Insecticide Resistance Action Committee

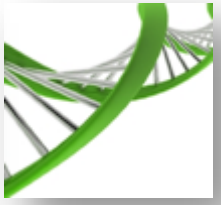
Lepidoptera Working Group
Session 2B

Luís Teixeira

Dublin

April 6th 2016




Welcome Lepidoptera WG Members!

Representative	Company
Adeline Bertrand	ADAMA
Sebastian Coggiola	ADAMA
Werner Heck	BASF
Siddharth Tiwari	BASF
Nigel Godley	Bayer
Ralf Nauen	Bayer
Eric Andersen	Cheminova/FMC
Jim Dripps	Dow
Maria Torne	Dow
Andrea Bassi	DuPont
John Andaloro	DuPont
Luis Teixeira	DuPont
Nobuyuki Nonaka	Nihon Nohyaku
Brian Duggan	Nufarm
Jan Elias	Syngenta
Robert Senn	Syngenta
Daniel Zommick	Valent
Dirk Ave	Valent
Total = 18	Total = 10

IRAC

Reminder of Antitrust guidelines

DON'T

1. Do not, in fact or appearance, discuss or exchange information regarding :

   (a) Individual company prices, price changes, price differentials, mark-ups, discounts, allowances, credit terms, etc., or data that bear on price, e.g. costs, production, capacity, inventories, sales, etc..

   (b) Industry pricing policies, price levels, price changes, differentials, etc..

   (c) Changes in industry production, capacity or inventories.

   (d) Bids on contracts for particular products; procedures for responding to bid invitations.

   (e) Plans of individual companies concerning the design, production, distribution or marketing of particular products, including proposed territories or customers.

   (f) Matters relating to actual or potential individual customers or suppliers that might have the effect of excluding them from any market or of influencing the business conduct of firms toward such suppliers or customers.

2. Do not discuss or exchange information regarding the above matters during social gatherings incidental to meetings, even in jest.

Reminder of Antitrust guidelines

DO

1. Have an agenda and adhere to prepared agendas for all meetings.

2. Get minutes taken and object if they do not accurately reflect the discussion and actions taken.

3. Consult with your legal counsel on all antitrust questions relating to meetings.

4. Protest against any discussions or meeting activities which appear to violate the antitrust laws; disassociate yourself from any such discussions or activities and leave any meeting in which they continue.

Lepidoptera WG SMART Objectives 2016

1. Maintain currency of the global IRM guidelines based on new experiences, new active ingredients, and application methods.
2. Improve Lepidopteran educational and communication tools
3. Transition country diamide working groups to resistance action groups
4. Initiate compliance process to align IRM recommendations among company product labels.
5. Assess usability of “diamide” bioassay methods for lep products

Lepidoptera WG SMART Objectives 2016

Goals	Objectives
1. Maintain currency of the global IRM guidelines based on new experiences, new active ingredients, and app methods.	• Update new global insecticide IRM guidelines (for leps) - rewrite to transition from diamide to insecticide IRM guidelines - clarify recommends for lep products providing non-lep control - incorporate seed treatment application method - revise and include product label IRM language examples - disseminate to ISK and use in Goals #2 and 5 Disseminate label criteria
2. Improve Lepidopteran educational and communication tools	• Determine Lobesia poster status and finalize FAW poster • Decide future poster needs (Liriomyza, Heliothines) • Assist in completion of IRAC/Crop Life Grower Benefit Brochure • Complete an IRM training slide set using new insecticide IRM guidelines with examples and visuals
3. Transition country diamide working groups to resistance action groups	• Choose new global liaisons to communicate to country teams • Lep team companies identify country reps to participate in local mtgs • Update country resistance action group membership and emails
4. Initiate compliance process to align IRM recommendations among company product labels.	• Each company assesses 2 product labels/country to include: - max # of apps, quality IRM language, mode of action icon - focus - key lep labels in USA, Brazil, China, India, Italy, Spain, - create process to collect, review, and audit progress
5. Assess usability of “diamide” bioassay methods for lep products	• Assess bioassay methods developed for Diamide products vs leps if they can be used to assess non-diamide products.
6. Tuta task team	• Review and updateTuta educational materials • Setup core team • Implementing a workshop • Complete Tuta IRM BMP package

Lepidoptera WG activities

- Brazil Task Team (March 2015)
- IRAC review conference call (April 2015)
- Rothamsted meeting (September 2015)
- Five conference calls
- Multiple revisions of posters and guidelines
- Label collections

2015/16 Action Item Status

ACTION ITEM	LEADER	TIMELINE	Completed when
Determine Lobesia poster status; Finalize FAW poster; Decide future poster need	J. Dripps	4Q2015	At meeting
Update versions of IRM label language and acquire team approval	Robert	4Q2105	At meeting
Revise global guidelines (include non-lep control in IRM strategies, seed treatment, revise label language versions) and get team approval	Nigel	4Q2015	At meeting
Coordinate company label IRM language compliance process: max # of apps, quality IRM language, mode of action icon. Choose first round of country labels (2/company) to upgrade: Leps in USA, Brazil, China, India, Italy, Spain,	John A.	2016	At meeting
Assist Russell to decide pest/market to implement joint IRAC Task Team project…. Suggestions: Yellow stemborer / Striped Stemborer Tuta absoluta Soybean looper Asian Corn Borer		1/2Q2016	Lep team will assist with Tuta task team

2015/16 Action Item Status (cont.)

ACTION ITEM	LEADER	TIME	Completed when
Update country team members list	Luis	4Q2015	Ongoing
Involve non-diamide companies in CRAG – Invite ISK reps	Team	4Q2015	Done
Finalize country liaisons – distribute leaders among companies	Luis	4Q2015	At meeting
Assess bioassay methods developed for Diamide products vs leps if they can be used for non-diamide products.	Jan/Luis	1/2Q2016	At meeting
Evaluate IRAC "Benefits of IRM to Grower" pamphlet (ID education/ information items at the point of sale that have greatest impact)	John A	1Q2016	Done
Create a basic IRM PowerPoint presentation from guidelines		1/2Q2016	To be done

Lepidoptera joint meeting with Biotech (Thu)

1. Joint session with Biotech WG
   - Insecticide/Biotech integrated opportunities
   - Insecticide/Biotech statement – revisions and potential inclusion of seed treatments
   - BMP discussions – opportunity for future interactions e.g. expansion to needs across Latin America, Asia, S. Africa
2. Excellence Through Stewardship (ETS) – brief history on the IRM efforts; discuss potential for expansion needs from chemistry efforts
3. Any further opportunity/need for Task Team efforts?
   - Puerto Rico opportunity will be driven by IRAC--US
   - Others?

Lepidoptera WG meeting agenda (Wed)

10:00 Welcome, introductions and reminder of antitrust guidelines

10:10 Review 2015/16 Lepidoptera WG activities

10:20 Country updates: The liaison presents summary slides.

- Group status, meetings, reports of resistance, label alignment, proposed IRM strategies
- Challenges/highlights, requests from country WGs to the Lepidoptera working group
- Guidance/communications to country WG
- Review liaison assignments

12:00 Lunch

13:00 Lepidoptera WG discussion

- Label Review Compliance project
- Review Brazil task team effort and key learnings
- Discuss Lep WG contribution to new Tuta Task team (form a committee)
- Review current diamide guidelines and transition to Lep IRM guidelines

14:30 Coffee/Tea

14:45 Lepidoptera WG discussion (Contd.)

- Review/Edit SMART objectives
- Finalize Lobesia and FAW posters
- Other topics? Research findings?

17:30 Session closed

Insecticide Resistance Action Committee

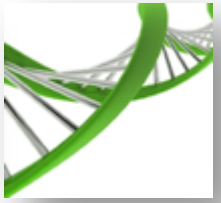
ANNUAL REPORTS: COUNTRY RAG'S

Lepidoptera Working Group Mtg
50th IRAC International Meeting

Dublin Ireland

April 6, 2016, 2015




Country Group Review

- Argentina✓
- Australia ✓
- Brazil✓
- Chile✓
- China✓
- France✓
- India✓
- Indonesia✓
- Israel✓
- Italy✓
- Japan✓
- Korea✓
- Malaysia✓
- Mexico✓
- Morocco✓
- Philippines✓
- South Africa✓
- Spain✓
- Taiwan✓
- Thailand✓
- Turkey✓
- USA✓
- Vietnam✓

Country group liaisons

Representative	Company	Country groups by company	Country groups				
Adeline Bertrand Sebastian Coggiola	ADAMA	2	France	Israel			
Werner Heck Siddharth Tiwari	BASF	0					
Nigel Godley Ralf Nauen	Bayer	3	India	Philippines	Turkey		
Eric Andersen	Cheminova/FMC	1	Chile				
Jim Dripps Maria Torne	Dow	3	Australia Spain	Korea			
Andrea Bassi John Andaloro Luis Teixeira	DuPont	10	Italy Argentina Brazil	Morocco Indonesia Mexico	Japan S Africa	Malaysia	USA
Nobuyuki Nonaka	Nihon Nohyaku	0					
Brian Duggan	Nufarm	0					
Jan Elias Robert Senn	Syngenta	4	China	Thailand	Vietnam	Taiwan	
Daniel Zommick Dirk Ave	Valent	0					

Adeline Bertrand

Israel

No recent meetings

2015-2016 (Israel) Diamide Working Group Report

TEAM STATUS

1.Date team was formed: 20 Sep 2015

2.Number of meetings in 2015 and 1st Q 16: 1

3.Name the highest risk insects and crops the team is targeting:_____

_Plutella, Tuta absoluta, (cabbage, Tomato) _corn- Chilo partellus

Dr Yuval Binyamini- Luxembourg ltd:Yuval Benyamini <yuval@Luxembourg.co.il>
Mr Doron Baum- CTS LTD (Agrica): DoronB@cts.co.il
Mr Glidai Shlomo- Gadot Agro (Merhav..): shlomog@gadot.com
Mr Yoram Cahlon- Syngenta IL: Yoram.Cahlon@SYNGENTA.COM: current coordinator

IRAC

France

No recent meetings

2014-15 FRANCE Country RAG

TEAM STATUS

1.Date team was formed: 21th November 2014

2.Number of meetings in 2014 and 1st Q 15: 1 meeting in 2014

3.Name the highest risk insects and crops the team is targeting: Topics to be addressed during the next meeting

4.List team members and current coordinator:

DuPont:
Main contacts (R&D): Amandine Picard (amandine.picard@dupont.com) & Gwenael Champroux (Gwenael.L.Champroux@dupont.com)
If needed (Marketing) : Jean-Robert Roos, Patrick Bergougnoux, Aurelie Morin
Syngenta :
Main contacts : Sebastien Vautrin (sebastien.vautrin@syngenta.com), François Sénéchal, Céline Thibault.
Team coordinator: Amandine Picard

Nigel Godley

India

IRAC – Diamide Group India

Review Meeting – IRAC Diamide Group

Date : 10’th September , 2015

Venue : Bayer House – Thane

Participant

- **DuPont** - Sanjay Sharma , Rajiv Rathod
- **Bayer** - Gulshan Singh Rana, KVV Satya
- **Syngenta-** Rajendra Deshmukh, Yashwant Patil
- **Rallis India**- G.N.Kendappa
- **Dow Chemicals-** Srigiriraju Lakshmipathi
- NNC : Not attended
- **Crop Life India** – Varun Goel

