN Study Teams

Plot preparation for sprayer calibration in mango field

Preparing dragon fruit sample for residue analysis

Preparing spray solution for field application

Practicing sprayer calibration

Preparing mango samples by grinding fruit under dry ice

Latin America

Members of Latin American Study Teams

Applying test substance to field

Colombian team reviewing data entry

Harvested bananas

Banana sample collection

Preparing samples for residue analysis

The IR-4 Project Global Activities

Edith Lurvey[1] and Michael Braverman and Daniel Kunkel[2]

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Our Vision

Global network of capable minor use programs working together to solve minor use pest management problems and set international MRLs
• Help establish and mentor minor use programs • Partner with other data development groups • Address the many unresolved needs •

The IR-4 Project was started as a United States national program in 1963 for the registration of pesticides in minor crops and is funded by United States Department of Agriculture (USDA). Its mission is to **Facilitate Registration of Sustainable Pest Management Technology for Specialty Crops and Minor Uses**. Since its inception, IR-4 has provided data in support of around 16.000 tolerances (U.S. MRLs) for food uses.

In recent years IR-4 has focused its research on reduced risk pesticides, products that support IPM, pest problems without solutions, and addressing potential trade irritants that may result from pesticide products and uses. IR-4 currently conducts approximately 80 magnitude of residue (MOR) studies (chemical/crop) supported by 500 field trials, all conducted under Good Laboratory Practices. Part of the success has been the residue data extrapolations made possible by the implementation of Crop Groupings in the U.S.

As more countries established there own regulatory and residue enforcement systems and standards, it became apparent that to serve U.S. stakeholders, IR-4 needed to become more active in global regulatory issues to help insure the free trading of agricultural products. IR-4 has been in a working partnership with Canada since 1996, when IR-4 started to do joint Canada/U.S. residue studies and submit the data to each others' regulatory agencies. IR-4 also have Memorandums of Understanding with Canada, New Zealand, Brazil, and Costa Rica, where joint papaya studies are being conducted.

IR-4 organized two Global Minor Use Summits (2007 and 2012) with Food and Agriculture Organization (FAO) and the U.S. Environmental Protection Agency (USEPA) to discuss topics of wide international interest. One resulting priority from the summit was the need for more Codex MRLs for crops of interest, primarily in tropical and subtropical crops. Most MRLs are generated in the industrial countries and this does not always address MRL and all pest control needs in other parts of the world. A global network of capable minor use programs working together to solve minor use needs is part of a vision IR-4 shares with other countries. IR-4 has worked to help establish and mentor new minor use programs in other countries or regions in the hopes that we can partner in data development to more efficiently address grower needs.



Global Minor Use Priority Setting Workshop
Chicago, IL. Sept.20-23.

To register:
http://www.ir4.rutgers.edu/FoodUse/FUWorkshop/register.cfm



Global Capacity Building

With IR-4's has a vision of a global network of capable minor use programs that can address grower needs and generate data IR-4 will.
•Help establish and mentor new minor use programs (e.g. MOUs and countries involved in Tropical Fruit Project)
•Partner with other data development groups
•Promote lower risk product
•Promote IPM products

IR-4 Efforts in International Cooperation

Leadership Role in International Activities

- Capacity building
- Research

•NAFTA/Regulatory Cooperation Council
•Leadership
Global Minor Use Summits
Codex (e.g. Crop Groups)
Organisation for Economic Co-operation and Development (OECD)

See the poster **The IR-4 Project and Its Activities Related to Global Maximum Residue Level (MRL) Activities** for more details on the Latin American project.
The Link for more information on IR-4 international activities, and access to the Global Minor Use Information Portal: http://www.ir4.rutgers.edu/international.html

Use of IR-4 Data at Codex (JMPR)

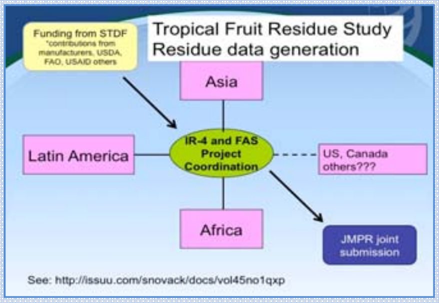
- Work with commodity groups and EPA to add uses (chemicals) to Joint Meeting for Pesticide Residues (JMPR) work plan
- Review JMPR work plan and dovetail IR-4 data with chemicals scheduled for review
- Work with USEPA and Registrants to submit data to JMPR
- Consider working with other countries to nominate chemicals or add commodities to JMPR work plan

IR-4 contributes extensive data sets to JMPR directly and indirectly, for the support of science based residue standards

Provide technical coordination and training for the Global Tropical Fruit Study

One of the action items from the Global Summits was to provide training for the non-industrialized countries to allow them to conduct their own residue studies.

- Reduced risk products (azoxystrobin, difenoconazole, pyriproxyfen and spinetoram)
  - no anticipated registration problems
  - manufacturers willing to work with the project
- Inedible peel subgroup 006B of the new Tropical Fruit Crop Group chosen
  - not many registrations at the time.
- Studies initiated in Asia, Latin America and Africa.

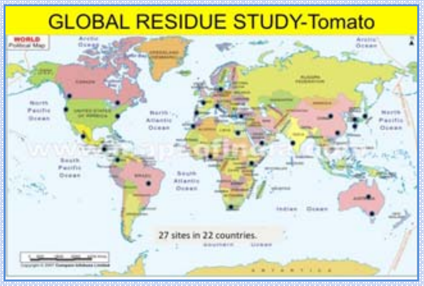


IR-4 Global Residue Studies

- Generating data from multiple countries to support registrations and data for regulatory submission.
- Providing data to address and modify domestic regulatory requirements.
- Optimize domestic trials to generate more robust data sets
- Establishing Global Codes MRLs

Directed Global Residue Studies

- Tomato study comparing residues of 4 chemicals across a wide variety of geographical and environmental zones
  - MRLs differed by 0.1 ppm or less
  - Calculated variance is greater for trial than location



- Blueberries/Flupyradifurone Study
  - New compounds
  - 26 field trials in 9 countries
  - One protocol, from IR-4, one Global GAP
  - Samples analyzed by Bayer Crop Science Lab
  - Submitted for Global joint review in 2012, labeled for use (registered) in 2015

ASEAN Pesticide Residue Data Generation Project

This project aims to improve technical expertise in pesticide residue data generation, review and interpretation, explore ways to better support minor-use crops, enable developing country contributions to the Codex-MRL setting and adoption process, and strengthen national pesticide residue monitoring programs.

ASEAN Collaboration on Maximum Residue Levels (MRLs)

- Pesticide residue data required to establish Codex MRLs are almost exclusively generated in industrialized countries. Rarely are data generated in developing countries, therefore, few Codex MRLs are established for crops grown in these regions.

- If MRLs do not exist, then exported products face rejection at ports. If MRLs do not reflect actual use patterns where the crops are grown, then pests will not be controlled effectively. Therefore, enabling ASEAN Member States to generate residue data facilitates the registration of new crop protection tools, empowers countries to establish MRLs, and boosts international trade opportunities.

- To achieve these goals, ASEAN Member are partnering with the U.S. IR-4 Project to conduct coordinated and complimentary residue studies, following extensive capacity building in both the field and laboratory.

- Skills and experiences gained through this project, which focuses on low risk pesticides and tropical fruits, will further enable ASEAN Member States to expand and prioritize their residue programs. Hence, proactively addressing their emerging pest control needs, and becoming directly engaged with and contributing to the establishment of international trade standards.

Global Capacity Development Background

Over 300 delegates from 40 countries attended the first Global Minor Use Summit at FAO Headquarters in Rome, Italy.

- A key result from the 2012 Global Minor Use Summit in Rome, Italy was to support greater capacity development in areas of need.
- This included the promotion of lower risk pesticides; along with increased coordination and cooperation to assist developing countries in generating pesticide residue data.
- Upon the five years following the Global Summit, USDA provided resources for a number of meetings and workshops to increase communication and coordination within three regions: Asia, Africa, and Latin America.
- In March 2012, specific grants were secured to initiate further training modules and residue studies in each of these regions.

Azoxystrobin

Asia

→

Difenoconazole

Asia

→

Spinetoram

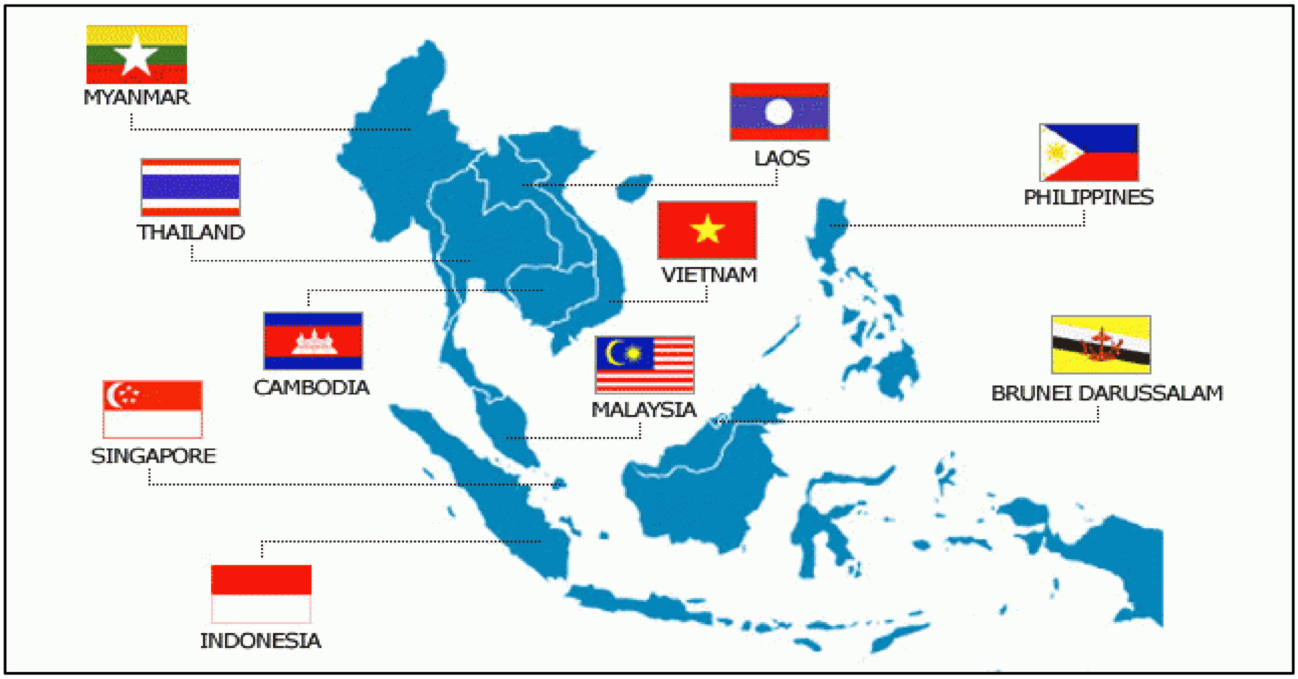
Asia, Africa, & Latin America

→

Pyriproxyfen

Asia, Africa, & Latin America

Regional Update For ASEAN Member States



The first region to commence the Global Pesticide Residue Project was the Association of South East Asian Nations (ASEAN).

- In May of 2012, the first field treatments were conducted in Malaysia involving Pyriproxyfen on mango.
- This study was performed in cooperation with Singapore, who conducted the laboratory analysis.
- By January of 2013, the second study was initiated in Thailand for Spinetoram on mango.
- Other studies will start soon and include Pyriproxyfen on papaya in the Philippines, and a pre-mix of Azoxystrobin and Difenconazole on dragon fruit.

- An additional study in Thailand will involve Spinetoram on longan or lychee.
- In addition to field training, laboratory workshops on GLP method validation have been conducted in Malaysia, Singapore, and Thailand.
- For those studies in progress, some samples are already being analyzed for residues.
- And it is anticipated by December of 2015, several reports will be ready for submission to JMPR.

ASEAN Pesticide Residue Project Partners

- Association of Southeast Asian Nations (ASEAN)
- Governments of Brunei Darussalam, Cambodia, Indonesia, LAO DPR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
- USDA Foreign Agricultural Service
- IR-4 Project, USA
- U.N. Food & Agriculture Organization

<u>Budgetary Information:</u>

- STDF Contribution: US $637,000
- In-kind Contribution: US $605,000
- Total Cost US $1,242,000

Members of ASEAN Study Team attending a Good Laboratory Practices (GLPs) Training Program.