Review – Rice

- Only one Diamide application per crop per season is advised
  - Please allow maximum two rounds in one crop cycle , as suggested by global guidelines – to be come back by Syngenta
- In Rice two application windows were identified as follow
  - A. TP Rice the windows-1: **up to 30 DAT** (days after transplanting) and window 2: **40-60 DAT.**
  - B. DS the windows-1: 25-40 DAS and Window 2: 50-70 DAS
- All the Diamide products should be used either in window 1 or in window2 but should not participate in both the windows.
- Diamides should be promoted based on window approach only.
- All the promotional material of member companies should disseminate the same message related to this subject.
- IRAC common communication material will be on the similar lines for Rice.
- All the stake holders agreed not to talk about Rice nurseries in the communication (Syngenta suggested to allow application in Nursery segment) – Still to close this point
- For effective pest management, use alternate mode of action chemistries

Review – Cabbage

- In cabbage two applications in a crop were advised.
- In Cabbage four windows were identified, the first window is from nursery to 20 days after transplanting (DAT), the second window is from 21-50 DAT, third window is from 51-80 DAT and 4th window is from 80 DAT and beyond.
- Diamides should be applied either in the '1st' and '3rd' window or in '2nd' and '4th' window.
- All the stake holders decided to allow an additional/back to back application in window 2 (20-40 DAT) at 10 days interval and the same recommendation goes in the IRAC common communication material.
- If participate in 4'th window , not to participate in 1'st window of succeeding crop
- For effective pest management, use alternate mode of action chemistries

Review – Egg Plant

- In Egg plant maximum 3 applications of diamides are allowed in a crop season
- For management of egg plant shoot and fruit borer (SFB), 5 windows were identified when insecticide applications are required to protect the crop from damage by this pest.
- The first window is from 0 to 40 days after transplanting (DAT) , the second window is from 41-70 DAT, third window is from 71-100 DAT , 4th window is from 101-130 DAT and 5th window is from 131 DAT and beyond.
- Application of Diamides in subsequent windows need to be avoided.
- Apply either in the 1st , 3rd & 5th window “OR” 2nd and 4th window.
- For effective pest (shoot & fruit borer) management, use alternate mode of action chemistries
- For effective pest management, use alternate mode of action chemistries

Review – Tomato

- In Tomato maximum 3 applications of diamides are allowed in a crop season
- For management of Tomato fruit borer (FB) , Tuta absoluta(Tomato pin worm), 5 windows were identified when insecticide applications are required to protect the crop from damage by this pest.
- The first window is from 0 to 40 days after transplanting (DAT) , the second window is from 41-70 DAT, third window is from 71-100 DAT , 4th window is from 101-130 DAT and 5th window is from 131 DAT and beyond.
- No application of Diamide in subsequent window is allowed
- Apply either in the 1^{st} , 3^{rd} & 5^{th} window “OR” 2nd and 4th window.
- For effective pest management, use alternate mode of action chemistries

Review – Pigeon Pea

- For management Helicoverpa armigera, (pod borer) and Maruca vitrata, Flower webber (FW) , 2 windows were identified when insecticide applications are required to protect the crop from damage by these pest
- The first window is from flower bud initiation 91/101 days after sowing (DAS) to 120/130 DAS [Flower bud to 50% of flowering] , the second window is from 121/131 DAS to 151/161 DAS [Pod initiation & development]
- Maximum two applications of Daimide are allowed in a crop life cycle.
- One can decide to participate in either of the identified two window
- IRAC common communication material will be on the similar lines for Pigeon pea.
- For effective pest management, use alternate mode of action chemistries

Review – Chick Pea

- For management Helicoverpa armigera, (Pod borer) and Spodoptera Exigua , maximum two applications of Diamide are allowed in crop life period
- No consecutive applications of Daimide .
- Use alternative MOA chemistry
- IRAC common communication material will be on the similar lines for Chick pea .
- For effective pest management, use alternate mode of action chemistries

Common Action Area's

- All the stake holders agreed for separate communication material for transplanted and Direct seeded Rice.
- Develop communication plan for Rice, Cabbage, Egg Plant, Tomato, Red gram and Bengal Gram before the next season.
- Should involve communication managers of all the stake holder companies in the communication material preparation.
- Common communication on Resistance management strategy for trade partners / customers through crop life . The IRAC group will develop the communication . The draft will be prepared and decided in next meeting
- It is advisable to Share the promotional literature with India IRAC Diamide group
- Any deviation from the aligned / agreed guidelines should be brought to the table of IRAC Diamide group

Common Action Area's

- Stakeholders agreed to share finding of Resistance monitoring programme within the group (Once in a year)
- Printing IRAC group number on the labels – to take further action
- Suggested to Incorporate resistance management guidelines on the label
- Face to face meeting once in every qtr
- Nominate official from organization one from technical and one from marketing
- Request Crop life to activate the India IRAC/FRAC/HRAC groups
- Crop life has to initiate technical group of member companies .
- Next meeting will be in November , 2015 (FTF)
- Nominate the team members – one from Technical side and one from Marketing side (third will be optional) with complete details of Person – Full name , Designation, Organization , E mail and contact Mobile and office no's – G.S.Rana will compile and develop a group and share with team . It is to be done before sending minutes.

Country “R” Action Group Progress:

1. Understand Objectives
2. Meet and Organize
3. Review Antitrust
4. Review Global Guidelines

5.Select High Risk Insects & crops
6.Develop Plan to Communicate MOA
7. Develop IRM Guideline Plan by Crop
8. Develop Communicate & Educate Plan

9.Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply
11. Work on more pests & crops
12. Transition from Diamide to IRM WG

Thanks for your participation

&

Valuable suggestions

Philippines

Turkey

Eric Andersen

Chile

Jim Dripps

Australia

Insecticide Resistance Management Review Group (IRMRG)- a technical group advising on insecticide resistance management strategies representing CropLife members for registered insecticides used in Australian production systems.

The IRMRG have an annual meeting. Our next meeting is scheduled for 22nd March, 2016.

Issue/Lead:	**Item 6.1 – Meeting – 31 March 2015 (Geoff Cornwell)**
For:	**Decision**
Pages:	**Five**

MINUTES OF THE MEETING OF THE INSECTICIDE RESISTANCE MANAGEMENT REVIEW GROUP HELD AT 10.00AM ON TUESDAY 31 MARCH 2015-QANTAS MEETING ROOMS, BRISBANE AIRPORT

Present:	Mr Geoff Cornwell (Chairman)	DuPont (Australia) Pty Ltd
	Mr Luke Collins	Adama Australia
	Mr Gavin Heard	BASF Australia Ltd
	Mr Rob Vitelli	Bayer CropScience Pty Ltd (partial)
	Dr Rob Annetts	Dow AgroSciences Australia Pty Ltd
	Dr Kristen Knight	Monsanto Australia Limited
	Mr Glen Tucker	Nufarm Australia Ltd
	Mr Ken McKee	Syngenta Crop Protection Pty Ltd
	Mr Doug Paton	Sumitomo Chemical Australia Pty Ltd
	Also in attendance:	
	Mr Alastair James	CropLife Australia Ltd (Secretary)

Department of Agriculture and Food

Diamondback Moth (DBM) Insecticide Resistance Management (IRM) Strategy Western Australia

Update 20 Sept. 2015

Consult product labels and/or permits for registrations for specific vegetable brassica crops and application information.
This strategy is part of integrated pest management (IPM) for vegetable brassica crops — cauliflower, broccoli, cabbage and Brussels sprouts.

Crop stage	Window 1: 1 July–31 Dec	Window 2: 1 Jan–30 June
Seedling treatment	Group 28 + Group 4A[1] **Durivo®** WHP 42[2] AI: **chlorantraniliprole + thiamethoxam**	A shorter window is recommended due to longevity of product
Early	Group 11 Bt's AI: ***Bacillus thuringiensis*** WHP not required	
Mid to late	Group 5 **Success™ NEO** WHP 3 AI: **spinetoram**	Group 6 **Proclaim®** WHP 3 AI: **emamectin benzoate**
	Group 28 **Belt®** AI: **flubendiamide** WHP 3[2] **Coragen®** AI: **chlorantraniliprole** WHP 7[2]	Group 22A **Avatar®** WHP 7[2] AI: **indoxacarb**
Late	Group 13 **Secure®** AI: **chlorfenapyr** WHP 7	Group 2B **Regent®** WHP 7 AI: **fipronil**
	Group 3A **Synthetic pyrethroids (SP's)** AI: **alpha-cypermethrin, cypermethrin** WHP 1 AI: **lambda-cyhalothrin, tau-fluvalinate[3], permethrin** WHP 2 AI: **esfenvalerate, gamma-cyhalothrin** WHP 2	
	Group 1B **Organophosphates (OP's)** AI: **maldison[4], acephate** WHP 3[5] AI: **chlorpyrifos** WHP 5 AI: **prothiofos[6]** WHP 7	

WHP = withholding period in days. AI = active ingredient

[1] **Durivo®** contains active ingredients from Group 28 and Group 4A. Do not apply **Belt®** or **Coragen®** in **Durivo®** treated crops.
[2] **Durivo®**, **Belt®**, **Coragen®** and **Avatar®** have different WHP for leafy brassicas and other vegetable brassica crops.
[3] **Tau-fluvalinate** is only registered for cauliflowers. [4] **Maldison** is registered for cabbage and cauliflower only. [5] WHP for **acephate** on broccoli is 14 days.
[6] **Prothiofos** is not registered for cauliflower.

IRAC

IRMRG meeting.

GWC notes. 22.3.2016.

Item 1. Welcome.

- Welcome all.
- Particular welcome to Lauren O'Connor who will be replacing Ken McKee as the Syngenta representative for future meetings. Lauren will be present today as a non-voting observer.
- On behalf of CropLife, I would like to thank you all for your time & commitment to this meeting over & above your normal job roles.

Item 1. Ground Rules.

- One voice at a time.
- We each must concentrate on a purposeful contribution.
- Take care of your own personal needs.
- Everybody is responsible for the success of the meeting.
- Silence is not consent.
- Use of computers: please NO E-mails.
- We, each participant, are responsible for the accomplishment of the meeting objective.
- No personal attacks.
- Bucket all ideas that are peripheral to objective.
- No rank in the room.
- Be good humoured.
- Concentrate on 80:20 (80% effects comes from 20% causes).
- Courtesy to each speaker. Make sure mobile phones are off or on silent.

Item 6.2. Action Control.

- Item 8.6 within Action Control. *Resistance Management Strategies for Grain Protectants.*
  - A clearer route to RMS needs to be organised/ stated. Relevant information is found at:
    - Industry links, Grain Trade Australia, Grain Protection (NWPCG), Phosphine Strategy.
    - This is the link http://www.graintrade.org.au/nwpgp
    - See Pat Collins e-mail 16.12.2015

Item 7.

- Guidelines for defining active constituent names in the Insecticide Resistance MoA tables.
  - Extract from IRAC MoA Classification Scheme (Feb, 2014, Version 7.3)
    - 6. The MoA Classification Scheme.
      - The MoA classification scheme developed & endorsed by IRAC is based on the best available evidence of the MoA of available insecticides. Details of the listings have been agreed by IRAC companies and approved by internationally recognised industrial and academic insect toxicologists and biochemists.
    - 6.1. Rules for inclusion of a compound in the MoA list.
      - Chemical nomenclature is generally based on that appearing in The Pesticide manual, 16th edition, November 2012, Ed. Colin MacBean, published by The British Crop Protection Council.
      - To be included in the active list, compounds must have or be very close to having a minimum of one registered use in at least one country.
      - In any one MoA classification sub-group, where more than one active ingredient in that chemical sub-group is registered for use, the chemical sub-group name is used.
      - In any one MoA classification sub-group, where only one active ingredient is registered for use, the name of that exemplifying active ingredient may be used.
    - Also refer to Appendix 4 in this document for more detail

Item 7. Insecticide Resistance MOA table- Annual Review.