Developing Capacity in Supervised Residue Trials

<u>A National Study Team includes the following:</u>

- ❑ Study Director
- ❑ Field Investigator
- ❑ Lab Investigator
- ❑ Quality Assurance Officer
- ❑ Sponsoring Management

<u>The remaining stakeholders include:</u>

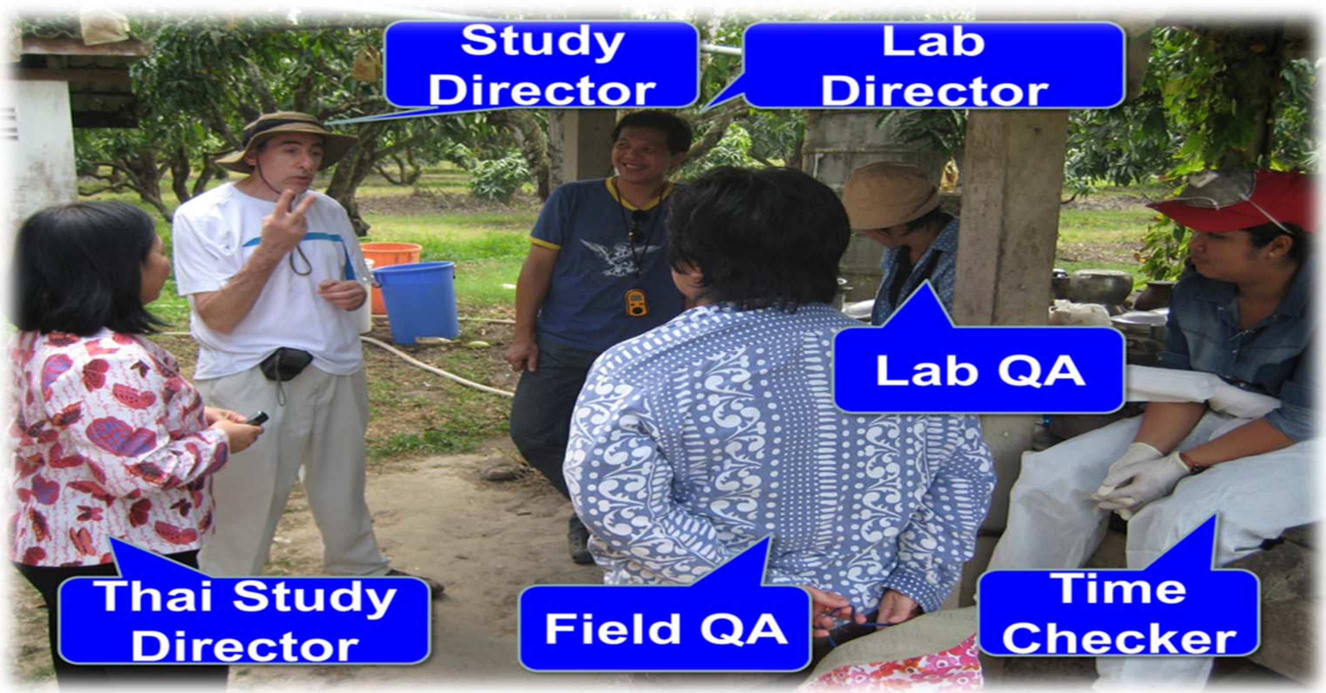
- ❑ Pesticide Registrants
- ❑ National Registration Authorities
- ❑ Farmers
- ❑ Exporters

Start Date: 1 December 2012
End Date: 30 November 2015
Location: South East Asia

Plot preparation for sprayer calibration in Thai mango field.

- The first project phase is to establish national study teams, conduct stakeholder consultations, and define the scope of the study, then coordinate these studies within the region, in order to maximize efficiencies and avoid duplication of efforts.

- Once this has been completed, the national study teams are trained, in both the field and laboratory, on the principals of Good Laboratory Practices (GLPs) for conducting supervised residue trials and Quality Assurance reviews.



IR-4 Study Director, Michael Braverman, instructing National Study Team Members prior to conducting mango field trials in Thailand.

- The pesticide registrants provide technical support for developing study protocols, provide testing and analytical reference substances, assist in analytical methods, and submit registration dossiers.

- The Asian Secretariat provides project leadership and management.

- The IR-4 Project, based at Rutgers University in the United States, provides technical oversight of the project.

- The U.S. Department of Agriculture facilitates project coordination.

- The FAO provides technical and procedural guidance.

Conducting Coordinated Supervised Residue Trials

- The IR-4 Project and national Study Directors develop protocols in collaboration with the pesticide registrants, the national registration authorities, farmers, and other organizations that may have done similar work in the past. These protocols define the test substance to be used, crop type, location and number of trials, substance rate and interval, analytical methods, etc.

- Once this is agreed upon, the national study teams coordinate efforts in the field application of the test pesticides and analytical methods for determining the remaining residues at harvest.

Field Team Member preparing the Azoxystrobin/Difenoconazole spray solution for field trials in Vietnam.

Indonesian Field Team Members practicing the sprayer calibration process for supervised residue trials.

- Depending on the crop, six to twelve replicate field trials need to be conducted within each study.

- Four very low risk test pesticides will be used in the ASEAN component of the project (azoxystrobin, difenoconazole, pyriproxyfen, and spinetoram), and the studies will focus on three of the Codex representative commodities within the tropical fruit group (dragon fruit, mango, and papaya).

- This ASEAN project is being coordinated with complimentary STDF-funded projects in Africa and Latin America.

Engaging in, and Contributing to, the Codex Process

Thai (left) and Philippine (right) Field Team Members applying test substances.

- A major component of this project is not only to improve understanding of the Codex process, but for participating countries to actually engage in, and contribute to, establishing Codex standards—and through this process, strengthen national commitments to Codex.

- Upon completion of the supervised residue studies, the generated residue data will be packaged and submitted to Codex to establish MRLs.

Participating countries will receive guidance on the following procedures:

How to Nominate their Project Pesticide/Commodity to be Placed on the Joint Meeting on Pesticide Residues (JMPR) Review Schedule. → How to Prepare and Package the Data Submission. → How to Best Coordinate Efforts with Other Countries.

Analytical Team Member preparing dragon fruit sample for residue analysis in Vietnam.

Thai Analytical Team Member preparing mango samples by grinding fruit under dry ice.

Establishment of National Residue Study Teams and Minor Use Programs

- Experiences gained from this project will support the establishment of permanent national pesticide residue programs and core members of national study teams.
- Upon completion of this project, study teams will have the ability to conduct further residue studies as part of national registration processes, or establishment of Codex MRLs or export market import tolerances.
- Farmers and export associations will benefit by having a mechanism in place to help them gain new pest control tools and gain access to new markets that require residue trade standards.

Regional Process for Conducting Coordinated, Joint Residue Studies

- Rarely do countries need to work in isolation for gaining access to the newest pest control tools or developing international trade standards. Yet, this has often been the case, resulting in duplicated efforts, wasted resources, or no action being taken at all.
- Once common needs are identified amongst a group of countries, conducting residue studies and establishing critical Codex standards does not need to be prohibitively expensive, nor a daunting effort.
- As a result of this project, a regional minor use expert group will be formed around the Project Steering Committee nucleus.
- In cooperation with private sector partners (e.g., CropLife Asia), this expert group will meet regularly to develop solutions on regional minor use issues, as well as identifying and prioritizing pesticide and MRL needs.
- Once these needs are prioritized, countries will be able to develop strategies to maximize outputs by dividing work, resources, and responsibilities to generate necessary residue data.

Increased Contribution to Establishing Codex MRL

- To date, there are very few Codex MRLs that were generated solely from data of developing countries.
- This project will enable ASEAN Member States to conduct nationally-led residue studies, directly contributing to the Codex MRL process.
- Additionally, this project will assist the JMPR in clarifying and addressing new issues around commodity grouping, minimum number of required trials, combining data sets from multiple countries, and sample collection and storage of large fruits.

Capacity building and residue studies of pyriproxyfen on mango and papaya in South East Asia (Brunei, Malaysia and Singapore) for establishment of Codex MRL

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[1]Department of Agriculture (DOA), Malaysia. [2]Malaysian Agricultural Research and Development Institute (MARDI). [3]Agri-Food and Veterinary Authority (AVA) of Singapore.
[4]Department of Agriculture, Brunei. [5]The IR-4 Project, Rutgers, the State University of New Jersey.
[6]United States Department of Agriculture-Foreign Agricultural Service. [7]Sumitomo Chemical
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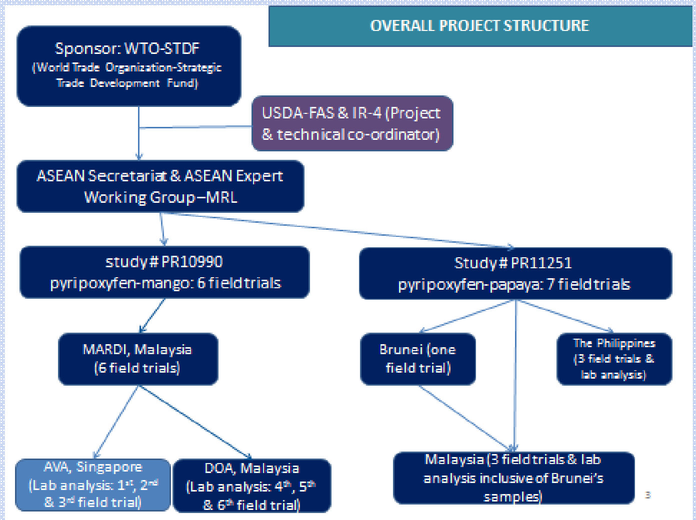
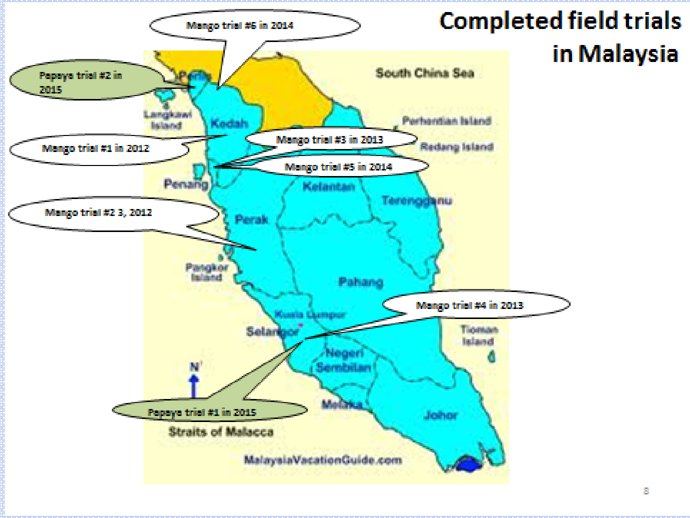
INTRODUCTION

Two residue studies (pyriproxyfen on mango and papaya, respectively) were initiated in South East Asian region under the collaboration of The Expert Working Group on Harmonisation of MRLs of Pesticides among ASEAN Countries, United States Department of Agriculture-Foreign Agricultural Service (USDA-FAS) and The IR-4 Project. The project is part of the global initiative by the USDA-FAS and the IR-4 Project to coordinate residue studies in African, Asia and Latin America region for the purpose of Codex MRL setting. The project consists of two phase which are capacity building in generating residue data according to Good laboratory Practice and actual implementation of residue study. The pyriproxyfen-mango study (started in 2012) involved collaboration of Malaysia and Singapore. The second study of pyriproxyfen-papaya involved Brunei, Malaysia and The Philippines started in 2014. The project progress under The Philippines is not reported in this poster.





Study Personnel applying pesticide

Study Director, Quality Assurance & Field Research Director at the test site

CAPACITY BUILDING

Capacity building in the form of theoretical and practical training was conducted prior to the actual implementation of planned residue study. Site visits to the laboratories by technical coordinator of the project were also part of the capacity building activities in assessing and improving laboratory capability. Hands-on field training were conducted during the implementation of the first field trial in 2012 the under the guidance of Michael Braverman of IR-4. Field and laboratory training were conducted in Bangkok in 2013. Training on the report writing was conducted by the IR-4 in Bali, Indonesia in November 2015.