- Need to align Main MOA Group & Primary site of action column with IRAC table. Include type eg. nerve action.
- Updates to include:
  - Group 2- …Blockers instead of …Antagonists.
  - Group 4- …Competitive modulators instead of agonists.
  - Group 5- …Modulators instead of activators.
  - Group 6- Glutamate-gated chloride channel allosteric modulators instead of Chloride channel activators.
  - Group 9- Chordotonal organ TRPV channel modulators instead of Selective Homopteran feeding blockers. Note flonicamid is now out of this group.
  - Group 15- delete reference to Lepidopteran.
  - Group 16- delete reference to Homopteran.
  - Group 20- delete reference to Coupling Site II.
  - Group 29- To be added. Chordotonal organ Modulators – undefined target site. This applies to flonicamid.
    - Informed Gerry Shepherd, ISK of this change on 11.3.2016 & they (UPL) will be updating their label nomenclature. iskoceania@gmail.com
- Any new additions?
  - Metaflumizone is Group 22B & Vip 3A is Group 11.

IRMS Annual Review. Item 8.2. TSM IRMS.

Abamectin resistance in Two Spotted Mite Increasing

Results from the 2013-14 resistance monitoring program show a concerning increase in the incidence of abamectin (Agrimec®) resistance in Two Spotted Mite (TSM). Positive resistance results to abamectin in Two Spotted Mite (TSM) have rarely been detected until 2010-2011, when abamectin resistance was found in three out of the four TSM strains tested. Since then abamectin resistance has been regularly detected. This past 2013-2014 season abamectin resistance was detected in six out of the eleven strains tested and worryingly one of those strains comprised 79% resistant TSM.

These results for abamectin suggest restraint in usage is now required. A common use pattern for abamectin has been to apply in combination with mirid sprays as an 'insurance spray'. Mirid sprays can be disruptive of beneficials so the inclusion of abamectin reduces the risk of subsequent mite outbreaks. However, this practice may ultimately lead to abamectin failure against mites. In general, the numbers of TSM in crops across most regions has dramatically reduced. This would suggest that insurance sprays against mite outbreaks in most situations may be unnecessary, and may be having a negative impact by increasing the levels of abamectin resistance.

Issues to consider:

- Spraying mirids below threshold may increase the chances of flaring other pests, such as mites and SLW
- The use of an 'insurance' spray against mites at below threshold values may increase the risk of resistance

Take Home Messages:

- Control pests at or above industry recommended thresholds
- When making spray decisions and insecticide choices, consider the impact on beneficials and risk of flaring non-target pests

More information on insect thresholds, control options and impact on beneficials can be found in the 2014-15 Cotton Pest Management Guide.
http://www.crdc.com.au/publications/cotton-pest-management-guide-2014-15

-CropLife has a TSM strategy for pome fruit.
-The following concerns relate to cotton.
-The only mite strategy for cotton is listed on the seasonal IRMS.
-Add the "Issues to consider" to the cotton IRMS.

IRMS Annual Review. Item 8.2. TSM IRMS.

(Extract from The Australian Cottongrower February-March 2016 edition).

Mite resistance danger from over-use of abamectin

Grant A Herron, NSW DPI and Lewis J Wilson, CSIRO Agriculture

AT A GLANCE…

- Mirids have emerged as the major pest in Bt-cotton. Most mirid sprays reduce beneficials, increasing the risk of twospotted spider mite (TSSM) outbreaks.
- So a miticide, usually abamectin, is often added to mirid sprays to prophylactically control TSSM.
- This is selecting for resistance in TSSM to abamectin and during 2014–15 resistance was detected in about 70 per cent of TSSM strains with one strain comprising 75 per cent resistant individuals.
- Better decisions about the need to include abamectin with mirid sprays will help reduce selection pressure. This includes effective mirid sampling and application of thresholds so they are only controlled when necessary and use of more selective control options when they are needed, combined with effective mite sampling and omission of abamectin if mite numbers are low.

Does IRMRG support the addition of these IRM comments on the cotton strategy?

Cotton IRMS

INSECTICIDE RESISTANCE MANAGEMENT STRATEGY 2014/15

BEST PRACTICE PRODUCT WINDOWS AND USE RESTRICTIONS TO MANAGE INSECTICIDE RESISTANCE IN APHIDS, SILVERLEAF WHITEFLY, MITES AND HELICOVERPA SPECIES.

Central & Southern Regions: Balonne, Bourke, Darling Downs, Gwydir, Lachlan, Lower & Upper Namoi, Macintyre, Macquarie, Murrumbidgee

STAGE 1	STAGE 2 (15 Dec 2014)	STAGE 3 (15 Jan 2015)	STAGE 4 (15 Feb 2015)	WHICH PRODUCT FOR WHICH PEST? Refer to Tables 2–18, pages 10–46
Foliar *Bacillus thuringiensis* (Dipel)				Excludes Bollgard II refuges.
Helicoverpa viruses (Gemstar, Vivus)				Avoid season long use of low rates.
Pirimicarb				NON CONSECUTIVE APPLICATIONS. [1]
Paraffinic Oil (Canopy, Biopest)				No restrictions.
	start = 1450 Day Degrees Pyriproxyfen			In a salvage situation, knockdown also required [3,7]
Phorate at planting insecticide				Note [1]
Etoxazole (Paramite)				
GROUP 28: MAX 4/SEASON	Chlorantraniliprole (Altacor) Group 28			Note [4,7,10]
	Cyantraniliprole (Exirel) Group 28			Note [3,4,7,10]
Dicofol				Ground only. NSW only. [9]
Amorphous silica (Abrade)				No restrictions.
	start date = canopy closure Diafenthiuron			NON CONSECUTIVE APPLICATIONS. [3,9]
Pymetrozine (Fulfill)				NON CONSECUTIVE APPLICATIONS [3]
Indoxacarb (Steward)		January 31		Note [4,9]
Spirotetramat (Movento)				Note [3]
Abamectin		Max. 3		Note [4,9]
Emamectin (Affirm)				Note [4,7,9]
	start date = squaring Propargite			NON CONSECUTIVE APPLICATIONS. [7]
Amitraz				Note [4]
Sulfoxaflor (Transform) Group 4C				NON CONSECUTIVE APPLICATIONS [2,7,9]
Fipronil				Notes [4,7,9]
Neonicotinoids (Amparo, Cruiser, Gaucho, Actara, Confidor, Intruder, Shield) Group 4A				NON CONSECUTIVE APPLICATIONS. [2,7,9]
Chlorantraniliprole + Thiamethoxam (Voliam Flexi) Group 4A + Group 28				Consider risk to each group [2,4,7,9,10]
CHECK IMPACTS ON BENEFICIALS, PAGES 8–9.		February 1 Carbamates (methomyl, thiodicarb)		Note [5,9]
		Dimethoate / Omethoate		Not for use in rotation with pirimicarb. [1,7,9]
		OPs (chlorpyrifos, methidathion)		Notes [4,7,9]
		Synthetic Pyrethroids		High resistance, *H. armigera*. [3,4,7,8,9]

SELECTIVITY: increasing ↓ decreasing

STOP OVERWINTERING OF RESISTANT POPULATIONS BY PRACTISING GOOD FARM HYGIENE AND CONTROLLING WINTER HOSTS. PUPAE BUST AFTER HARVEST.[6]

COMMENTS AND NOTES DESCRIBE ALL USE RESTRICTIONS

NO MORE THAN **ONE** APPLICATION PER SEASON

NO MORE THAN **TWO** APPLICATIONS PER SEASON

NO MORE THAN **THREE** APPLICATIONS PER SEASON

NO MORE THAN **FOUR** APPLICATIONS PER SEASON

Note 1: If a phorate side dressing is used instead of a neonicotinoid seed dressing then do not use pirimicarb or dimethoate/omethoate as first foliar spray as there is cross resistance between them all. Dimethoate/omethoate use will select catastrophic pirimicarb resistance in aphids so do not use pirimicarb and dimethoate/omethoate in the same field.

Note 2: Failures of neonicotinoids against aphids have been confirmed. DO NOT follow a neonicotinoid seed treatment with a foliar neonicotinoid when aphids are present. If there is an alternative do not follow a neonicotinoid with sulfoxaflor.

Note 3: Cross check with the Silverleaf Whitefly Threshold Matrix, page 29.

Note 4: Maximum 2 consecutive sprays, alone or in mixtures.

Note 5: Additional applications can be made if targeting Helicoverpa moths using Magnet.

Note 6: Sprayed conventional cotton crops defoliated after March 9 are more likely to harbour resistant diapausing *Helicoverpa armigera* and should be pupae busted as soon as possible after harvest and no later than the end of August.

Note 7: Observe Witholding Periods, page 158. Products in this group have WHP 28 days or longer.

Note 8: High resistance is present in *Helicoverpa armigera* populations. Expect field failures.

Note 9: Refer to label for warnings of insecticide risk to bee population. Fipronil has long residual toxicity to bees.

Note 10: Maximum 4 applications of Group 28 insecticides (Altacor, Exirel, Voliam Flexi). No use of Altacor in Chickpeas after 15th October

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

- Specific DBM brassica IRMS for various states currently do not exist on the CropLife web site except for WA which was updated in 2015.
- This needs to be rectified.
- The proposed short term plan is to place the following wording on the CropLife site for user guidance:

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

- Always read and follow product labels. Some products place a limit on the number of times they can be applied per crop (see table below) and when they can be applied.
- Monitor crops regularly and only apply insecticide when the pest threshold is reached.
- Be aware of insecticide mode of actions used in the nursery phase of the crop and ensure a one generation break exists before re-use of that same mode of action in the field phase of the crop.
- Ensure spray rig is properly calibrated and achieving good coverage with appropriate sized spray droplets.
- Time the application to the most susceptible life stage of the target pest.
- To encourage beneficial insects, use *Bacillus thuringiensis* (Bt) sprays and avoid broad spectrum insecticides, particularly early to mid crop cycle.
- DO NOT use insecticide tank-mixes where both active ingredients control DBM.
- DO NOT re-treat a spray failure with a product from the same chemical group.
- Practice good crop hygiene to reduce DBM pressure- plant clean seedlings and incorporate crop residue as soon as practical after harvest.
- To help prevent the development of resistance to any one specific active ingredient (see table below), observe the following instructions:
  - Use in accordance with the current IRMS for your region.
  - Apply a specific active ingredient using a “window” approach to avoid exposure of consecutive insect pest generations to the same mode of action. Multiple successive applications of a specific active ingredient are acceptable if they are used to treat a single pest generation.
  - Following a “window” of a specific mode of action product, rotate to a “window” of applications of effective insecticides with a different mode of action.
  - The total exposure period of any one mode of action “active window” applied throughout the crop cycle (from seedling to harvest) should not exceed 50% of the crop cycle.
  - Incorporate IPM techniques into the overall pest management program and
  - Monitor insect populations for loss of field efficacy.

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

Mode of Action Group as specified on product label	Active ingredient	Number applications permitted per crop per season from product label
1A	methomyl, thiodicarb	not specified
2B	fipronil	4 per year within 8 week period
3A	synthetic pyrethroids (various)	not specified
5	spinetoram	4
6	emamectin benzoate	4 per year
11	*Bacillus thuringiensis*	not specified
13	chlorfenapyr	2 but 4 in brussel sprouts
22A	indoxacarb	4
28	chlorantraniliprole, flubendiamide	3 but 1 for Durivo (chlorantraniliprole + thiamethoxam)

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

- The proposed long term plan is to establish annual DBM resistance monitoring so that data is generated to make informed decisions on how the IRMS is to be set up by region.
- How will this be done?

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

- CropLife companies that contribute main chemistry for DBM control in brassica vegetables have been canvassed for support of annual DBM resistance monitoring project both technically & financially.
  - As a general comment all co's (BASF, Bayer, Dow, DuPont, Syngenta) support approach in principle however there are concerns around data ownership, data interpretation, who decides how data is used in formulating the IRMS.

PROJECT:

Plutella xylostella (Diamond back moth, DBM/Cabbage moth) annual insecticide resistance monitoring for key brassica vegetable production areas in Australia.