PROJECT ACTIVITIES

Signing of protocol by the Study Director was made to mark the beginning of the study. Prior to the start of field trial, test items were shipped by Sumitomo Chemical to MARDI. Test site survey, selection and preparation were made before the start of field trials. Control and treated plot were established in each trial. Applications of test item onto test sites were made in two applications per trial in the two residue studies (mango and papaya). Field samples were collected according to schedule in the protocol and sent to MARDI's laboratory for temporary storage before final shipment to the two analytical laboratories, which were AVA of Singapore and DOA of Malaysia. Analytical method validation and storage stability study were performed prior to actual analysis of field samples. After completion of sample analysis, analytical reports were sent to the Study Director for preparation of Study Report. Co-ordination with Sumitomo Chemical on national registration was also made to ensure successful Codex MRL setting in the future.

PROJECT PROGRESS

Pyriproxyfen-mango: Six field trials were completed (2012-2014) and laboratory analysis were completed with the submission of analytical reports to the Study Director in 2014. The preparation of final report by the Study Director is underway. The interim study report was submitted to Sumitomo Chemical so that the minor use registration with the Malaysian regulatory authority can be established before the actual residue data submission to JMPR in 2017.

Pyriproxyfen-papaya: Two field trials were conducted in Malaysia in 2015 out of targeted three field trials (the third field trial will be conducted in 2016). One field trial was also successfully conducted in Brunei and the samples are planned to be shipped to the Malaysian laboratory (DOA) in September 2015.

ACKNOWLEDGEMENT

- Nuansri Tayaputch, Chairperson of The Expert Working Group on Harmonisation of MRLs of Pesticides among ASEAN Countries.
- Sri Dyah Khusumawardhani, ASEAN Secretariat.
- Laboratory staff of MARDI, Department of Agriculture, Malaysia and Agri-Food and Veterinary of Singapore.
- Farmers for cooperation in field trials.

ASEAN-WTO Pesticide Residue Data Generation Project

Azoxystrobin and Difenoconazole Maximum Residue Levels in Dragon Fruit

Trial ID: 10993.14-VN01 (Vietnam)

Tran Thanh Tung[1] and Michael Braverman[2]

[1]Southern Pesticide Control and Testing Center – PPD, Vietnam. [2]IR-4 Project, Rutgers, the State University of New Jersey

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OBJECTIVES OF THE STUDY

Maximum residue field trials were conducted in Binh Thuan province, Vietnam to collect treated and untreated residue samples in dragon fruit. The trials were managed by the Plant Protection Department (PPD), Ministry of Agriculture and Rural Development of Vietnam, to generate samples for analysis of residues of Azoxystrobin and Difenoconazole in dragon fruit. The trials were covered under a Protocol signed by Indonesia (as the lead country of the Study), and guided by the Study Director (Dr. Michael Braverman, IR-4). All activities were conducted based on the appropriate Standard Operating Procedures (SOPs), and in accordance with EPA's Good Laboratory Practices; as well as consistent with the provisions outlined in the OECD Series on Principles of Good Laboratory Practices and Compliance Monitoring. The study was conducted from November 2014 to February 2015, and financially supported by the STDF Pesticide Residue Data Generation Project Fund; managed by the ASEAN Secretariat. In cooperation with Indonesia, the data will be submitted to JMPR to develop a new CODEX MRL.

MAIN ACTIVITIES:

1. **TRAININGS** (Nov. 2014): Prior to conducting the residue field trials, local staff were trained by Dr. Michael Braverman, IR-4:

- Good Laboratory Practices (GLP) training program in residue field studies (10 participants - Field Trial Staff).
- Good Laboratory Practices (GLP) Sample Processing Training (7 participants -Lab Staff).

Field and Lab Trainings

Study Conducted From November 2014 to February 2015

Photos include Field Trial and Lab Staff

2. RESIDUE FIELD TRIAL (Non-Decline Study):

Trial Site Information: Location: 10°50'N; 107°55'E, coastal area; soil type: Acrisols, Sandy Loam.

Test System: Dragon Fruit (white flesh variety - commercial variety), 3 years old.

Application Treatments : 1/ Untreated plot: 16.98 x 5.7m (12 trees); 2/ Treated plots: 33.88 x 11.26m (48 trees). Amistar Top 325 SC, at 756 ml/ha, equal to 151g Azoxystrobin + 94g Difenoconazole per hectare. GLP test substance and standards provided by Syngenta.

Application Method: Foliar directed application using power knapsack sprayer with electric pump (FST-16D).

Application Timing: Three foliar applications of Amistar Top at 10 day intervals: at 20 days, 10 and 0 days prior to harvest.

Members of ASEAN Study Team.

Field Site prior to applying test substance.

Applying Azoxystrobin and Difenoconazole to field trials.

APPLICATION OUTCOMES:

1st application: Complete amount of test substance/ha = 747.2886 ml/ha, ~ % target rate = **98.85%.**

2nd application: Complete amount of test substance/ha = 761.7032 ml/ha; ~ % target rate = **100.75%.**

3rd application: Complete amount of test substance/ha = 770.9550 ml/ha; ~ % target rate = **101.98%.**

3. RESIDUE SAMPLE COLLECTION (Non-Decline Study):

Time of sampling and amount of samples: Samples were collected at -1, 0, 1, and 7 days after last application. Two samples from each plot were collected in a manner to assure an impartial sample representative of the entire plot. Each sample consisted of 12 marketable fruits defined as being between 70-100% ripeness. Samples were stored in sampling bags provided by IR-4 and kept in a cool box using wet ice and gel packs, then shipped to the lab within 4 hours before being processed. An additional set of samples were also collected to serve as a back-up.

Dragon Fruit collected for processing at harvest.

ASEAN Field Trial Staff placing Dragon Fruit in sampling bags.

Cool box used to store IR-4 provided sampling bags.

4. RESIDUE SAMPLE PROCESSING AND SHIPPING:

Upon arrival in the lab, the samples of whole fruits were processed to prepare frozen ground samples before shipping to Indonesia for residue analysis. Sample homogenization was carried out under frozen conditions, using dry ice and stored in the freezer at < -20°C to ensure the integrity of the samples. A total of 10 samples from the field trials (02 untreated and 08 treated) were prepared and shipped to the Indonesian lab. All samples were confirmed to be frozen on arrival in Indonesia with their integrity maintained. The samples are ready for residue analysis.

Weighing samples of Dragon Fruit for residue analysis.

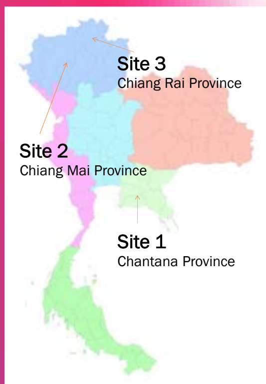
Cutting Dragon Fruit before grinding with dry ice.

Shipping ground samples to the Indonesian lab.

Spinetoram: Magnitude of the Residue on Lychee

Department of Agriculture, THAILAND   **IR4 & USDA/FAS, USA**

Thailand



Location of three sites

Discussion about the height of spraying and harvesting which 4 meters are the standard height.

Applying spinetoram

The Pesticide Residue Group under The Agricultural Production Sciences Research and Development Division of The Department of Agriculture, THAILAND, has a responsibility to conduct residue trial research to submit the data to set Codex MRL based on ISO/IEC 17025. Most monitoring data of fruits and vegetables from the markets had done to comply a policy of pesticide usage. Codex MRLs of dried chili were previously developed from this type of study. This project was initiated in 2015 with the assistance of Dr. Michael P. Braverman as Study Director. It was a collaboration between DOA and IR4 in compliance with GLP.

Objective : To collect and analyze treated and untreated residue samples from appropriate field sites according to the application parameters requested to provide JMPR with residue chemistry data to support a pesticide tolerance or CODEX.

Procedure

1. On the Job Training :
Field / laboratory
2. Three Sites Selection
3. Two plots/trial :
untreated and
treated plots
4.Calibrations :
output and speed
5. Application rate :
60 g a.i/hectare
(500ml formulated product/Ha)
3 applications/trial
7 days interval
average of actual rate
Site1 101%
Site2 100.6%
Site3 100.5%
6. Samples collection
Site1 0, 3, 7, 14 and 21 days
Site2 0, 14 days
Site3 0, 14 days
7. Sample Handling
8. Analysis w LC-MS/MS

Method of Analysis

Weigh 5 ± 0.05 g
↓
Add 100 ml ACN/water (80:20)
↓
Homogenize for 1 min.
↓
Shake for 30 min.
↓
Centrifuge 2000 rpm/5min
↓
Add 50 μL of IS. + vortex mix for 30 sec.
↓
LC-MS/MS

Field Trial Experiments : Challenge Points

1. Lychee is a kind of tropical fruit which cannot be induced to pollinate out of season and the fruiting time is a short period of approximately 2 months. The climate is very important for blooming.
   For a short period to work; training was divided into 2 areas : field work training and laboratory training. Simulating practices were used in both trainings. All practices were the same as the previous staff received from the first training 3 years ago by Dr. Michael Braverman and Dr. Wayne Jiang.
2. The three field trials were conducted during April – May of 2015. There was an overlap between the field trial periods. The variables that differentiated the trials were lychee variety, trial location, elevation, spray applicator and staff.
   Field staff were separated into 2 groups by the same field research director. The varieties of lychee were Kom and Hong-Huay. This study was carried out in compliance with GLP standards.
3. The distance between field sites and the laboratory in Bangkok was 245-785 km, the samples were frozen before transportation.
   Site 1 Chantaburi Province (245 km from Bangkok : 6 hrs by car)
   Site 2 Chiang Mai Province (669 km from Bangkok : 12 hrs by car)
   Site 3 Chiang Rai Province (785 km from Bangkok : 11 hrs by car) .
   From sites to stations, untreated and treated samples were kept in their iceboxes and data loggers were used to monitor temperature.
   Freezer was transferred to the station A (Chantaburi Province) and station B (Chiang Rai Province) to keep all samples frozen after the pit was removed. While samples were in transit to the laboratory, a data logger and dry ice were used.

Results :

The obtained result were in acceptable range (recovery70-120%). The conditions of LC-MS-QQQ are showed below. TIC and each standard used matching of 1 precursor ion and product ion and internal standards were used in this study.

It is ongoing for analysis of the residues. This project will be completed by December 2015. The results of the collaborative work for Spinetoram on the minor crop group of tropical fruit with inedible peel (lychee) will be submitted to the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) by December 2016.

Lychee trees

Lychee fruit

Harvesting treated lychees

On the Job Training

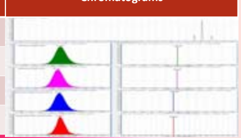
Acknowledgement:
Thanks to United States Department of Agriculture-Foreign Agricultural Service Standards and Trade Development Facility IR-4 Project and Dow Agro Sciences

LC-MS/MS Conditions:

Condition	Description			
Instrument	HPLC 1200 Agilent QQQ 6460			
Column	Phenomenex Kinetex 2.6 μ XB-C18 100A , 100 x 2.1 mm			
Injection Volume	5 μL			
Run time	18.10 min			
Mobile phase	A	5 mM ammonium formate		
	B	Acetonitrile		
Gradient	Time (min)	A (%)	B (%)	Flow (mL/min)
	0.00	94	6	0.50
	0.50	94	6	0.50
	15.00	2	98	0.50
	18.00	2	98	0.50
	18.10	94	6	0.50

Compound Name	Precursor Ion	Product Ion	Dwell time	CE (V)
XDE-175-J	748.6	142.2	20	37
XDE-175-L	760.9	142.2	20	37
XDE-175-N-demethyl-J	734.9	128.2	20	31
XDE-175-N-formyl-J	762.8	156.2	20	29
XDE-175-L(ISTD)	769.9	146.2	20	37
XDE-175-J (ISTD)	757.9	146.2	20	37
XDE-175-N-demethyl-J (ISTD)	739.9	128.2	20	33

Compound Name	%Recovery	Chromatograms
XDE-175-J	**106**	
XDE-175-L	**97**	
XDE-175-N-demethyl-J	**110**	
XDE-175-N-formyl-J	**70**	



LC-MS/MS Triple Quadrupoles

Reference: *Determination of Residues of XDE-175 and its Metabolites in Agricultural Commodities by Liquid Chromatography with Tandem Mass Spectrometry. GRM 05.03 Dow AgroSciences LLC M.J. Hastings, B.M. Wendelburg*

Samples in freezer -20 °C

Flesh and peeled samples

The Global Tropical Fruit Project: Developing International Capacity in Generating Maximum Residue Levels (MRL)

Edith Lurvey[1], Jason Sandahl[2], Daniel Kunkel[3]

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Introduction

Pesticide residue data needed to establish Codex Minimum Residue Levels (MRLs) is usually generated in the industrialized countries. Because data is rarely generated in Latin America, few Codex MRLs are established for many of the crops primarily grown in the region. If these data do not exist, then exported products face rejection at ports of entry for those countries requiring MRLs. In addition, many of the existing MRLs do not reflect the Good Agricultural Practices (GAPs) needed in the region since they are based on other countries' data and the MRLs may not meet the needs of the growers or provide adequate pest management. This lack of MRL trade standards for these minor, yet economically important crops, severely limits the participation of small exporters and farmers trying to participate in the global market by exporting their specialty crops.