AIMS:

Secure funding on an annual basis for sound, scientific insecticide resistance monitoring on *Plutella xylostella* spanning the key MOA's currently registered and used in brassica vegetables in Australia so that relevant and practical Insecticide Resistance Management Strategies (IRMS) can be developed & implemented on a seasonal basis.

Testing season to begin in 2017.

JUSTIFICATION:

There is currently no funded and formal resistance monitoring program in place for *Plutella xylostella* in brassica vegetable production areas in Australia. This is a vulnerable position to be in because:

1. *Plutella xylostella* is a notorious pest for developing resistance to synthetic insecticides therefore DBM insecticide resistance development is a potential threat to viable brassica vegetable production systems in Australia,
2. Current DBM Insecticide Resistance Management Strategies in place for all states need updating. These can not be updated scientifically and effectively unless sound resistance monitoring data is available for decision making purposes.

PROPOSED METHODOLOGY:

(i). To be conducted by SARDI based at Waite in Adelaide, South Australia. They currently have the expertise and infrastructure.

SARDI are currently involved in a GRDC funded project focusing on DBM management including insecticide resistance status. The two projects would complement one another as there is known DBM gene migration between the canola and vegetable production areas in Australia.

(ii). Target active ingredients to screen on an annual basis:

Representative active ingredient	**Group**	**Company**
Chlorantraniliprole	28	DuPont
Emamectin benzoate	6	Syngenta
Fipronil*	2	BASF
Indoxacarb	22A	DuPont
Spinetoram	5	Dow

*Baseline dose response needs to be established using the Waite susceptible population.

(iii). Target brassica vegetable production areas for *Plutella xylostella* collections on an annual basis:

1. Lockyer Valley, south east Queensland.
2. Sydney Basin, NSW.
3. Werribee, Victoria.

Four (4) populations to be collected from each region per annum. Specific data on collection location, date and crop to be documented. Population collections to be organized by participating chemical companies.

Collected larvae have to be reared to the next generation to achieve sufficient larvae numbers for testing.

(iv). Test procedure.

SARDI currently have discriminating dose data for *Plutella xylostella* on all listed active ingredients except fipronil.

Initial tests will involve screening collected DBM populations against the discriminating dose of each active ingredient.

If any “red flags” appear then a full dose response test will be conducted with that active ingredient on that specific population of DBM to determine the Resistance Factor (RF).

(v). In parallel testing.

Syngenta are currently running a project identifying DBM resistant genes to Group 28 chemistry. It is proposed that for all DBM field collections made for synthetic insecticide discriminating dose testing, that a sample of these larvae also be tested for Group 28 resistant gene identification. This would be conducted by Syngenta.

DATA INTERPRETATION:

For the generated data to be of any value in developing effective IRMS's for DBM in the various production areas from season to season, the data will need to be analysed, reviewed and discussed for development of IRMS path forward by all participating parties.

IRMS Annual Review Item 8.4. DBM IRMStrategies- Brassicas.

- In addition, an application has been made to HIA to secure industry funding to support this project.
- Document was submitted on-line (22.2.16) using Innovation Concepts & Ideas Proposal Form.
  - Document goes to Brenda Kranz, HIA & then out to industry advisers for comment.
  - Turn around period for this process is 3 weeks-4 months.
  - If project is supported, it is then put out to tender. This process lasts for 2-6 weeks.
  - Project would be levy funded (Pool 1) if supported by HIA.

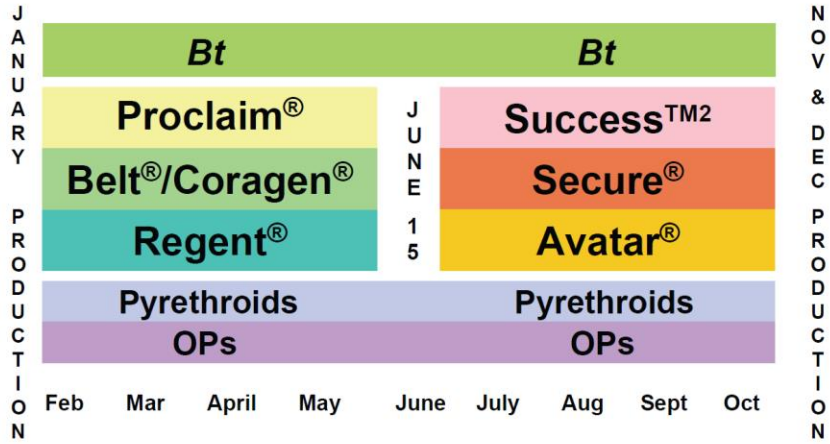
IRMRG Diamondback Moth (DBM)

2009

Insecticide Resistance Management Strategy

for the Lockyer Valley, Queensland

This strategy aims to delay the development of resistance to new insecticide groups



The industry aims to promote co-ordinated use of insecticides to control DBM. Using chemicals in a random manner will cause DBM to rapidly develop resistance. Help to avoid this by adopting this IRM strategy.

Proclaim®, Belt®, Coragen® or Regent® may be used from 1 Feb until 15 June.

Success™2, Secure® or Avatar® may be used from 16 June until 31 Oct.

Labels of some products place a limit on the number of times they can be used. If further control is required on one planting, different groups from within the same window should be rotated.

It is important to monitor crops regularly for DBM.

Do not use mixtures of insecticides for controlling DBM (eg Bt's and pyrethroids).

Use of the biological insecticide, Bt, in the early stages of crop development is encouraged to boost natural enemies. Avoid broad-spectrum sprays (eg. OP's and pyrethroids).

Good crop hygiene - planting clean seedlings and the prompt working in of post harvest crop residues - will help to reduce DBM pressure.

CropLife AUSTRALIA

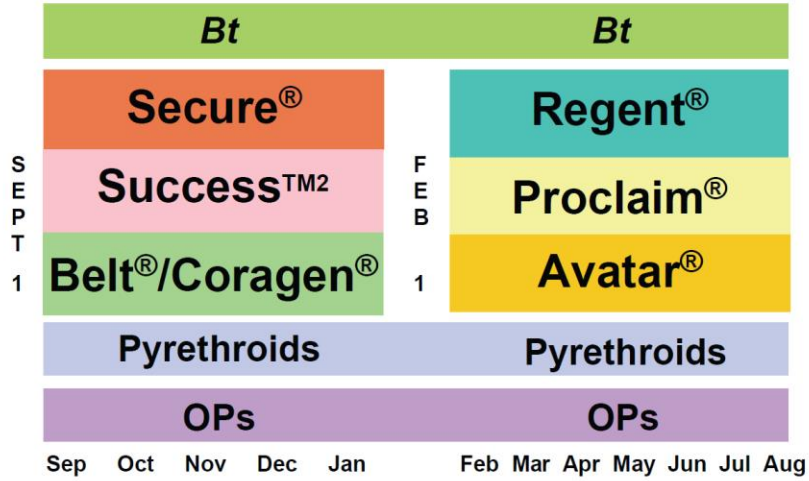
IRMRG is CropLife Australia's Insecticide Resistance Management Review Group

IRMRG Diamondback Moth (DBM) 2009

Insecticide Resistance Management Strategy

for NSW, Victoria, Tasmania, South Australia and Stanthorpe district, QLD

This strategy aims to delay the development of resistance to new insecticide groups



The industry aims to promote co-ordinated use of insecticides to control DBM. Using chemicals in a random manner will cause DBM to rapidly develop resistance. Help to avoid this by adopting this IRM strategy.

Secure®, Success™2, Belt® or Coragen® may be used from 1 Sep until 31 Jan.

Regent®, Proclaim® or Avatar ® may be used from 1 Feb until 31 Aug.

Labels of some products place a limit on the number of times they can be used. If further control is required on one planting, different groups from within the same window should be rotated.

It is important to monitor crops regularly for DBM.

Do not use mixtures of insecticides for controlling DBM (eg Bt's and pyrethroids).

Use of the biological insecticide, Bt, in the early stages of crop development is encouraged to boost natural enemies. Avoid broad-spectrum sprays (eg. OP's and pyrethroids).

Good crop hygiene - planting clean seedlings and the prompt working in of post harvest crop residues - will help to reduce DBM pressure.

CropLife AUSTRALIA

IRMRG is CropLife Australia's Insecticide Resistance Management Review Group

Circulated within IRMRG for comment on 24.9.14.

Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

Diamondback moth (DBM) insecticide resistance management (IRM) strategy Western Australia

Update 19 Sept. **2014**

Consult product labels and/or permits for registrations for specific vegetable brassica crops and application information.
This strategy is part of integrated pest management (IPM) for vegetable brassica crops — cauliflower, broccoli, cabbage and Brussels sprouts.

Crop stage	Window 1: 1 July–31 Dec			Window 2: 1 Jan–30 June		
Seedling treatment	Group 28[1]	**Durivo®**	WHP 42[2]	A shorter window is recommended due to longevity of product		
Early	Group 11C	Bt *(Bacillus thuringiensis)*	e.g. **Bacchus, Delfin®, Dipel®, Xentari®**			WHP not required
Mid — late	Group 5	**Success™ Neo**	WHP 3	Group 6A	**Proclaim®**	WHP 3
	Group 28	**Belt®** **Coragen®**	WHP 3[2] WHP 7[2]	Group 22A	**Avatar®**	WHP 7[2]
	Group 13A	**Secure®**	WHP 7	Group 2B	eg **Fipronil, Regal®, Regent®**	WHP 7
Late	Group 3A	Synthetic pyrethroids	e.g. **Bulldock® 25EC, Cypermethrin, Dominex® Duo, Fastac® Duo** **Ballistic®, Karate®, Mavrik®[4], Pounce, Sumi–Alpha® Flex, Trojan®**			WHP 1[3] WHP 2
	Group 1B	Organophosphates	e.g. **Hy–Mal®[5], Lancer®, Orthene® Xtra** **Lorsban, Chlorpyrifos** **Tokuthion®[7]**			WHP 3[6] WHP 5 WHP 7
	Group 1B	Organophosphate	**Phosdrin®** (insecticide of last resort; restrictions apply, refer to label)			WHP 7

WHP = withholding period in days.

[1] **Durivo** contains active ingredients from Group 28 and Group 4A. Do not apply Belt or Coragen in Durivo treated crops. [2] **Durivo**, **Belt**, **Coragen** and **Avatar** have different WHP for leafy brassicas and other vegetable brassica crops. [3] WHP for **Bulldock** on broccoli is 3 days. [4] **Mavrik** is only registered for cauliflowers. [5] **Hy–Mal** is registered for cabbage and cauliflower only. [6] WHP for **Orthene Xtra** and **Lancer** on broccoli is 14 days. [7] **Tokuthion** is not registered for cauliflowers.

Department of Agriculture and Food

Update **19** **September 2014**

Diamondback moth (DBM) in vegetable brassicas insecticide resistance management (IRM) strategy Western Australia

This strategy is part of integrated pest management (IPM) for vegetable brassica crops — cauliflower, broccoli, cabbage and Brussels sprouts.

Features of the insecticide resistance management strategy

1. The industry aims to promote co-ordinated use of 'newer chemistry' insecticides to control DBM, *Plutella xylostella*, and to avoid or delay the development of insecticide resistance to them.
2. Rotate the use of insecticides with different modes of action and restrict their use to certain periods of the year, referred to as windows.
3. Monitor crops regularly and only apply insecticide when the pest threshold is reached.
4. Always read and follow product labels. Some products place a limit on the number of times they can be applied per crop and when they can be applied: see below for summary.
5. To encourage beneficial insects, avoid broad spectrum sprays, particularly early in a crop cycle.
6. Do not use insecticide tank mixes.
7. Practise good crop hygiene to reduce DBM pressure — plant clean seedlings and incorporate crop residue as soon as is practicable after harvest.
8. Time the application to the most susceptible life stage of the target pest.
9. Ensure spray rig is properly calibrated and achieving good coverage.

Product application frequency critical comments

Window 1

Durivo — Groups **28** and **4A**
Do not make more than one application per crop. Following Durivo, rotate to a product from an alternative mode of action group for a period of at least one DBM generation. Total exposure period for all Group 28 insecticides should not exceed 50% of the crop cycle.

Success Neo — Group **5**
Do not make more than four applications to any crop in any one season. Apply repeat application at 7–14 day intervals.

Belt — Group **28**
A maximum of three applications may be applied per crop, within a period not less than 14 days. Generally, spray intervals of 7–14 days are suitable.

Coragen — Group **28**
A maximum of three applications are to be applied per crop. No more than two consecutive sprays per crop, with a minimum spray interval of seven days.

Secure — Group **13A**
Apply a maximum of two sprays per crop, seven days apart. Applications vary for Brussels sprouts, see label for details.

Window 2

Proclaim — Group **6A**
Do not apply more than four times per crop. Where more than one crop is grown do not make more than four applications in any one year.

Avatar — Group **22A**
A maximum of four applications can be made to any one crop. Do not re-treat within seven days.

Fipronil, Regal, Regent, etc — Group **2B**
Limit the number of applications to no more than four per year, preferably applied within an eight week period.

Consult product labels and/or permits for registrations for specific vegetable brassica crops and application information

This strategy suggests best practice insecticide use by growers and is regularly updated in consultation with growers and CropLife Australia.

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Department of Agriculture and Food

Diamondback Moth (DBM) Insecticide Resistance Management (IRM) Strategy Western Australia

Update 20 Sept. 2015

Consult product labels and/or permits for registrations for specific vegetable brassica crops and application information.
This strategy is part of integrated pest management (IPM) for vegetable brassica crops — cauliflower, broccoli, cabbage and Brussels sprouts.

Crop stage	Window 1: 1 July–31 Dec	Window 2: 1 Jan–30 June
Seedling treatment	Group 28 + Group 4A[1] Durivo® WHP 42[2] AI: chlorantraniliprole + thiamethoxam	A shorter window is recommended due to longevity of product
Early	Group 11 Bt's AI: *Bacillus thuringiensis* — WHP not required	
Mid to late	Group 5 Success™ NEO WHP 3 AI: spinetoram	Group 6 Proclaim® WHP 3 AI: emamectin benzoate
	Group 28 Belt® AI: flubendiamide WHP 3[2] Coragen® AI: chlorantraniliprole WHP 7[2]	Group 22A Avatar® WHP 7[2] AI: indoxacarb
	Group 13 Secure® AI: chlorfenapyr WHP 7	Group 2B Regent® WHP 7 AI: fipronil
Late	Group 3A Synthetic pyrethroids (SP's) AI: alpha-cypermethrin, cypermethrin — WHP 1 AI: lambda-cyhalothrin, tau-fluvalinate[3], permethrin — WHP 2 AI: esfenvalerate, gamma-cyhalothrin — WHP 2	
	Group 1B Organophosphates (OP's) AI: maldison[4], acephate — WHP 3[5] AI: chlorpyrifos — WHP 5 AI: prothiofos[6] — WHP 7	

WHP = withholding period in days. AI = active ingredient

[1] Durivo® contains active ingredients from Group 28 and Group 4A. Do not apply Belt® or Coragen® in Durivo® treated crops.
[2] Durivo®, Belt®, Coragen® and Avatar® have different WHP for leafy brassicas and other vegetable brassica crops.
[3] Tau-fluvalinate is only registered for cauliflowers. [4] Maldison is registered for cabbage and cauliflower only. [5] WHP for acephate on broccoli is 14 days.
[6] Prothiofos is not registered for cauliflower.

Department of Agriculture and Food

Update **20** **September 2015**

Diamondback moth (DBM) in vegetable brassicas
Insecticide Resistance Management (IRM) Strategy for Western Australia

This strategy is part of integrated pest management (IPM) for vegetable brassica crops — cauliflower, broccoli, cabbage and Brussels sprouts.

Features of the insecticide resistance management strategy

1. The industry aims to promote co-ordinated use of 'newer chemistry' insecticides to control DBM, *Plutella xylostella*, and to avoid or delay the development of insecticide resistance to them.
2. Rotate the use of insecticides with different modes of action and restrict their use to certain periods of the year, referred to as windows.
3. Monitor crops regularly and only apply insecticide when the pest threshold is reached.
4. Always read and follow product labels. Some products place a limit on the number of times they can be applied per crop and when they can be applied: see below for summary.
5. To encourage beneficial insects, avoid broad spectrum sprays, particularly early in a crop cycle.
6. Do not use insecticide tank mixes.
7. Practise good crop hygiene to reduce DBM pressure — plant clean seedlings and incorporate crop residue as soon as practical after harvest.
8. Time the application to the most susceptible life stage of the target pest.
9. Ensure spray rig is properly calibrated and achieving good coverage.

Product application frequency critical comments

Active ingredient (ai) in brackets

Window 1

Group 28 insecticides

Use the window approach to avoid exposing more than one generation of DBM to Group 28 insecticides. The total exposure period of all Group 28 should not exceed 50% of the crop cycle.

Durivo® (ai: **chlorantraniliprole** - Group 28 and ai: **thiamethoxam** - Group 4).
Do not make more than one application per crop.

Belt® (ai: **flubendiamide**) - Group 28.
A maximum of three applications may be applied per crop, within a time period of not less than 14 days. Generally, spray intervals of 7–14 days are suitable.

Coragen® (ai: **chlorantraniliprole**) - Group 28.
A maximum of three applications are to be applied per crop. No more than two consecutive sprays per crop, with a minimum spray interval of seven days.

Group 5 - Success™ Neo (ai: **spinetoram**)
Do not make more than four applications to any crop in any one season. Apply repeat application at 7–14 day intervals.

Group 13 - Secure® (ai: **chlorfenapyr**)
Apply a maximum of two sprays per crop, seven days apart. Applications vary for Brussels sprouts, see label for details.

Window 2

Group 6 - Proclaim® (ai: **emamectin benzoate**)
Do not apply more than four times per crop. Where more than one crop is grown do not make more than four applications in any one year.

Group 22A - Avatar® (ai: **indoxacarb**)
A maximum of four applications can be made to any one crop. Do not re-treat within seven days.

Group 2B - Regent® (ai: **fipronil**)
Limit the number of applications to no more than four per year, preferably applied within an eight week period.

Consult product labels and/or permits for registrations for specific vegetable brassica crops and application information

This strategy suggests best practice insecticide use by growers and is regularly updated in consultation with growers and CropLife Australia.

Enquiries: Stewart Learmonth phone: +61 08 9777 0167, email: stewart.learmonth@agric.wa.gov.au
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Annual Review. Item 8.3.
DBM IR monitoring. *FROM 2015 IRMRG MTG.*

- Current insecticide resistance monitoring for DBM in horticultural areas is minimal to non-existent from season to season.
  - Implication of this is that industry can not develop sound IRMS's based on science as we do not know if tolerance to a particular molecule is changing from season to season.

- SARDI conducted testing in past using funding from industry projects (AusVeg/HAL) however this funding is no longer available. SARDI's focus is now on DBM in canola funded by GRDC.
  - There is a potential relationship between DBM in canola & horticulture.

- Proposal is that CropLife members contribute annually (starting in 2016) on an ongoing basis to fund DBM resistance monitoring.

Annual Review. Item 8.3.
DBM IR monitoring. *FROM 2015 IRMRG MTG.*

- Interested contributors to date in principle: DuPont, Syngenta, Bayer, BASF, Others?

- If project to progress, need to decide on:
  - Researcher to involve. SARDI? They have the infrastructure. Need extra monetary & human resources. SARDI estimate on cost?
  - Annual contribution required per member? AusVeg contribution?
  - Which areas to sample from. Logistically can not sample all production areas however perhaps focus on the main production areas such as Lockyer Valley, Sydney Basin, Werribee. Other area suggestions?
    - SARDI suggested targeting 10-12 populations per season testing with current DD and if any red flags show up then conduct a full dose response bioassay on that population to determine Resistance Factor. Evaluate chlorantraniliprole, emamectin benzoate, fipronil, indoxacarb, spinetoram.
  - Contract to be put in place between researcher & CropLife members.

E-mail from Mr. Greg Baker, 19.3.15.

Hi Geoff,

RE: Proposal to resistance screen DBM strains from 3 production areas against 5 insecticide actives

I have calculated the funding estimate on 12 strains per annum (4 from each of Gatton, Sydney Basin and Werribee), which would involve 60 discriminating dose (DD) bioassays. (NB. We will need to establish a baseline dose-response for fipronil using the Waite Susceptible strain, but already have these established for the other 4 chemistries involved.)

I have assumed that the field collections would be arranged through your companies' field networks, and hence have not costed the collecting/shipment of the DBM samples to the Waite.

To rationalize the number (and cost) of potential full dose-response bioassays required, I propose only doing a max of 2 full dose-response bioassays with each active (max total of 10). That is, do the full bioassay for 2 of the mid to high surviving strains in the DD bioassays, as this should provide a good indication of the RR range for these strains that demonstrated 'tolerance/resistance' in the DD bioassays. Do you agree with this approach?

Based on this suggested approach, the labour cost of maintaining cultures, plants, running bioassays, analysis, report preparation plus the cost of consumables and chemical waste disposal under our 'commercial cost model' for 2015-16 is $37,745 (excl GST).

Please note that Adelaide University are planning on introducing 'glasshouse/insectary charges over the next year or so, which I estimate would add around another $1,000 to the cost. But I haven't included this cost in the estimate at this stage.

I trust that this is adequate for your purposes, and welcome any queries you may have.

Kind regards,

Greg

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IRMS Annual Review Item 8.5.

Sorghum, Maize, Summer & Winter pulse IRMStrategies for *Helicoverpa armigera*.

- Strategy currently on CropLife web site is out dated & this needs to be rectified.
- The proposed short term plan is to place the following wording on the CropLife site for user guidance & to include winter grain legumes as well:

IRMS Annual Review Item 8.5.

Sorghum, Maize, Summer & Winter pulse IRMStrategies for *Helicoverpa armigera*.

- Always read and follow product labels. Some products place a limit on the number of times they can be applied per crop (see table below) and when they can be applied.
- Monitor crops regularly and only apply insecticide when the pest threshold is reached.
- Ensure spray rig is properly calibrated and achieving good coverage with appropriate sized spray droplets.
- Time the application to the most susceptible life stage of the target pest.
- To encourage beneficial insects, use *Bacillus thuringiensis* (Bt) or NPV sprays and avoid broad spectrum insecticides where possible, particularly early to mid crop cycle.
- DO NOT use insecticide tank-mixes where both active ingredients control *Helicoverpa* spp.
- DO NOT re-treat a spray failure with a product from the same chemical group.
- Practice effective pupae busting as soon as practicable after harvest.
- To help prevent the development of resistance to any one specific active ingredient (see table below), observe the following instructions:
  - Use in accordance with the current IRMS for your region. Guidelines for use in chickpeas are also associated with the TIMS cotton IRMS.
  - Apply a specific active ingredient using a “window” approach to avoid exposure of consecutive insect pest generations to the same mode of action. Multiple successive applications of a specific active ingredient are acceptable if they are used to treat a single pest generation.
  - Following a “window” of a specific mode of action product, rotate to a “window” of applications of effective insecticides with a different mode of action.
  - The total exposure period of any one mode of action “active window” applied throughout the crop cycle (from seedling to harvest) should not exceed 50% of the crop cycle.
  - Incorporate IPM techniques into the overall pest management program and
  - Monitor insect populations for loss of field efficacy.