Background

Two Global Minor Use Summits (2007 and 2012) identified the need for increased participation in priority setting and Codex MRL submissions from the areas where MRLs are most needed: Africa, Asia and Latin America. Since the requirements for data generated under GLP or OECD record keeping rules are a limiting factor for each country developing its own residue data, a logical first step was to put together a project for capacity building. The United States Department of Agriculture, Foreign Agriculture Service (USDA/FAS) provided resources for early meetings and workshops to facilitate coordination and discuss the needs within the three target regions. In 2013 the Standards and Trade Development Facility (STDF) provided three year grants to the three regions, focusing on GLP training, and the establishment of residue field trials and the analysis of their samples in various countries around the world. In Latin America the Inter-America Institute for Cooperation in Agriculture (IICA) provides project management; the IR-4 Project, based at Cornell University in the United States, provides technical oversight and training for the project; and the U.S. Department of Agriculture facilitates project coordination, and the Food and Agriculture Organization of the United Nations (FAO) provides technical and procedural guidance.

First Steps

Two preliminary meetings began the process of assessing collaboration between the countries in Central America and the Andean region. Outcomes included making preliminary decisions on the products and crops to include in the project and initial identification of the researchers in each country who would do the initial studies. The countries involved were **Bolivia, Colombia, Costa Rica**, Ecuador, El Salvador, Dominican Republic**, Guatemala**, Honduras, **Panama**, Paraguay and Peru. Projects were initiated in five countries (in **blue**), based on their demonstrated willingness to commit personnel and time to the project.

Beginning in 2012, as a part of the preliminary meetings, general Good Laboratory Practices (GLP) training sessions focused on supervised residue field trials were conducted for all the participating countries. Training were conducted in two locations: Colombia for the Andean and Guatemala for the Central American countries. A one-day laboratory residue training session was held for all eleven country labs in conjunction with the LAPRW2013. As each of the six countries conducting actual trials initiated their first field trial, the field and laboratory personnel involved in the project each received an additional week of intensive training. This initial effort is just the beginning as it takes at least two years to become proficient with GLPs.

Table 1: Residue Projects: Country, Chemical, Crop and Progress

Country	Chemical	Crop	# Trials	Lab status
Bolivia	Spinetoram	Banana	3 / 3	Sample received
Colombia	Spinetoram	Avocado	6 / 6	Analysis of samples
Costa Rica	Pyriproxyfen	Banana	3 / 6	Method Validation
Guatemala	Pyriproxyfen	Banana	3 / 6	Method Validation
Panama	Pyriproxyfen	Pineapple	3 / 6	Analysis of samples

A December 2016 submission date has been scheduled with Codex/JMPR for both Pyriproxyfen and Spinetoram MRLs.

Key Objective

This project aims to improve technical expertise in pesticide residue data generation, review and interpretation; explore ways to better support minor-use crops; enable the countries in Latin American, and globally, to contribute to the Codex MRL-setting and adoption process; and strengthen national pesticide residue monitoring programs.

For example, the project is already fostering regional cooperation with the join Guatemala/Costa Rica project for pyriproxyfen on banana.

Common Training Characteristics

Field training:

•Protocol preparation in conjunction with IR-4, the registrant and the local Study Director
•Development of Standard Operating Procedures (SOPs)
•Identification of equipment needs
•Identification of trial site requirements and trial differentiation
•Trial initiation:
- Handling of test substance under GLP
- Calibration of equipment to insure correct application rate
- Timed application
- careful cleaning of equipment

•All data recorded so that trial can be reconstructed

•Careful collection of residue samples to avoid contamination
- Some samples peeled (inedible peeled fruit) to provide better risk data

Laboratory training:

•Sample receipt, insuring that they are receiving required samples in good condition
•Samples ground with dry ice for residue integrity
- subsamples spiked for storage stability studies

•Sample extraction
•Method validation: 70 – 120% recoveries in spiked samples
•Documentation of all activities
•Analytical summary report

Data package submission to JMPR/Codex

•Field Data Summary
•Analytical Summary Report

Quality Assurance for all phases of the field and laboratory work

•In- life inspections of critical phases: applications; sampling; laboratory sample receipt; sample grinding, extraction and analysis
•Audits of raw data and reports

Anticipated Outcomes

•MRLs established in some inedible peeled tropical fruit
•Validate a crop group MRL based on FAO groupings
•Trained GLP personnel in each participating country
•Regional and Inter-regional coordination and cooperation for MRLs
•Development of additional projects based on activities: for example the USDA/FAS funded project to conduct a GLP study for the use of difenoconazole and tebuconazole in Snow peas and French beans to address the lack of U.S. MRLs for two important export crops for Guatemala.

STDF Standards and Trade Development Facility
USDA
The IR-4 Project
IICA

STANDARD TRADES DEVELOPMENT FACILITIES (FAO, OIE, World Bank, WHO, WTO)
UNITED STATES DEPARMENT OF AGRICULTURE, FOREIGN AGRICULTURE SERVICE
IR-4 PROJECT
INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE

Latin American Pesticide Residue Data Generation Project

This project aims to improve technical expertise in pesticide residue data generation, review and interpretation, explore ways to better support minor-use crops, enable developing country contributions to the Codex-MRL setting and adoption process, and strengthen national pesticide residue monitoring programs.

Latin American Collaboration on Maximum Residue Levels (MRLs)

- Pesticide residue data required to establish Codex MRLs are almost exclusively generated in industrialized countries. Rarely are data generated in developing countries, therefore, few Codex MRLs are established for crops grown in these regions.

- If MRLs do not exist, then exported products face rejection at ports. If MRLs do not reflect actual use patterns where the crops are grown, then pests will not be controlled effectively. Therefore, enabling Latin American countries to generate residue data facilitates the registration of new crop protection tools, empowers countries to establish MRLs, and boosts international trade opportunities.

- To achieve these goals, Latin American countries are partnering to conduct coordinated and complimentary residue studies, following extensive capacity building in both the field and laboratory.

- Skills and experiences gained through this project, which focuses on four low risk pesticides and tropical fruits, will further enable Latin American countries to expand and prioritize their residue programs. Hence, proactively addressing their emerging pest control needs, and becoming directly engaged with and contributing to the establishment of international trade standards.

Global Capacity Development Background

Over 300 delegates from 40 countries attended the first Global Minor Use Summit at FAO Headquarters in Rome, Italy.

- A key result from the 2012 Global Minor Use Summit in Rome, Italy was to support greater capacity development in areas of need.
- This included the promotion of lower risk pesticides; along with increased coordination and cooperation to assist developing countries in generating pesticide residue data.
- Upon the five years following the Global Summit, USDA provided resources for a number of meetings and workshops to increase communication and coordination within three regions: Asia, Africa, and Latin America.
- In March 2012, specific grants were secured to initiate further training modules and residue studies in each of these regions.

Azoxystrobin — Asia → *Difenoconazole* — Asia → *Spinetoram* — Asia, Africa, & Latin America → *Pyriproxyfen* — Asia, Africa, & Latin America

Regional Update For Latin America

- In Latin America, extensive GLP training has taken place and the appropriate committees have been established.

- The Latin American project is expected to conduct the following field trial applications in the coming months:

I. Pyriproxyfen scheduled for bananas in Costa Rica late this winter.

II. Pineapples in Panama will start this spring.

III. Avocados in Peru will start in May.

Bananas produced post-Pyriproxyfen application in Costa Rica.

- Additional field and lab training will be associated with each of these events.

- Thus enabling the lab analysis to follow shortly after samples are harvested from these studies.

<u>Additional countries conducting field trial applications:</u>

I. Colombia
II. Guatemala
III. Bolivia

Field Team Member harvesting pineapples in Panama.

Avocadoes produced post-field trial application in Colombia.

Latin American Pesticide Residue Project Partners

- Inter-America Institute for Cooperation in Agriculture
- Governments of Bolivia, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Panama, Paraguay, Peru
- USDA Foreign Agricultural Service
- IR-4 Project, USA
- Food & Agriculture Organization

National Study Team in Colombia conducting Field Training on avocadoes.

Budgetary Information

- STDF Contribution: US $ 367.902
- In-kind Contribution: US $ 330.000
- Other Contributions: US $ 483,250
- Total Cost: US $ 1.181.152

Start Date: October 2013
End Date: September 2016
Location: Latin America

Developing Capacity in Supervised Residue Trials

A National Study Team includes the following:

- ❑ Study Director
- ❑ Field Investigator
- ❑ Lab Investigator
- ❑ Quality Assurance Officer
- ❑ Sponsoring Management

Colombian stakeholders generating residue data for Codex MRLs.

The remaining stakeholders include:

- ❑ Pesticide Registrants
- ❑ National Registration Authorities
- ❑ Farmers
- ❑ Exporters

- The first project phase is to establish national study teams, conduct stakeholder consultations, and define the scope of the study, then coordinate these studies within the region, in order to maximize efficiencies and avoid duplication of efforts.
- Once this has been completed, the national study teams are trained, in both the field and laboratory, on the principals of Good Laboratory Practices (GLPs) for conducting supervised residue trials and Quality Assurance reviews.

Colombian Field Team Members demonstrating Good Laboratory Practices (GLPs) by applying test substance in the field.

- The pesticide registrants provide technical support for developing study protocols, provide testing and analytical reference substances, and submit registration dossiers.
- The Inter-America Institute for Cooperation in Agriculture (IICA) provides project management.
- The IR-4 Project, based at Cornell University in the United States, provides technical oversight of the project.
- The U.S. Department of Agriculture facilitates project coordination.
- The FAO provides technical and procedural guidance.

Conducting Coordinated Supervised Residue Trials

- The national Study Directors develop protocols in collaboration with the pesticide registrants, the national registration authorities, farmers, and other organizations that may have done similar work in the past.

- These protocols define the test substance to be used, crop type, location and number of trials, substance rate and interval, analytical methods, etc.

- Once this is agreed upon, the national study teams coordinate efforts in the field application of the test pesticides and analytical methods for determining the remaining residues at harvest.

Bananas are collected by Field Team Members for processing at harvest in Costa Rica.

Costa Rican analytical researchers prepare samples measuring pesticide residue levels.

- Depending on the crop, six to twelve replicate field trials need to be conducted within each study.

- Two very low risk test pesticides will be used in the Latin America component of the project (pyriproxyfen and spinetoram), and the studies will focus on three of the Codex representative commodities within the tropical fruit group (avocado, banana, and pineapple).

- This Latin America project is being coordinated with complimentary STDF-funded projects in Asia and Africa.

Engaging in, and Contributing to, the Codex Process

Colombian Field Team Members applying test substance in the field; thus engaging their understanding and contribution to the Codex process.

- A major component of this project is not only to improve understanding of the Codex process, but for participating countries to actually engage in, and contribute to, establishing Codex standards – and through this process, strengthen national commitments to Codex.

- Upon completion of the supervised residue studies, the generated residue data will be packaged and submitted to Codex to establish MRLs.

Participating countries will receive guidance on the following procedures:

How to Nominate their Project Pesticide/Commodity to be Placed on the Joint Meeting on Pesticide Residues (JMPR) Review Schedule.

→

How to Prepare and Package the Data Submission.

→

How to Best Coordinate Efforts with Other Countries.

Establishment of National Residue Study Teams and Minor Use Programs

The Global Residue Project enables countries from across Latin America to collaborate efforts towards solving common pesticide problems.