IRMS Annual Review Item 8.5.

Sorghum, Maize, Summer & Winter pulse IRMStrategies for *Helicoverpa armigera*.

Mode of Action Group as specified on product label	Active ingredient	Number applications permitted per crop per season from product label	Labelled crops
1A	methomyl, thiodicarb	not specified	All cereal grains, oilseed, pulses
3A	synthetic pyrethroids (various)	not specified	All cereal grains, oilseed, pulses
6	emamectin benzoate	2	All pulses
11	*Bacillus thuringiensis*	not specified	All cereal grains, oilseed, pulses
22A	indoxacarb	1	chickpea, faba bean, mung bean, soybean, azuki bean
28	chlorantraniliprole	2	chickpea, mung bean, soybean
Not categorised	Nucleopolyhedrovirus (NPV)	no limit but avoid season long use of low rates	All cereal grains, oilseed, pulses

IRMS Annual Review Item 8.5.

Sorghum, Maize, Summer grain legumes IRMStrategies for *Helicoverpa armigera*.

- The proposed long term plan is to produce an IRMS for crops x region and to gain industry consensus on these strategies (see spreadsheet for draft strategies).

GWC notes from meeting.

- Standing Orders- 14 days means 14 calendar days- not work days.
- CropLife Board meeting is early June so need to have details finalised by end April.
- Send to Al the link to grains RMS.
- RLEM strategy-
  - Ken McKee
    - More comfortable with combination of bare earth with seed treatment but believes EPE should be combined as well. Happy to go with this but not sure how effective it will be for resistance management.
    - Due to RLEM dominant resistance, if already have SP resistance, then a statement should be included that can also use SP for control of other pests.
  - Rob Vitelli
    - How applicable is this document to pasture situation?
  - Kristen Knight
    - Document too complicated & needs simplification.
- Mite in pome-
  - Luke Collins to investigate resistance issue with Caldwell's distribution in the Goulburn Valley and compare with an area where mite resistance is not an issue.
- Check IRAC's philosophy on tankmixing insecticides to control the one species.
- DBM RMS-
  - MOA rotation needs to go to the top of the list & be highlighted.
  - "DO NOT use tankmixes" statement to be checked with IRAC guidance. Would it be better to say "DO NOT recommend".
  - Adama have a DBM pheromone trap that could be used for collecting adults.

Korea

2) Please send me any meeting reports for meetings held within the last 6 months. If there were no meetings during the last 6 months, please let me know this.
à We have not meeting within last 6 months

3) Please compile and send any new resistance developments, concerns or issues. If there is nothing new to report, please let me know this.
à We have not any report on new resistance developments, concerns or issues in Korea, yet.

2014-15 Korea Country Resistance Action Group

PROGRESS

1.Record your stage of progress using stage numbers (slide 9) . Done

2.If you are in the planning phase (yellow) what prevents you from moving to the implementation phase (green)? Green

3.State progress placing Mode of Action Icon on label : Mandatory by law from Nov 2014

slide 9

4.State progress placing IRM language on all Diamide labels : As a warning statement for resistance management

5.State progress placing Max # of Apps/Season on all Diamide labels : no more than 2-3 applications per seasons

6.State progress developing a Mode of Action communication plan : Training and Seminar for MKT , Salespersons, retailers and farmers

7.State progress developing an IRM Implementation Plan (communication/training) :

- Syngenta thru Syngenta MKT and Sales persons, Sojitz thru SG sales persons (a local formulator), DuPont thru DBFH, NHC, DBA, KNC (local formulators) for refresher training with 1 time/year.

- Presented IRM at Korea Society of Applied Entomology and Introduced IRM at a journal of KCPA

Maria Torne

Spain

Resistance Action Group (CRAG)Report

for 4Q 2015 through 2Q 2016

PLEASE COMPLETE BY MARCH 30, 2016
Return to your country liaison

- Your input is needed for annual reporting to the International IRAC committee meeting on April 5, 2016
- Your report documents your team's progress, status of diamide and other mode of action resistance, markets that pose potential resistance issues, and identifies support you may need from the Global Diamide team.
- Please fill out pages 2-6 as completely as possible and attach requested documentation on completed or drafted IRM strategies.

2015-16 Spain Country Resistance Action Group

TEAM STATUS

1.Date team was formed: IRAC Spain in 2001 / Diamide WG in 2009

2.Number of meetings in 2015 and 1st Q 16:

2 for IRAC Spain (15th March / 24th November), next will be 10th of May

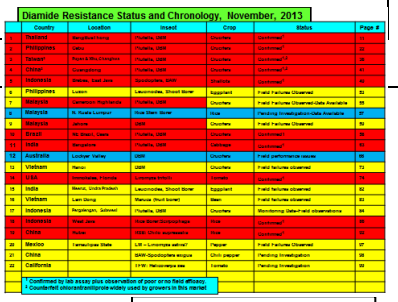
1 for the Diamide WG (15th March 2015)

1.Name the highest risk insects and crops the team is targeting:

Lepidoptera: GNORAB (tomato), HELIAR (veggies), CARPPO (apple)

Others: MYZUPE, Mites and BEMITA

RESISTANCE STATUS


Diamide Resistance Status and Chronology, November, 2013

	Country	Location	Insect	Crop	Status	Page #
1	Thailand					
2	Philippines					
3	Taiwan*					
4	China*					
5	Indonesia					
6	Philippines					
7	Malaysia					
8	Malaysia					
9	Malaysia					
10	Brazil					
11	India					
12	Australia					
13	Vietnam					
14	USA					
15	India					
16	Vietnam					
17	Indonesia					
18	Indonesia					
19	China					
20	Mexico					
21	China					
22	California					

* Confirmed by lab assay plus observation of poor or no field efficacy
** Counterfeit chlorantraniliprole widely used by growers in this market

slide 7,8

1.See slide 7 and 8 that summarize all confirmed and suspicious populations reported by countries. Confirm or edit the information on the table. Did we miss something???

No resistances confirmed, though some increase of LC50 in Tuta populations has been observed.

P. Bielza has found same Sicily mutation in Spanish populations, though at low frequency. This means a high resistance risk if RMS is not followed (IPM and Food Chain go against it).

List additional insect markets that are suspicious, rumors, field failures and explain why. No rumors, but there's higher GNORAB pest pressure

Agreed label recommendation (15th March)

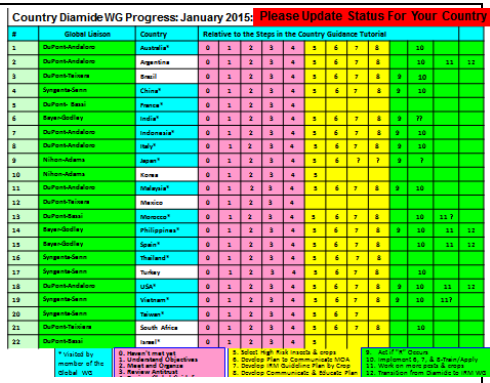
This product belongs to Group 28 of the IRAC classification -modulators of the ryanodine receptor (diamides)-. Due to the possibility of resistance emergence their use should take into account the following management strategies:

• Usage within application periods, 1 or 2 consecutive applications for the same pest generation.
• In general, and depending on the crop*, a maximum of 2 periods of application per year, with a maximum of 2 applications per window is defined.
• Leave a minimum of 60 days between periods of application with insecticides of this group and avoid exposing them to successive generations of the pest.
• The maximum number of applications should not exceed 50% of insecticide applications against the same pest.“

A waiting period of 90 days instead of 60 days was discussed.

2015-16 Spain Country Resistance Action Group

PROGRESS


Country Diamide WG Progress: January 2015 Please Update Status For Your Country

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial											
1	DuPont-Andalora	Australia*	0	1	2	3	4	5	6	7	8		10	
2	DuPont-Andalora	Argentina	0	1	2	3	4	5	6	7	8		10	11 12
3	DuPont-Teixeira	Brazil	0	1	2	3	4	5	6	7	8	9	10	
4	Syngenta-Genn	China*	0	1	2	3	4	5	6	7	8	9	10	
5	DuPont- Bassi	France*	0	1	2	3	4							
6	Bayer-Godfey	India*	0	1	2	3	4	5	6	7	8	9	77	
7	DuPont-Andalora	Indonesia*	0	1	2	3	4	5	6	7	8	9	10	
8	DuPont-Andalora	Italy*	0	1	2	3	4	5	6	7	8	9	10	
9	Nihon-Adams	Japan*	0	1	2	3	4	5	6	7	7	9	7	
10	Nihon-Adams	Korea	0	1	2	3	4	5						
11	DuPont-Andalora	Malaysia*	0	1	2	3	4	5	6	7	8	9	10	
12	DuPont-Teixeira	Mexico	0	1	2	3	4							
13	DuPont-Bassi	Morocco*	0	1	2	3	4	5	6	7	8		10	11 7
14	Bayer-Godfey	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11 12
15	Bayer-Godfey	Spain*	0	1	2	3	4	5	6	7	8		10	11 12
16	Syngenta-Genn	Thailand*	0	1	2	3	4	5	6	7	8			
17	Syngenta-Genn	Turkey	0	1	2	3	4	5	6	7	8		10	
18	DuPont-Andalora	USA*	0	1	2	3	4	5	6	7	8	9	10	11 12
19	Syngenta-Genn	Vietnam*	0	1	2	3	4	5	6	7	8	9	10	117
20	Syngenta-Genn	Taiwan*	0	1	2	3	4	5	6	7				
21	DuPont-Teixeira	South Africa	0	1	2	3	4	5	6	7	8		10	
22	DuPont-Bassi	Israel*	0	1	2	3	4	5						

* Visited by member of the Global WG

0. Haven't met yet
1. Understand Objectives
2. Meet and Organize
3. Review Technical

5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA
7. Develop IRM Guideline Plan by Crop
8. Develop Communicate & Educate Plan

9. Aut./F.T. Closure
10. Implement 6, 7, 8 Then Apply
11. Work on more pests & crops
12. Transition from Diamide to IRM WG

1.Record your stage of progress using stage numbers (slide 9) ._____

2.If you are in the planning phase (yellow) what prevents you from moving to the implementation phase (green)? _____

3.State progress placing Mode of Action Icon on label:

4.State progress placing IRM language on all Diamide labels:

5.State progress placing Max # of Apps/Season on all Diamide labels:

6.State progress developing a Mode of Action communication plan:

7.State progress developing an IRM Implementation Plan (communication/training):

8.If in the "Green" Phase then state progress with training program to implement stages 6,7, and 8_____

slide 9

2015-16 Spain Country Resistance Action Group

What is going well?

Diamides: Label recommendation agreement and use

Use of *Nesidiocoris tenuis* in tomato and other BCA in veggies (pepper)

General:

More communication with Authorities

More and more influence

Challenges Slowing Progress?

Lack of resources and people workload

Supermarket restrictions increasing

The request for support :

We need a common tool to measure resistance risk by pest, crop and area, to be accepted by Authorities (to gear up Comparative Assessment in EU).

We'd like to have the support from IRAC International for that tool and also EPPO involvement and acceptance.

2015-16 Spain Country Resistance Action Group

ACCOMPLISHMENTS

1.Attach all recently finished or draft IRM strategies with phenology charts and supporting slides.

None for Lepidoptera. A new poster on Diamides

1.State successes around accomplishing any of the responsibilities of the Diamide WG (label MoA, label language, alignment with local experts, addition of more insects)

Very good for Diamides. Needs to be shared and extended to the whole group.

List your next priority of high risk insects and crops.

Lepidoptera: GNORAB (tomato), HELIAR (veggies), CARPPO (apple)

Others: Myzus, Mites and WF

Unfortunately, there are not enough resources to start a new Lepidoptera project so far (IRAC Spain budget is focused on Myzus).

We may start a new Project with INIA involving a local subsidy (EIP), so we could start new projects, but this is still under discussion.

2015-2016 Transition of Country Diamide Working Groups to Broader Inter-Company Resistance Management Teams

Options Available

Traditional Country Diamide Working Group
(most country teams are still here)

- **New Country Resistance Action Group (CRAG)** (diamide + non diamide)
- **Merge with Country IRAC Organization**
- **Merge with Country Crop Life Organization**

****Please comment on your current meeting structure.**

Have You:

- **invited non-diamide company members to attend your country meetings?**
- **merged with your country IRAC or Crop Life organization?**
- **if you have done any of these…how is the new structure/process working out??**

Diamide Resistance Status and Chronology, September, 2015

	Country	Location	Insect	Crop	Status	Page #
1	Thailand	BangBuaThong	Plutella, DBM	Crucifers	Confirmed[1]	11
2	Philippines	Cebu	Plutella, DBM	Crucifers	Confirmed[1]	22
3	Taiwan[2]	Puyen & Xihu, Changhwa	Plutella, DBM	Crucifers	Confirmed[1,2]	36
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]	41
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]	49
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed	53
7	Malaysia	Cameroon Highlands	Plutella, DBM	Crucifers	Field Failures Observed-Data Available	55
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation-Data Available	57
9	Malaysia	Jahore	DBM	Crucifers	Field Failures Observed	59
10	Brazil	NE Brazil, Ceara	Plutella, DBM	Crucifers	Confirmed1	58
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]	63
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues	66
13	Vietnam	Hanoi	DBM	Crucifers	Field failures observed	73
14	USA	Immokalee, Florida	Liromyza trifolli	Tomato	Confirmed[1]	74
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed	82
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed	83
17	Indonesia	Pergalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data–Field observations	84
18	Indonesia	West Java	Rice Borer:Scirpophaga	Rice	Confirmed[1]	86
19	China	Hubei	RSB: Chilo supressalis	Rice	Confirmed[1]	92
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed	97
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation	98
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation	99

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Diamide Resistance Status and Chronology, September, 2015

	Country	Location	Insect	Crop	Status
23	Canada		Leptinotarsa, CPB	Potato	Communication-Caydde Savinelli
24	RSA		Heliothis	Lettuce	RSA WG observation
25	RSA		Liriomyza	Tomato	RSA WG observation
26	Taiwan		Spodoptera, BAW	Scallions	Taiwan WG observation
27	Vietnam	Mekong	RLF	Rice	VN WG observation
28	Vietnam	Lan Dong	Maruca	Beans	VN WG observation
29	Vietnam	Red River Delta	Spodoptera(BAW), Heliothis armigera	Tomato	VN WG observation
30	USA	Mississippi, S. Carolina	DBM	Crucifers	DuPont observation; field failures
31	Brazil	Sao Paulo	Chrysodeixis includens	Soybean	Syngenta data
32	USA	Washington State	Oblique banded leafroller	Apple	Jay Brunner; field failures
33	Japan	Multiple	DBM	Crucifers	DuPont Kai partners field failures
34	Italy	Sicily	Tuta	GH Tomato	Field failures in 2014
35	USA	NC, GA, FL	Chrysodeixis includens	Soybean	P. Davis – Univ of ?? 2014 Field Failures
36	Puerto Rico		Chrysodeixis includens	Tomato?	P. Davis – Univ of ?? 2014 Field Failures
37	Greece	Crete	Tuta	GH Tomato	Field failures in 2015
38					
39					
18					
19					
20					
21					

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

2015 September: Country "R" Action Groups Established and Status

Please Update Status For Your Country

#	Global Liaison	Country	Relative to the Step											
1	DuPont-Andaloro	Australia*	0	1	2	3	4	5	6	7	8		10	11	12
2	DuPont-Andaloro	Argentina	0	1	2	3	4	5	6	7	8		10	11	
3	DuPont-Teixera	Brazil*	0	1	2	3	4	5	6	7	8	9	10	11	12
4	DuPpont-Teixeira	Chile	0	1	2	3	4								
5	Syngenta-Senn	China*	0	1	2	3	4	5	6	7	8	9	10	11	12
6	DuPont- Bassi	France*	0	1	2	3	4								
7	Bayer-Godley	India*	0	1	2	3	4	5	6	7	8	9	10	11	12
8	DuPont-Andaloro	Indonesia*	0	1	2	3	4	5	6	7	8	9	10	11	12
9	DuPont-Andaloro	Italy*	0	1	2	3	4	5	6	7	8	9	10	11	
10	DuPont-Andaloro	Japan*	0	1	2	3	4	5	6	?	?	9	10		12
11	Syngenta-Senn	Korea	0	1	2	3	4	5	6	7	8		10	11	
12	DuPont-Andaloro	Malaysia*	0	1	2	3	4	5	6	7	8	9	10		
13	DuPont-Teixera	Mexico	0	1	2	3	4								
14	DuPont-Bassi	Morocco*	0	1	2	3	4	5	6	7	8		10	11	
15	Bayer-Godley	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11	12
16	Bayer-Godley	Spain*	0	1	2	3	4	5	6	7	8		10	11	12
17	Syngenta-Senn	Thailand*	0	1	2	3	4	5	6	7	8	9	10		
18	Syngenta-Senn	Turkey	0	1	2	3	4	5	6	7	8		10		
19	DuPont-Andaloro	USA*	0	1	2	3	4	5	6	7	8	9	10	11	12
20	Syngenta-Senn	Vietnam*	0	1	2	3	4	5	6	7	8	9	10	11	
21	Syngenta-Senn	Taiwan*	0	1	2	3	4	5	6	7	8	9	10		
22	DuPont-Teixiera	South Africa	0	1	2	3	4	5	6	7	8		10	11	12
23	DuPont-Bassi	Israel*	0	1	2	3	4	5							

*Global member visit

Initial stage: meet, apply global recommends locally

Planning Stage: Develop communication, education and IRM strategic plan.

Implementation Stage: Train, apply, react to "R", choose more insects

Andrea Bassi

Italy

Insecticide Resistance Action Committee

ITALY – IRAC / IRM activity:

- Diamide-resistant *Tuta absoluta* (separately).

- IRAC Diamide Working Group (Oct. 2015).

- Current state of Insecticide Resistance (Mar. 2016).

IRAC

Insecticide Resistance Action Committee

Part 1

Italy - Diamide Working Group

Oct. 2015 (courtesy S. Pasquini)

Insecticide Resistance Action Committee

Italy Diamide Working Group

Agenda 06 October 2015

hr	topic	lead	
15.00	Introduction and agenda	Pasquini/Ramella	
15.15	Actions Minute last meeting	Pasquini/Ramella	
15.30	Tuta absoluta resistance update	Bertoli/all	
16.00	Lobesia botrana monitoring sensitivity update	all	
16.30	Review labels of chlorantraniliprole and cyanthraniliprole based products for IRM chapter	all	
17.00	Agree IRM strategy for new crops and pests	all	
17.30	Meeting end		

Insecticide Resistance Action Committee

Italy Diamide Working Group

Objectives of the workgroup

1. Intensify the implementation of IRM through contacts at country level, involving the local country representatives of each company and local relevant authorities.

2. Establish a IRM strategy and communication plan for ryanodine receptor modulator insecticides for Italy and crops following the global guidelines. All involved companies must agree on this common proposal.

3. To agree label text for IRM of chlorantraniliprole and cyantraniliprole based products in accordance with IRAC raccomandations. The text will be inserted in the labels of Cyantraniliprole based products since the submission.

Diamide Resistance Status and Chronology, MARCH 2015

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1	Thailand	BangBuaThong	Plutella, DBM	Crucifers	Confirmed[1]
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3	Taiwan[2]	Puyen & Xihu, Changhwa	Plutella, DBM	Crucifers	Confirmed[1,2]
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed
7	Malaysia	Cameroon Highlands	Plutella, DBM	Crucifers	Field Failures Observed-Data Available
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation-Data Available
9	Malaysia	Jahore	DBM	Crucifers	Field Failures Observed
10	Brazil	NE Brazil, Ceara	Plutella, DBM	Crucifers	Confirmed1
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues
13	Vietnam	Hanoi	DBM	Crucifers	Field failures observed
14	USA	Immokalee, Florida	Liromyza trifolli	Tomato	Confirmed[1]
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed
17	Indonesia	Pergalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data–Field observations
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19	China	Hubei	RSB: Chilo supressalis	Rice	Confirmed[1]
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Diamide Resistance Status and Chronology, MARCH 2015

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26	Taiwan		Spodoptera, BAW	Scallions	Taiwan WG observation
27	Vietnam	Mekong	RLF	Rice	VN WG observation
28	Vietnam	Lan Dong	Maruca	Beans	VN WG observation
29	Vietnam	Red River Delta	Spodoptera(BAW), Heliothis armigera	Tomato	VN WG observation
30	USA	Mississippi	DBM	Crucifers	DuPont observation; field failures
31	Brazil		Pseudoplusia (loooper)	Soybean	Syngenta data
32	USA	Washington State	Oblique banded leafroller	Apple	DuPont data – Jay Brunner; field failures
33	Japan		DBM	Crucifers	DuPont Kai partners field failures
34	Italy	Sicily	Tuta absoluta	Tomato	Wide spread in greenhouse production
35	Brazil	Sao Paulo	Chrysodeixes inlcudens	Soybean	Confirmation under investigation
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Cntry "R" Action Group Progress: March 2015

Please Update Status For Your Country

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial											
1	DuPont-Andaloro	Australia*	0	1	2	3	4	5	6	7	8		10		
2	DuPont-Andaloro	Argentina	0	1	2	3	4	5	6	7	8		10	11	12
3	DuPont-Teixera	Brazil*	0	1	2	3	4	5	6	7	8	9	10		
4	DuPpont-Teixeira	Chile	0	1	2	3	4								
5	Syngenta-Senn	China*	0	1	2	3	4	5	6	7	8	9	10		
6	DuPont- Bassi	France*	0	1	2	3	4								
7	Bayer-Godley	India*	0	1	2	3	4	5	6	7	8	9	??		
8	DuPont-Andaloro	Indonesia*	0	1	2	3	4	5	6	7	8	9	10		
9	DuPont-Andaloro	Italy*	0	1	2	3	4	5	6	7	8	9	10		
10	DuPont-Andaloro	Japan*	0	1	2	3	4	5	6	?	?	9	?		
11	Syngenta-Senn	Korea	0	1	2	3	4	5							
12	DuPont-Andaloro	Malaysia*	0	1	2	3	4	5	6	7	8	9	10		
13	DuPont-Teixera	Mexico	0	1	2	3	4								
14	DuPont-Bassi	Morocco*	0	1	2	3	4	5	6	7	8		10	11 ?	
15	Bayer-Godley	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11	12
16	Bayer-Godley	Spain*	0	1	2	3	4	5	6	7	8		10	11	12
17	Syngenta-Senn	Thailand*	0	1	2	3	4	5	6	7	8				
18	Syngenta-Senn	Turkey	0	1	2	3	4	5	6	7	8		10		
19	DuPont-Andaloro	USA*	0	1	2	3	4	5	6	7	8	9	10	11	12
20	Syngenta-Senn	Vietnam*	0	1	2	3	4	5	6	7	8	9	10	11?	
21	Syngenta-Senn	Taiwan*	0	1	2	3	4	5	6	7					
22	DuPont-Teixiera	South Africa	0	1	2	3	4	5	6	7	8		10		
23	DuPont-Bassi	Israel*	0	1	2	3	4	5							

* Visited by

0. Haven't met yet
1. Understand Objectives

5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA

9. Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply

Insecticide Resistance Action Committee

Italy Diamide Working Group: updated label changes proposed

CHLORANTRANILIPROLE based products

Example

Product ® XXX SC

Active substances xxx

Gruppo IRAC: modulatore recettori rianodinici	**28**	**Diamidi**
Gruppo IRAC: MoA classification (a.i.2)	nn	Chemical family

PREVENZIONE E GESTIONE DELLE RESISTENZE: Coragen è un prodotto a base di chlorantraniliprole ed appartiene al gruppo 28 (RRM= modulatore dei recettori rianodinici) secondo la classificazione IRAC (Insecticides Resistance Action Committee).