- Experiences gained from this project will support the establishment of permanent national pesticide residue programs and core members of national study teams.
- Upon completion of this project, study teams will have the ability to conduct further residue studies as part of national registration processes, or establishment of Codex MRLs or export market import tolerances.
- Farmers and export associations will benefit by having a mechanism in place to help them gain new pest control tools and gain access to new markets that require residue trade standards.

Establishment of Permanent National Pesticide Residue Programs
----
Core Members of National Study Teams

→

National Registration Process

Establishment of Codex MRLS or Export Market Import Tolerances

→

Gain New Pest Control Tools and Access to New Markets

Requiring Residue Trade Standards

Regional Process for Conducting Coordinated, Joint Residue Studies

- Rarely do countries need to work in isolation for gaining access to the newest pest control tools or developing international trade standards.
- Yet, this has often been the case, resulting in duplicated efforts, wasted resources, or no action being taken at all.
- Once common needs are identified amongst a group of countries, conducting residue studies and establishing critical Codex standards does not need to be prohibitively expensive, nor a daunting effort.
- As a result of this project, a regional minor use expert group will be formed around the Project Steering Committee nucleus.
- In cooperation with private sector partners (e.g., CropLife Latin America), this expert group will meet regularly to develop solutions on regional minor use issues, as well as identifying and prioritizing pesticide and MRL needs.
- Once these needs are prioritized, countries will be able to develop strategies to maximize outputs by dividing work, resources, and responsibilities to generate necessary residue data.

Increased Contribution to Establishing Codex MRL

- To date, there are very few Codex MRLs that were generated solely from data of developing countries.
- This project will enable Latin American countries to conduct nationally-led residue studies, directly contributing to the Codex MRL process.
- Additionally, this project will assist the JMPR in clarifying and addressing new issues around commodity grouping, minimum number of required trials, combining data sets from multiple countries, and sample collection and storage of large fruits.

Technical studies in Colombia for the establishment of Maximum Residue Limits (MRLs) for Spinetoram in avocado

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INTRODUCTION

Colombia is participating in a regional collaborative project for establishment of maximum residue limits (MRLs) in the minor crop, subgroup 006B for tropical fruit with inedible peel. The Global study is funded by a Standards and Trade Development Facility grant, led by the USDA with technical support from the IR-4 Project. Colombia is developing technical studies for determination of pesticide MRLs for Spinetoram, registered in the country under the trade name Exalt 60 SC, for *Thrips* control in avocado. The project is implemented under Good Laboratory Practices (GLP), and includes establishment of six field trials done in three of the main avocado production regions and the laboratory analyses to determine pesticide residue levels. The locations were selected from farms certified by ICA in Good Agricultural Practices (GAP).

EXPERIMENTAL

FIELD STUDIES

The six field trials were conducted in the second half of 2014 in the three main avocado production regions of Colombia: Antioquia, Risaralda and Cauca. The variables that differentiated the trials were: geographic location, avocado variety, application equipment; the use or not of adjuvants and spray volumes. Varieties are listed in Table 1 for each of the tests. In those trials where the same type of equipment were used, spray volumes differed by at least 25%.

Table 1. Variables for field trials

VARIABLES						
Department	Cauca	Antioquia	Cauca	Risaralda	Risaralda	Antioquia
Testing ID	11400.14-CO01	11400.14-CO02	11400.14-CO03	11400.14-CO04	11400.14-CO05	11400.14-CO06
Farm	Jireh	Los Pinares	Porvenir	El Píramo	La Bulgaria	Comercializadora Heclemen
Avocado variety	Hass	Reed	Hass	Papelillo	Hass	Hass
Use of adjuvants	No adjuvant	Adjuvant	No adjuvant	Adjuvant	Adjuvant	No adjuvant
Application equipment	Stationary pump	Mist blower	Motorized backpack sprayer	Mist blower	Motorized backpack sprayer	Stationary pump
Spray volume	1039 L/hectare	1239 L/hectare	1070 L/hectare	828 L/hectare	1417 L/hectare	1505 L/hectare
SAMPLING						
Number of samples at day 1	2 treated	3 treated	3 treated	2 treated	3 treated	Decline study: Sampling at days 0, 1, 3, 4, 7, 11, 14 and 21
	2 untreated	3 untreated	3 untreated	2 untreated	3 untreated	
Number of samples at day 14	2 treated	3 treated	3 treated	2 treated	3 treated	
Matriz analysis	Whole fruit	Pulp, peel and whole fruit	Pulp, peel and whole fruit	Whole fruit	Pulp, peel and whole fruit	Whole fruit

Each trial was composed of two plots, an untreated control plot and a treated plot, contained six trees each and was separated by at least 30 meters. In the treated plot, three applications of Spinetoram were done at 7 day intervals at a rate of 60 g of a.i./hectare (1L formulated product/hectare). Before each application, the discharge volume of the equipment and operator application rate were calibrated. Coefficients of variation <5% were considered.

After application, the efficiencies were calculated, which are shown in Table 2

$$\text{Efficiency} = \frac{\text{applied dose (ml/hectare)} * 100}{\text{Dose protocol (ml/hectare)}}$$

Table 2. Efficiency application

	Testing ID					
Efficiency (%)	11400.14-CO01	11400.14-CO02	11400.14-CO03	11400.14-CO04	11400.14-CO05	11400.14-CO06
Application 1	103	104	101	102	102	103
Application 2	101	103	104	100	100	101
Application 3	102	106	100	101	101	100
Average	102	104	101	101	101	102

In five of six field trials, avocado samples were collected from non treated plots (control) and treated plots 1 and 14 days after the third application, in order to analyze the residues in different fractions of the fruit; whole fruit (seedless) pulp, and peel. In the trial six samples were collected at days 0, 1, 3, 4, 7, 11, 14, 21 to determine decline curve.

Samples were collected from different quadrants of the tree, under aseptic conditions, avoiding the edges and preventing cross-contamination. Once collected they were refrigerated, labeled, packed and shipped to the laboratory and temperature recorded. The same day the samples were coded in the lab, their seed removed and peel according to table 1 and stored at -20 °C for later analysis.

6 sub-samples of 5g of each fruit fraction were spiked with a mixture of Spinetoram J, L, Demethyl J and Formyl J, at concentration of 0,2 mg/kg in order to determine pesticide stability in stored samples.

LABORATORY

Preliminary processing

- Remove seed and additionally separate pulp and peel when necessary
- Weigh all portions separated
- Freeze at -20 °C
- Grind each portion in a food processor with dry ice
- Freeze subsamples at -20 °C

Analytical processing

- Weigh 5 g of sample
- Add 100 mL of acetonitrile/water (80:20)
- Homogenize at aprox 13000 rpm for 1 minute
- Shake for 30 minutes at aprox 180 excursions per minute
- Centrifuge for 5 minutes at 2000 rpm
- Filter through 0,45 µm PVDF filter unit
- Pipet 1 mL of the extract into chromatographic vial
- Add 50 µL of internal standards mix
- Vortex mix for aprox 30 seconds
- Chromatograph blanks, samples, spiked samples and matrix calibration curve

In Laboratorio Nacional de Insumos Agrícolas (LANIA) from Instituto Colombiano Agropecuario (ICA), the analisys method was standardized for residue analysis of Spinetoram (XDE-175)-J, Spinetoram (XDE-175)-L and their metabolites Spinetoram (XDE-175) -N-Demethyl-J and Spinetoram (XDE-175)-N-Formyl-J, analyzed by HPLC-MS/MS with ESI positive, using deuterated internal standards for the calibration curve in matrix. All standard substances were supplied by Dow Agrosciences. Testing accuracy of the method are being evaluated using four concentrations of each analyte at 0,01; 0,02; 0,2, and 2 mg/kg, in three avocado matrices (whole fruit except seed, pulp and peel separately). In the samples from three field tests Spinetoram residues and their metabolites will be evaluated only in the whole fruit while in the samples from the remaining three trials the residuality in the whole fruit, the pulp and peel will be evaluated separately.

Table 3. Chromatographic conditions

Condition	Description		
Instrument	HPLC Agilent 1200 QQQ 6400		
Chromatographic column	Agilent zorbax eclipse XBD		
	Stationary phase	C18 in reverse phase	
	Length	150 mm	
	Internal diameter	4,6 mm	
	Particle size	5 µm	
Injection volume	50 µL		
Analysis time	20 min	Flow (mL/min)	1
Mobil phase	Phase A	ACN/MeOH (1:1) with amonium acetate 2 mM	
	Phase B	Amonium acetate 2 mM	
Gradient	Time (min)	%A	%B
	0	67	33
	10	100	0
	15	100	0
	17	67	33
	20	67	33

Table 4. Spectrometric conditions

Analyte	Retention time (min)	Precursor ion (m/z)	Product ion (m/z)	
			Quantifier	Qualifier
Spinetoram (XDE-175)-J	13,5	748,6	142,2	98,0
Spinetoram (XDE-175)-L	14,0	760,5	142,2	98,2
Spinetoram (XDE-175)-N-Demethyl-J	12,2	734,5	128,2	84,2
Spinetoram (XDE-175)-N-Formyl-J	11,0	784,5	629,4	517,4
I.S. Spinetoram J	13,4	757,9	146,2	102,4
I.S. Spinetoram L	13,9	769,9	146,2	102,6
I.S. N-demetyl-spinetoram J	12,2	739,9	128,2	84,2

RESULTS

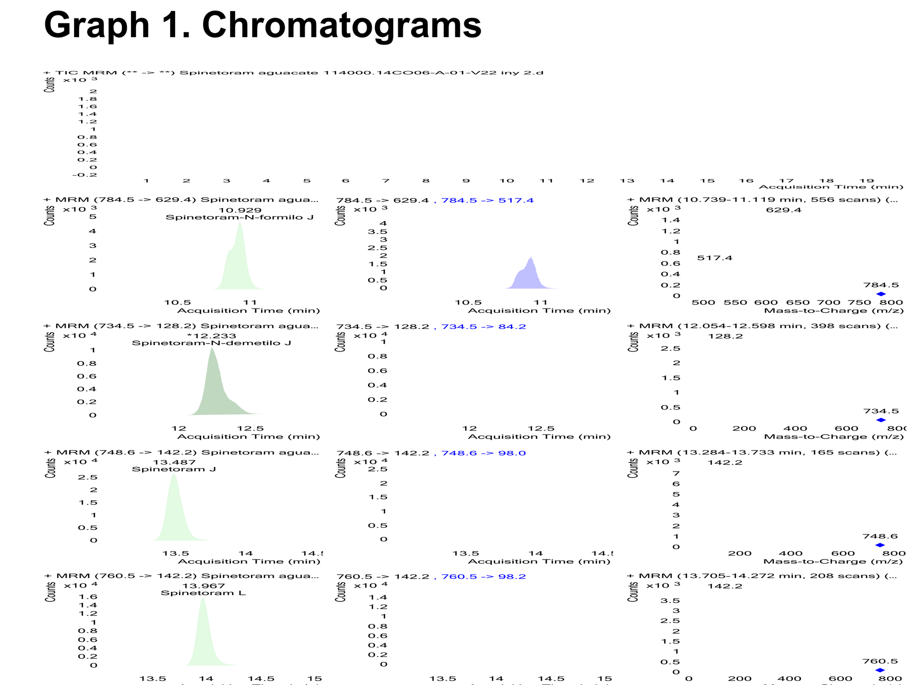
Results obtained for accuracy in whole fruit for all analytes, met criteria established with recoveries between 70 and 120%, see table 5. Typical chromatograms are showed in graph 1. It is possible to see a good resolution in the chromatogram TIC. For each analyte chromatographic signals representative of their product ions were obtained, allowing identification and quantification of analytes.

It is estimated that the ongoing research developed in Colombia will be completed by December 2015 and results of the collaborative work for Spinetoram on the minor crop group of tropical fruit with inedible peel (avocado, banana and mango) will be submitted to the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) by December 2016.

Table 5. Recoveries

Analyte	Recovery (%)
Spinetoram (XDE-175)-N-Formyl-J	72 – 98
Spinetoram (XDE-175)-N-Demethyl-J	90 – 111
Spinetoram (XDE-175)-J	85 – 100
Spinetoram (XDE-175)-L	87 – 103

Graph 1. Chromatograms



ACKNOWLEDGMENTS

Thanks to United States Department of Agriculture- Foreign Agricultural Service
Standards and Trade Development Facility
IR-4 Project

DETERMINATION OF MAXIMUM RESIDUE LEVEL (MRL) OF *PYRIPROXYFEN* IN PINEAPPLE (*Ananas comosus*) *CV.* MD-2, IN PANAMÁ

TECHNICAL WORK TEAM

NATIONAL COORDINATOR: FEDERICO ÁBREGO RUIZ, National Plant Protection Direction, Ministry of Agricultural and Livestock Development (MIDA).

STUDY DIRECTOR IN PANAMÁ: ERIC M. CANDANEDO LAY, Agricultural and Livestock Research Institute of Panama (IDIAP).

FIELD RESEARCHER: JOSÉ L. CAUSADÍAS S., Agricultural and Livestock Research Institute of Panama (IDIAP).

LABORATORY RESEARCHER: BRENDA I. CHECA ORREGO, National Plant Protection Direction, Ministry of Agricultural and Livestock Development (MIDA).

INTRODUCTION

Pineapple is one of Panama's most important export crops. It is exported to the United States, Europe, and Japan and is grown, mainly, in two zones: West Panama Province (basin of the Interoceanic Panama Canal) and in Chiriquí province (western Panama bordering with Costa Rica). The only variety grown is MD-2, of Hawaiian origin, *Cayena lisa* type. Quality of Panamanian pineapple, in terms of soluble solids and brix, is recognized among the best worldwide. The main pineapple growing zone, in West Panama province, is located 8.95778 North Latitude and -79.870 West Longitude, at altitudes between 100 and 200 MASL.

BACKGROUND

In August 1, 2012 Panama's Technical Work Team is formed, responsible for field, laboratory, and coordination activities.

In August 6, 2012 IDIAP designated two researchers join Panama's Technical Work Team, as Study Director for Panama and Field Researcher in pineapple crop.

From November 13 to 16, 2012 Panama participated in the introductory workshop on Good Laboratory Practices (GLP), the methodology and standards under which the field trials and laboratory analysis must be conducted, sponsored by the United States Department of Agriculture (USDA), in Guatemala City, Guatemala.

In December 5, 2012 Panama sent a letter of support to WTO, through STDF (Standards and Trade Development Facitity), in support of the creation of the «Latin American Project for Residue Data Generation for the Establishment of Maximum Residue Levels of Pesticides in Minor Crops» in six countries of the Region, together with the Inter-American Institute for Cooperation in Agriculture (IICA) and the United States Department of Agriculture (USDA).

From June 3 to 5, 2014, First meeting of the Steering Committee of Project STDF/PG/436 «Latin America: Strengthening Regional Capacity to Meet Pesticides Export Requirements Based on International Standards».

In 2014, Panama is committed to conduct six (6) field trials to determine the MRL of *Pyriproxyfen* (**SUMITOMO**) on pineapple.


Environmental monitoring and GPS

PROGRESS AND ACHIEVEMENTS

In may 6, 2014 Panama starts first field trial in Veladero, Gualaca, Chiriquí Province.

In november, 2014, method validation of **QuEChERS AOAC, 2007** to extract and purify the *analyte* or active ingredient of *Pyriproxyfen* in pulp, peel, and whole fruit was completed. After extraction, the analytical technique based on **Liquid cromatography coupled to mass spectrometry triple quadrupole** was applied, to confirm the presence and quantify the analyte. To date (September, 2015), three (3) out of six (6) field trials have been analyzed.

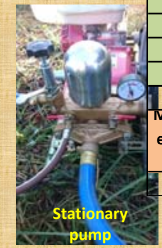
In july 14, 2015, the sixth and last field trial (a Decline study) was completed at Las Zanguengas, Chorrera, Province of West Panama.

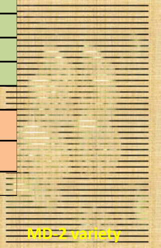
DETERMINATION OF *PYRIPROXYFEN* MRL ON PINEAPPLE (*Ananas comosus*) cv. MD-2: COMPLETED FIELD TRIALS (2014 - 2015)

Trial No.	Code No.	Location	Sample type	1st Application	2nd Application	1st Sampling	2nd Sampling
1	**11398.14-PA01**	San Lorenzo, Chiriquí	Pineapple (whole fruit)	March 24, 2015	April 7, 2015	April 8, 2015	April 21, 2015
2	**11398.14-PA02**	Veladero, Gualaca, Chiriquí	Fruit, peel and Pulp	May 6, 2014	May 20, 2014	May 21, 2014	June 4, 2014
3	**11398.14-PA03**	Las Zanguengas, W. Panama	Fruit, peel and Pulp	May 16, 2014	May 29, 2014	May 30, 2014	June 12, 2014
4	**11398.14-PA09**	Las Mendozas, Chorrera, W. Panama	Pineapple (whole fruit)	March 31, 2015	April 14, 2015	April 15, 2015	April 28, 2015
5	**11398.14-PA05**	Las Zanguengas, W. Panama	Peel and pulp	May 5, 2015	May 19, 2015	May 20, 2015	June 2, 2015
6	**11398.14-PA06**	Las Zanguengas, W. Panama	Pineapple (**Decline**)	June 9, 2015	June 23, 2015	June 23, 2015	June 24, 2015

Muestreos ensayo de Declino*	**o dala**	**1 dala**	**3 dala**	**5 dala**	**10 dala**	**14 dala**	**21 dala**
	June 23, 2015	June 24, 2015	June 26, 2015	June 28, 2015	July 3, 2015	July 7, 2015	July 14, 2015

* **dala** = days after last application


Stationary pump


MD-2 variety


Calibrating nozzels, 11398.14-PA05


Pyriproxyfen, 11398.14-PA03


1st application, 11398.14-PA09


1st sampling, 11398.14-PA01


Extraction by QueChERs


Analysis: Liquid cromatography


Trial identification


8 nozzels boom assembly


Different aspects of GLP training

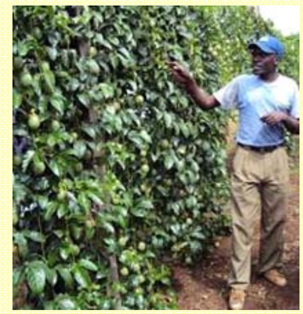

Sending samples in dry ice

STDF The IR-4 Project USDA IICA MIDA idiap

Residue Field Trials in East and West Africa for the Establishment of Maximum Residue Limits (MRLs) for Sulfoxaflor in Passion Fruit and Mango

Introduction:

Pesticide residue data used to establish Codex MRLs are almost exclusively generated in countries such as the United States, Canada, Australia, Japan, and the European Community to support product registrations. Very little data (if any) are generated in developing countries, and therefore, few Codex MRLs are established for crops grown primarily in these specific regions of the world Kenya, Uganda, Ghana, Senegal and Tanzania are participating in a regional collaborative project for establishment of maximum residue limits (MRLs) for sulfoxaflor in mangoes and passion fruits, subgroup 006B for tropical fruit with inedible peel. Sulfoxaflor, a new class of insecticide will be registered in the participating countries for controls of aphids and thrips in passion fruits and fruit flies and scales in mangoes.



The Global study is funded by a Standards and Trade Development Facility (STDF) grant, led by the United States Department of Agriculture (USDA) with technical support from the IR-4 Project. The coordination of the project in Africa is being undertaken through the African Union Inter African Bureau of Animal Resources (AU-IBAR) which is providing the necessary facilitation for the implementation of the project, while ensuring the timely delivery of planned activities, outputs and reports.

Objectives of this project are:

- To build Africa's capacity to generate pesticide residue MRLs to support codex MRL setting for minor crops
- To enhance Africa's participation in joint global data MRLs reviews for minor crops
- To enhance capacity of African nations to meet pesticide-related export requirements based on international (Codex) standards
- And to increase the competitiveness and market access for African agricultural commodities.

Methodology:

The field residue trails, efficacy studies and laboratory analyses will begin in the latter part of 2015 for all the countries. The residue trials will be implemented in accordance to the proposed GAPs, which will be recommended by the registrant, a minimum 15 experimental field trials will be conducted in five of the main passion fruit and mangoes eco-geographical production regions of the five countries (Ghana, Senegal, Kenya, Tanzania, and Uganda).

Quality Assurance and Control of Test Samples:

The testing of laboratory samples will be in accordance to Good Laboratory Practices (GLP) and any other recommended quality management system for laboratories. The analytical method will involve extraction of the matrices with acetonitrile/water, followed by addition of stable isotope internal standards, hydrolysis of base-labile conjugates with dilute sodium hydroxide, and hydrolysis of glucose conjugates with glucosidase. The sample extracts will be cleaned up by solid phase extraction (on- or off-line), before LC/MS/MS analysis. Good method recoveries and precision will be followed during the analysis of the matrices.

Expected Output:

The primary output of the project will be;

- The joint submissions of residue trial data packages to JMPR by the participating African countries,
- The establishment of Codex MRLs for mangoes and passion fruits to support agricultural trade in minor crops,
- The building regional of technical capacity and developing a regional/global process for the coordination of joint data reviews /work sharing on minor crops.
- The enhancement of Africa competiveness and market accesses for minor crops

Milestone covered:

Technical training of experts from the participating countries to carry out field trials has already been conducted in Ghana.

Acknowledgments:

The participating countries acknowledges the funding and technical support from Standards and Trade Development Facility, United State Department of Agriculture /Foreign Agriculture Service, IR-4 Project, and the African Union Inter African Bureau of Animal Resources (AU-IBAR)

STDF Standards and Trade Development Facility

USDA

The IR-4 Project

African Pesticide Residue Data Generation Project

This project aims to improve technical expertise in pesticide residue data generation, review and interpretation, explore ways to better support minor-use crops, enable developing country contributions to the Codex-MRL setting and adoption process, and strengthen national pesticide residue monitoring programs.

African Collaboration on Maximum Residue Levels (MRLs)

- Pesticide residue data required to establish Codex MRLs are almost exclusively generated in industrialized countries. Rarely are data generated in developing countries, therefore, few Codex MRLs are established for crops grown in these regions.

- If MRLs do not exist, then exported products face rejection at ports. If MRLs do not reflect actual use patterns where the crops are grown, then pests will not be controlled effectively. Therefore, enabling African countries to generate residue data facilitates the registration of new crop protection tools, empowers countries to establish MRLs, and boosts international trade opportunities.

- To achieve these goals, five African countries (Ghana, Kenya, Senegal, Tanzania, and Uganda) are partnering with the U.S. IR-4 Project to conduct coordinated and complimentary residue studies, following extensive capacity building in both the field and laboratory.

- Skills and experiences gained through this project, which focuses on low risk pesticides and tropical fruits, will further enable African countries to expand and prioritize their residue programs. Hence, proactively addressing their emerging pest control needs, and becoming directly engaged with and contributing to the establishment of international trade standards.

Global Capacity Development Background

Over 300 delegates from 40 countries attended the first Global Minor Use Summit at FAO Headquarters in Rome, Italy.

- A key result from the 2012 Global Minor Use Summit in Rome, Italy was to support greater capacity development in areas of need.
- This included the promotion of lower risk pesticides; along with increased coordination and cooperation to assist developing countries in generating pesticide residue data.
- Upon the five years following the Global Summit, USDA provided resources for a number of meetings and workshops to increase communication and coordination within three regions: Asia, Africa, and Latin America.
- In March 2012, specific grants were secured to initiate further training modules and residue studies in each of these regions.

Azoxystrobin

Asia

Difenoconazole

Asia

Spinetoram

Asia, Africa, & Latin America

Pyriproxyfen

Asia, Africa, & Latin America

Regional Update For Africa

- In Africa, extensive GLP training has taken place and the appropriate committees have been established.
- This region has selected projects and are in the process of initiating studies with field trial applications planned in the coming months.
- Studies expected in Africa will include work primarily with bananas, papaya, pineapple, passion fruit, guava, date and palm.
- Countries include Ghana, Kenya, Senegal, Tanzania and Uganda.
- These studies are scheduled to commence in late 2014.
- Other studies will be initiated in Morocco, Egypt; but are not part of the STDF grants.

National Study Team in Africa conducting Field Training on papayas.

African Pesticide Residue Project Partners

- Governments of Ghana, Kenya, Senegal, Tanzania, Uganda
- Standards and Trade Development Facility
- African Union
- USDA Foreign Agricultural Service
- IR-4 Project, USA
- U.N. Food & Agriculture Organization

National Study Team in Africa conducting Field Training on designated commodities.

<u>Budgetary Information</u>

- STDF Contribution: US $446,450
- In-Kind Contribution: US $618,300
- Total Cost: US $1,064,450

Start Date: 1st May 2013
End Date: 30th April 2016
Location: Sub-Saharan Africa

Developing Capacity in Supervised Residue Trials

<u>A National Study Team includes the following:</u>

- ❑ Study Director
- ❑ Field Investigator
- ❑ Lab Investigator
- ❑ Quality Assurance Officer
- ❑ Sponsoring Management

<u>The remaining stakeholders include:</u>

- ❑ Pesticide Registrants
- ❑ National Registration Authorities
- ❑ Farmers
- ❑ Exporters

African Project Leaders practicing the sprayer calibration process for supervised residue trials.

- The first project phase is to establish national study teams, conduct stakeholder consultations, and define the scope of the study, then coordinate these studies within the region, in order to maximize efficiencies and avoid duplication of efforts.

- Once this has been completed, the national study teams are trained, in both the field and laboratory, on the principals of Good Laboratory Practices (GLPs) for conducting supervised residue trials and Quality Assurance reviews.

Joe Defrancesco training a Ghanaian Field Team Member how to apply test substance in the field.

IR4 Study Director, Michael Braverman, assists Field Investigators in constructing field plots.

- The pesticide registrants provide technical support for developing study protocols, provide testing and analytical reference substances, assist in analytical methods, and submit registration dossiers.

- The African Union (AU) provides project leadership and management.

- The IR-4 Project, based at Rutgers University in the United States, provides technical oversight of the project.

- The U.S. Department of Agriculture facilitates project coordination.

- The FAO provides technical and procedural guidance.

Conducting Coordinated Supervised Residue Trials

- The national Study Directors develop protocols in collaboration with the pesticide registrants, the national registration authorities, farmers, and other organizations that may have done similar work in the past. These protocols define the test substance to be used, crop type, location and number of trials, substance rate and interval, analytical methods, etc.

- Once this is agreed upon, the national study teams coordinate efforts in the field application of the test pesticides and analytical methods for determining the remaining residues at harvest.

Ghanaian Laboratory Researchers prepare mango samples, one of two Codex representative commodities, for residue analysis.

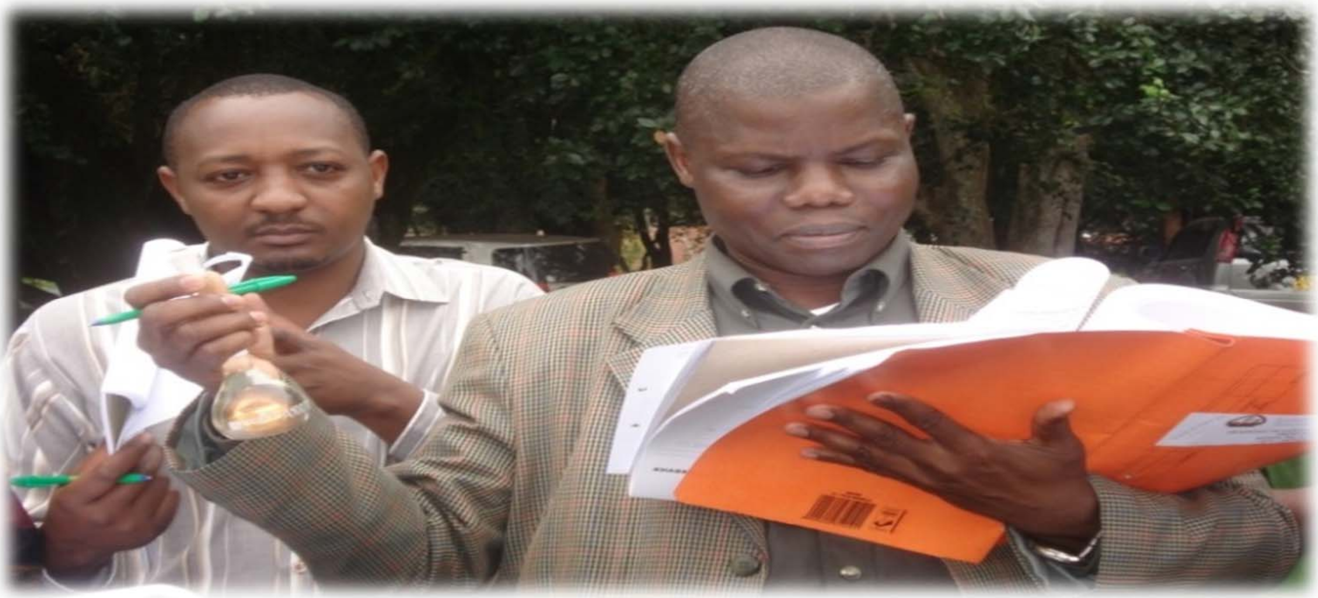
Senegalese Analytical Technicians prepare equipment for measuring pesticide residue levels post harvest.

- Depending on the crop, six to twelve replicate field trials need to be conducted within each study.

- A very low risk test pesticide will be used in the Africa component of the project (sulfoxaflur—provided by Dow), and the studies will focus on two of the Codex representative commodities within the tropical fruit group (mango and passion fruit).

- This Africa project is being coordinated with complimentary STDF-funded projects in Asia and Latin America.

Engaging in, and Contributing to, the Codex Process



Ghanaian Field Team Members generating residue data for Codex MRLs.

- A major component of this project is not only to improve understanding of the Codex process, but for participating countries to actually engage in, and contribute to, establishing Codex standards—and through this process, strengthen national commitments to Codex.
- Upon completion of the supervised residue studies, the generated residue data will be packaged and submitted to Codex to establish MRLs.

Participating countries will receive guidance on the following procedures:

How to Nominate their Project Pesticide/Commodity to be Placed on the Joint Meeting on Pesticide Residues (JMPR) Review Schedule.

How to Prepare and Package the Data Submission.

How to Best Coordinate Efforts with Other Countries.

Establishment of National Residue Study Teams and Minor Use Programs

The Global Residue Project enables countries from across Africa to collaborate efforts towards solving common pesticide problems.

- Experiences gained from this project will support the establishment of permanent national pesticide residue programs and core members of national study teams.

- Upon completion of this project, study teams will have the ability to conduct further residue studies as part of national registration processes, or establishment of Codex MRLs or export market import tolerances.

- Farmers and export associations will benefit by having a mechanism in place to help them gain new pest control tools and gain access to new markets that require residue trade standards.

Establishment of Permanent National Pesticide Residue Programs
----
Core Members of National Study Teams

→

National Registration Process

Establishment of Codex MRLS or Export Market Import Tolerances

→

Gain New Pest Control Tools and Access to New Markets

Requiring Residue Trade Standards

Regional Process for Conducting Coordinated, Joint Residue Studies

- Rarely do countries need to work in isolation for gaining access to the newest pest control tools or developing international trade standards. Yet, this has often been the case, resulting in duplicated efforts, wasted resources, or no action being taken at all.

- Once common needs are identified amongst a group of countries, conducting residue studies and establishing critical Codex standards does not need to be prohibitively expensive, nor a daunting effort.

- As a result of this project, a regional minor use expert group will be formed around the Project Steering Committee nucleus.

- In cooperation with private sector partners (e.g., CropLife Africa and the Middle East), this expert group will meet regularly to develop solutions on regional minor use issues, as well as identifying and prioritizing pesticide and MRL needs.

- Once these needs are prioritized, countries will be able to develop strategies to maximize outputs by dividing work, resources, and responsibilities to generate necessary residue data.

Increased Contribution to Establishing Codex MRL

- To date, there are very few Codex MRLs that were generated solely from data of developing countries.

- This project will enable African countries to conduct nationally-led residue studies, directly contributing to the Codex MRL process.

- Additionally, this project will assist the JMPR in clarifying and addressing new issues around commodity grouping, minimum number of required trials, combining data sets from multiple countries, and sample collection and storage of large fruits.

Generating project data on pesticide residues in Senegal in 2015

DIOUF Amadou[1,4], DIENE Nar[1], BA Samba D.[2] and GADJI Baba[3]

[1]CNC. [2]DPV, [3]Laboratoire Fondation Ceres-Locustox, [4]université Cheikh Anta Diop de Dakar

E-mail:snardiene@yahoo.fr/capsmisnate@gmail.com

Introduction :

Senegal, between 12 ° and 16 ° 8 41 north latitude and 11 ° 21 West longitude and 17 ° 32 has its western most tip of the entire Western Continental Africa. It covers 196,722 km2 and has a Sahelian climate.

Mango is one of the main fruits exported by Senegal: 15 000 tonnes in 2014, up 30% compared to 2013. This is a sector that employs about 25,000 people and generates turnover, of 20 billion FCFA. Constituting a socio-economic impact by its contribution in reducing poverty and improving the living conditions of the population. *(ref: Rapport campagne mangue 2014)*

However phytosanitary issues related to the presence of fruit fly represent a major constraint to good production. If the willingness by producers to make it a leading product in the world market, this fly must be fought vigorously. What has been undertaken by national and regional initiatives, but without the data generation approach..

Objectives of this project are:

- Provide mango growers, an effective way to fight against this pest (predator);
- Ensure that the production, mangoes complies with the international standard of the codex on the maximum limit of sulfoxaflur residues;
- Enable Senegal to seek proactively and develop pest management strategies that are locally appropriate, to enable Senegal to actively participate in international standardization process of Codex.

Methodology The study will be carried out in Senegal by a team composed of elements of the Corps Protection Direction (DPV), the National Codex Committee (CNC) and the Laboratory of Ceres-Locustox Foundation, in collaboration with the STDF program.

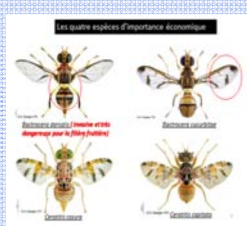
The study will be to an effectiveness and determination of MRLs sulfoxaflur:

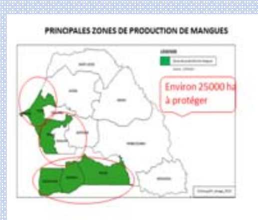
- the effectiveness test will be conducted in accordance with the protocol of Ghana, the sulfoxaflur be sprayed on mangoes to assess its effectiveness in reducing the damage caused by fruit flies;
- the determination of MRLs will be in accordance with the protocol of the STDF program, 4 plots will be used (1 + 3 treated control) each have 18 feet of mango trees (see the features of orchards made available in the study) and a pulvérisateur- brand tractor Airbus Jacto 2000 (2000l, 1000l, 800l, 200l and 50l).

The expected outputs for Senegal are to have available data on the biological effectiveness Sulfoxalfur against white fly (Bactrocera.) Residues of the "Sulfoxalfur" in mango.

Senegal's experience in the fight against fruit flies

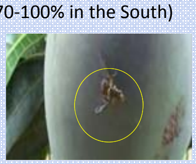
Fruit flies are pests of the order Diptera whose females sting the skin of the fruit with a ovipositor to lay their eggs.
Several species of flies are listed in Senegal:





Ref:rapport capagne mangue 2014

Since 2004, fruit flies cause enormous damage (40-60% in the North and 70-100% in the South)




Infested Mangoes

Mango orchard lopped because fruit flies

USAID/Senegal

The US government, through USAID provides assistance since 2007 in Senegal's fight against fruit flies invasions that threaten production areas, particularly in Casamance (south).

- Handbook fight against fruit flies to Senegal (*DPV & USAD, 2007*)

Projet Régional de Lutte Contre les Mouches des Fruits en Afrique de l'Ouest (West African Fruit Fly Initiative (WAFFI))sponsored by Word Bank

This project covers 8 countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, Senegal and Togo.

The activities developed in this project are:

- Continuation of trapping detection (see data sheet No. = 3) to better understand the outbreak peaks of fly species with the GF-120;
- Continuation of the training of trainers involving the owners of orchards and exporters;
- Multi-location trials with spot treatments using the GF-120 in the pilot orchards (see data sheet No. = 4);
- Promotion of protection and optimized management of weaver ants in pilot orchards, (see data sheet No. = 5). *(ref: Rapport WAFFI 2, 2010)*

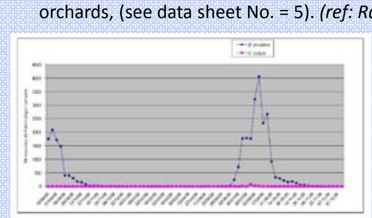


Figure 10: Fluctuations des populations de mouches des fruits dans les Niayes / Sénégal.

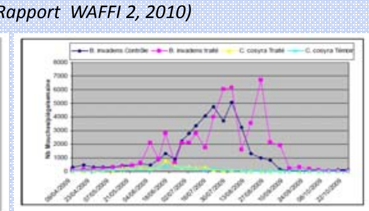


Figure 22 : Fluctuations des populations de B. invadens et de C. cosyra dans les parcelles témoins et les parcelles traitées au GF-120 en Casamance au Sénégal.

In Senegal, no control method performed at plots or farms has shown no convincing because the treated plots are immediately re-infested from neighboring plots. Moreover, within an infested plot and treated there is a very high potential for re-contamination from larvae and pupae buried in the ground. Pesticide treatments across a zone, made in neighboring countries have been spectacular failures.

Conclusion and perspectives: The experience acquired in this project will generalize such processing to all the fruit farms of Senegal and even throughout the sub region to contribute to the enhancement of the mango sector in Senegal, create systematic data generation for fruits and vegetables and certainly hope to create wealth for the thousands of families who depend on the culture of mango, reduce poverty and boost economic growth in the region of Casamance and the Niayes area.

Why not do the Senegalese mango (as desired by the Federal Cooperative players in the Senegal horticulture) a product leader in the global market?

The IR-4 Project

BRYANT CHRISTIE INC.
GLOBAL MRL DATABASE
A service of BRYANT CHRISTIE INC.

Codex Maximum Residue Limits: Who uses these Standards?

Daniel L. Kunkel (kunkel@aesop.rutgers.edu), Associate Director, IR-4 Project Headquarters and Kimberly Berry, Senior Manager, Bryant Christie Inc.

Overview

Maximum Residue Limits (MRLs) for pesticides serve as a reference value to not only monitor and enforce that a product was used correctly at the domestic level, but also affects commodities in trade. Due to issues that can often occur in trade, there is a considerable need to have one global pesticide standard for commodities in trade. While Codex MRLs (CXLs) would appear to be an ideal trade standard (regarding pesticide residue limits on commodities) countries are increasingly developing their own sovereign regulations, therefore bringing the value and utility of CXLs into question.

Food and Agriculture Organization of the United Nations

JMPR/Codex Process

As noted, Codex MRLs remain an important standard for commodities in trade. The work of the Codex (through the Joint Meeting of Pesticide Residues (JMPR) and the Codex Committee on Pesticide Residues (CCPR) serves an important role for the safety of the consumer, and for the facilitation of world trade of food commodities. The demand for JMPR reviews and Codex MRLs continues to increase each year. The resource constraints on JMPR, both financially and with regard to capacity, limit the number of reviews that can be done each year resulting n a backlog of reviews. This is especially problematic for new active ingredients, which are often safer to use.

To remain relevant the CCPR continues to consider new ways to increase the capacity of JMPR reviews. Three primary issues of concern have been identified: funding, the availability of expertise, and the timing/frequency of JMPR meetings. Many registrants have been incorporating applications for Codex MRLs early in development process of new crop protection products and new crop uses as a routine business practice, particularly for international joint reviews, which are becoming the norm. Customers (the commodity growers) are more insistent that their crop protection practices afford them maximum marketing flexibility, particularly for export possibilities. This is important when the market destination of the crop may not be known at the time that crop protection decisions are being made in the field. This generally means that CXLs must be in place along with MRLs in selected other national markets (where Codex MRLs may not be recognized) before these new products can be used on some crops.

Countries Use Codex MRLs in a Number of Different Ways

At this time, there are still many countries that use Codex MRLs (CXLs). However, the manner in which CXLs are applied in each country varies considerably. Some countries that do not establish national MRLs specify a deferral to CXLs. For other countries, the deferral to Codex is not as transparent but generally acknowledged as a best practice. In addition to CXLs, some countries will include US, EU, and/or default MRLs in a decision tree to determine the appropriate MRL. A decision tree or deferral path can be quite complex, involving taking the higher or lower MRL between Codex, the US, and the EU. Countries that establish MRLs in a national standard may, in addition, defer to CXLs as well as other decision tree steps. It is also important to note that these MRL deferral paths are often designated for imports only and are not considered to be indicative for domestic uses or registrations. Finally, although some countries do not automatically defer to CXLs, they do review CXLs and often use them in their decision for their national MRL regulation (please see Table 1).

World Health Organization

TABLE 1. Survey of countries that use Codex MRLs

Countries without a national MRL list may fully defer to CXLs

Algeria	Colombia	Jordan	Nicaragua	Syria
Angola	Ecuador	Lebanon	Nigeria	Tanzania
Bahamas	El Salvador	Libya	Pakistan	Trinidad and Tobago
Bangladesh	Fiji	Malawi	Paraguay	Tunisia
Barbados	Ghana	Mozambique	Peru*	Uruguay
Bermuda	Guatemala	Myanmar	Philippines*	Venezuela
Cambodia	Jamaica	Netherlands Antilles	Senegal	

* Peru and the Philippines have each published proposed national MRLs indicating their use of CXLs will be changing. The timing of these changes is not presently clear.

Countries without a national MRL list which defer to CXLs, but may also apply US, EU, and/or Default MRLs in more complex deferral paths

Costa Rica	Egypt	Panama	United Arab Emirates	Dominican Republic
Honduras				

Countries with a national MRL list which defer to CXLs when a national MRL is not established. Some of these countries also apply US, EU, and/or Default MRLs in more complex deferral paths

Argentina	Ethiopia	Kenya	New Zealand	Thailand
Brazil	French Polynesia	Korea	Saudi Arabia	Vietnam
Brunei	India	Malaysia	Singapore	
Chile	Israel	Morocco	South Africa	

Countries that adopt CXLs into their national MRL regulation

- China has been reviewing and adopting CXLs on a regular basis for several years. In the most recent adoption/implementation of over 1000 MRLs that covered 142 active ingredients, approximately 76% were harmonized Codex MRLs.
- On August 1, 2014, Hong Kong's new national MRL regulation went into effect replacing a full deferral to CXLs. For many active ingredients, the majority of MRLs adopted were CXLs. Hong Kong's Centre for Food Safety has indicated that they intend to adopt new CXLs periodically, although timing has not yet been determined. Additionally, Hong Kong adopted the Codex crop groups as defined in the Codex Classification of Foods and Animal Feeds.
- A recently proposed new Vietnamese MRL regulation adopts hundreds of CXLs as well as many of the Codex crop groups.
- A Indonesian MRL amendment that enters force February 17, 2016, aligns Indonesia's MRLs with CXLs for many commodities.
- The European Union annually adopts new CXLs into its MRL regulation if no reservations are made at the Codex Committee on Pesticide Residues (CCPR) meeting each year.

Other Considerations

The balance between domestic enforcement at the local level and with regard to a standard for commodities in trade at the same time is difficult. Generally, if a pesticide is not registered for use on a given crop domestically, then no MRL would be established for an imported commodity that may have been treated with the product. Consequently that crop could not be imported into that country. In many cases the importing country does not have a process for setting import MRLs or this process is a low priority, since registering products for domestic growers is paramount.

In other cases there maybe processes that can delay import MRLs, for example some countries require that the exporting country have a registration in place for the pesticide-crop combination, before an import MRL application can be submitted to the importing country. This condition can delay obtaining import MRLs by several years which is unfortunate for new active ingredients, which are often safer to use.

Codex CXLs would seem to be highly valuable in filling this void for import MRLs. Nonetheless, MRL harmonization and the facilitation of global trade would be much improved if all countries had clear import MRL setting processes that supported newer products.

In every respect it would seem that Codex CXLs would appear to be an ideal trade standard, however, there have been several obstacles that may bring to question the utility of this standard. These primarily include: countries developing their own sovereign regulations that affect trade; and resources for the Codex work on pesticides. FAO and WHO receive very little specified financial support for JMPR from respective member states, which may bring to question if they truly feel that the Codex/JMPR process is of value?

The Use of Global Residue Data Sets to Facilitate the Establishment of Harmonized Maximum Residue Levels

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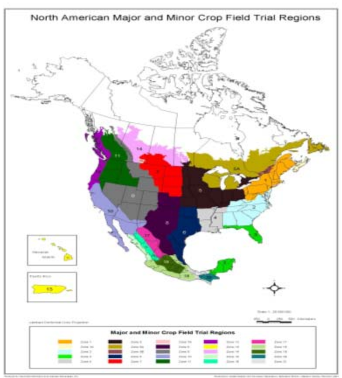
Maximum Residue Levels (MRLs) of pesticides are critical components in international trade of agriculture commodities. Establishment of MRLs is a complex process requiring supervised field trials were the test pesticide is applied to the crop according to appropriate application rates and timings outlined in the Good Agricultural Practice (GAP). In many countries, the regulatory authority provides guidance on the number and locations of supervised field trials required to establish a MRL.   The intent of these guidelines is to ultimately provide the reviewer with a statistically valid data set that ensures the MRL accurately covers the pesticide residues from the GAP use.

The North American Free Trade Agreement (NAFTA)-Pesticide Technical Working Group, with representatives from Canada, Mexico and the United States, established the NAFTA Residue Zone Maps (see below).   Guidelines for number and location of supervised field trials were based on North American agro-climate regions not political borders between States, Providences and Countries.   The goal was to encourage work sharing between countries, the development of a more robust data set and ultimately harmonization of the MRLs between these trading partners.



Many new uses in North America are registered following the guidelines associated with the NAFTA Residue Zones. Because of the success in North America, the authors have proposed that global residue zones can be established and used to achieve the same goals; worksharing between countries, development of a more robust data set and harmonization of MRLs internationally.

To test the feasibility of using residue data developed in one geographic region to suffice for other regions, the IR-4 Project conducted a study. In supervised field trials, using identical application equipment and pre-measured amount of chemical, a single application of four chemicals (mandipropamid, difenoconazole, thiamethoxam and lambda-cyhalothrin) were sprayed on field tomato (*Solanum lycopersicum* L.). The supervised field trials were at 27 field trial locations, representing field tomato production regions from 22 countries, six continents and multiple climates.

Application accuracy ranged from (5.1 to 112??% of the target rate.

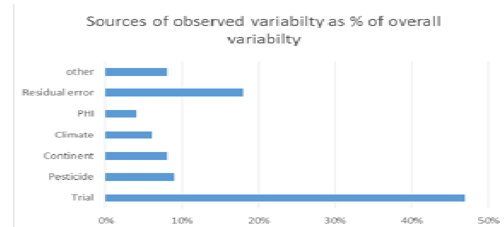
Mature tomato fruit were harvested at 0, 1 & 3 days after application, frozen and shipped frozen to the U.S. Environmental Protection Agency Analytical Chemistry Laboratory in Maryland, USA. The parent chemical and appropriate metabolites were analyzed using QuEChERs extraction method followed by analysis on a liquid chromatograph /tandem mass spectrometer. Residue values for all four chemicals were compared between sites, countries, continents and climates.

The amount of residue found on tomatoes was comparable across different continents and climates. The results for one of the chemicals (for example) in parts per billion are presented below:

Continent	Mean (ppb)	N	Standard Dev.
Africa	25.8	30	16.3
Asia	22.8	42	15.5
Australia	17.0	12	8.1
Europe	61.5	30	49.3
N. America	20.4	36	14.1
S. America	39.5	12	29.7

Climate	Mean (ppb)	N	Standard Dev.
Arid	32.0	36	17.5
Mediterr.	47.1	36	50.6
Temperate	21.4	60	15.0
Tropical	28.7	30	23.1

The results show that residue variability within trials for a region was greater than that between continents, climates and pesticides



This initial data set supports the concept that using data developed in one country to reduce the data requirements in another country is possible, while providing regulatory agencies with a more robust data set. This mixed data set is similar to the way the US and Canada has accepted data from each other's countries to support MRL establishment over the past several years.

The data from this study also shows the potential for data from various supervised field trials throughout the world could be combined into a single study that can be submitted to multiple regulatory authorities to support harmonized MRLs in multiple countries and regions.

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