Per tutte le colture, applicare i prodotti appartenenti al Gruppo 28 evitando di trattare generazioni consecutive dei parassiti bersaglio (approccio per “finestra di impiego”). Tra due finestre di impiego consecutive, alternare i trattamenti (singoli o a blocchi) con altri prodotti efficaci appartenenti a gruppi IRAC diversi, unitamente all’impiego di mezzi di controllo agronomici e biologici.

Per colture a ciclo breve (minore di 50 giorni), si intende come finestra di impiego la durata del ciclo della coltura.

Per una corretta difesa insetticida, si raccomanda sempre di seguire le linee guida IRAC specifiche per colture e parassiti.

Insecticide Resistance Action Committee

Italy Diamide Working Group

Chlorantraniliprole based products LABELS to be CHECKED for adaptation of IRM recommendations

- Coragen SC200
- Altacor WG35
- *Lumivia (seed treatment)*
- Voliam Targo SC064
- Ampligo SC150, Kendo Bi-Active
- Luzindo WG40

Insecticide Resistance Action Committee

Italy Diamide Working Group: final label changes proposed

CYANTRANILIPROLE based products

Example

Product ® XXX SC

Active substances xxx

Gruppo IRAC: modulatore recettori rianodinici	**28**	**Diamidi**
Gruppo IRAC: MoA classification (a.i.2)	nn	Chemical family

PREVENZIONE E GESTIONE DELLE RESISTENZE: Benevia è un prodotto a base di cyantraniliprole ed appartiene al gruppo 28 (RRM= modulatore dei recettori rianodinici) secondo la classificazione IRAC (Insecticides Resistance Action Committee).

Per tutte le colture, applicare i prodotti appartenenti al Gruppo 28 evitando di trattare generazioni consecutive dei parassiti bersaglio (approccio per “finestra di impiego”). Tra due finestre di impiego consecutive, alternare i trattamenti (singoli o a blocchi) con altri prodotti efficaci appartenenti a gruppi IRAC diversi, unitamente all’impiego di mezzi di controllo agronomici e biologici.

Per colture a ciclo breve (minore di 50 giorni), si intende come finestra di impiego la durata del ciclo della coltura.

Per una corretta difesa insetticida, si raccomanda sempre di seguire le linee guida IRAC specifiche per colture e parassiti.

Insecticide Resistance Action Committee

CYANTRANILIPROLE
based products – new text to be validated

PREVENZIONE E GESTIONE DELLA RESISTENZA: BENEVIA® e' un prodotto a base di cyantraniliprole ed appartiene al Gruppo 28 (RRM = modulatore dei recettori rianodinici) secondo la classificazione IRAC (Insecticides Resistance Action Committee). Per tutte le colture applicare i prodotti appartenenti al Gruppo 28 evitando di trattare generazioni consecutive dei parassiti bersaglio (approccio per "finestra d'impiego"). Tra due finestre d'impiego consecutive, alternare i trattamenti (singoli o a blocchi) con altri prodotti efficaci appartenenti a gruppi IRAC diversi, unitamente all'impiego di mezzi di controllo agronomici e biologici. Non effettuare piu` di due applicazioni di insetticidi appartenenti al Gruppo 28 per generazione del parassita/finestra d'impiego. Per colture a ciclo breve (minore di 50 giorni), s'intende come finestra d'impiego la durata del ciclo della coltura. Per una corretta difesa insetticida si raccomanda di seguire sempre le linee guida IRAC specifiche per colture e parassiti.

Insecticide Resistance Action Committee

Italy Diamide Working Group

Cyantraniliprole based products LABELS to be CHECKED for adaptation of IRM recommendations

- Exirel
- Benevia
- Verimark
- Minecto Alpha
- Fortenza
- Mainspring (Home & Garden)

Insecticide Resistance Action Committee

Italy Diamide Working Group

IRM strategies

Cydia pomonella
Tuta absoluta
Helicoverpa armigera
Spodoptera littoralis

Insecticide Resistance Action Committee

Italy Diamide Working Group

Country IRM strategy: Cydia pomonella on pomefruits

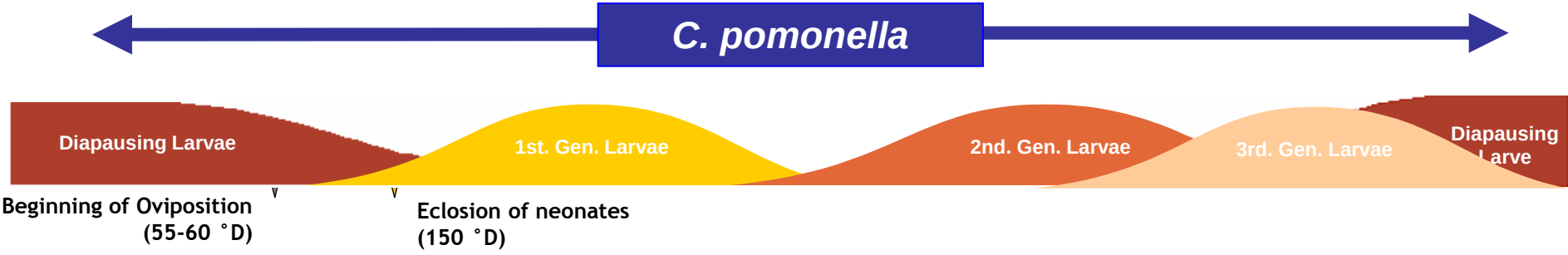
✓ **<u>IRM strategy</u> developed and recommended:**

1. Agreed in following Global IRM Group strategy, see example from Argentina with some adaptation for the local conditions
2. The basic principle is to AVOID treating consecutive generations of Cydia on pomefruits
3. The agreed anti-Resistance management is considered to be in line with local practice and officials recommendation for Cydia control
4. In the following 2 pages are the graphs and sentences proposed to follow in communication regarding use of IRAC 28 insecticides in fruit
5. Syngenta and DuPont (Italy) are committed (as individual Company) to include in technical presentations and brochures, this info about agreed anti Resistance management since 2014-15 campaign.

Ex1: Spray 1st generation with IRAC 28 insecticide : do not spray 2nd generation



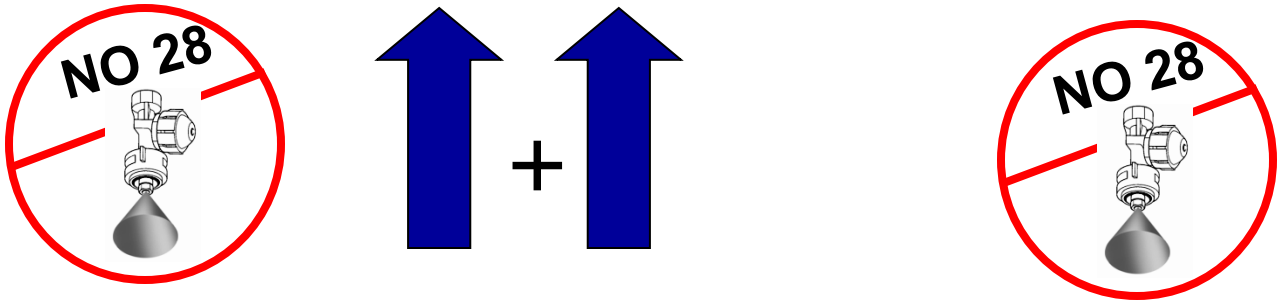




Avoid exposure of consecutive pest generations to the same mode of action.
Apply Group 28 Insecticides using a "block" or 'window' approach.

Second block of applications (3rd gen.) should be avoided if 1st gen. will be sprayed in the following year.

<u>Spray 2nd generation with IRAC 28 insecticide:</u> do not spray 1st or 3rd generation. Can spray 1st generation the following year.



Avoid exposure of consecutive pest generations to the same mode of action. Spray at beginning of 2nd generation, to avoid exposure of larvae of 3rd generation. Apply Group 28 Insecticides using a “block” or ‘window’ approach.

Insecticide Resistance Action Committee

Italy Diamide Working Group

Country IRM strategy: Tuta absoluta (tomato)

IRM strategy developed and recommended:

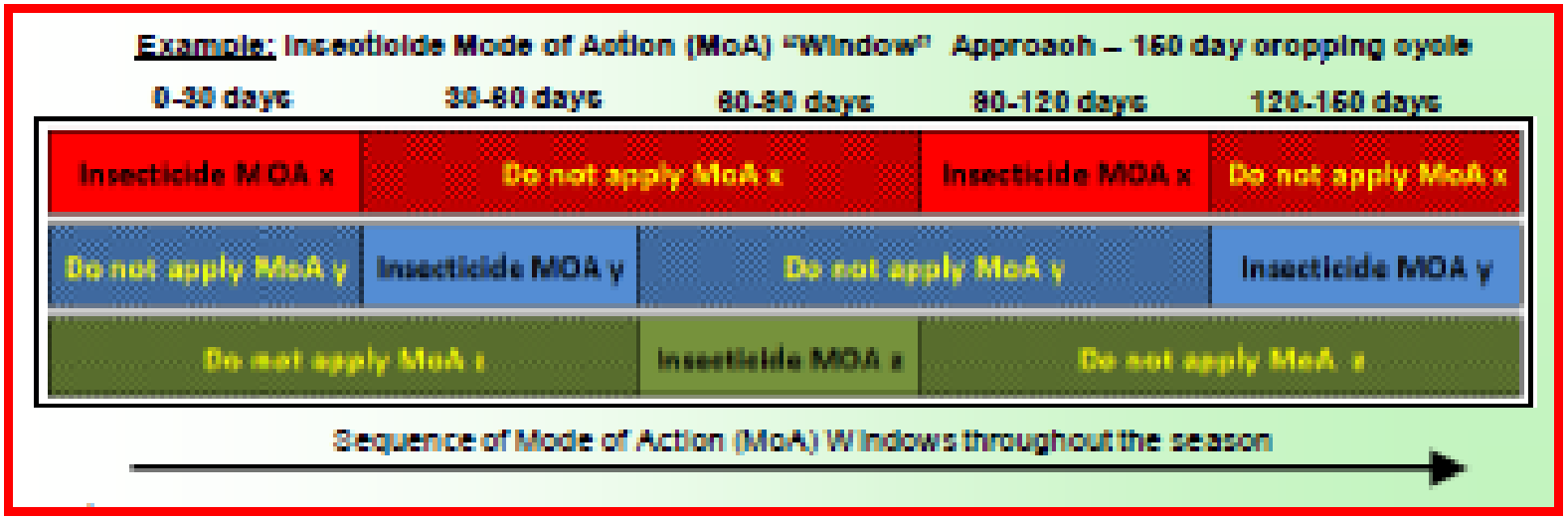
1. It is agreed to use the IRAC poster on Tuta absoluta
2. The basic principle is to avoid treating **2** consecutive generations of Tuta with same MoA
3. The application window (“Finestra di impiego”) is considered 30 days average . At least 60 days* (2 windows) should elapse between 2 blocks of applications with same MoA
4. The following general scheme will be adapted to include diamide based products

* **calculated from the last diamide application to the first application of the next diamide block**

Insecticide Resistance Action Committee

The tomato leafminer, *Tuta absoluta*

Recommendation for substainable and effective Resistance management



Insecticide Resistance Action Committee

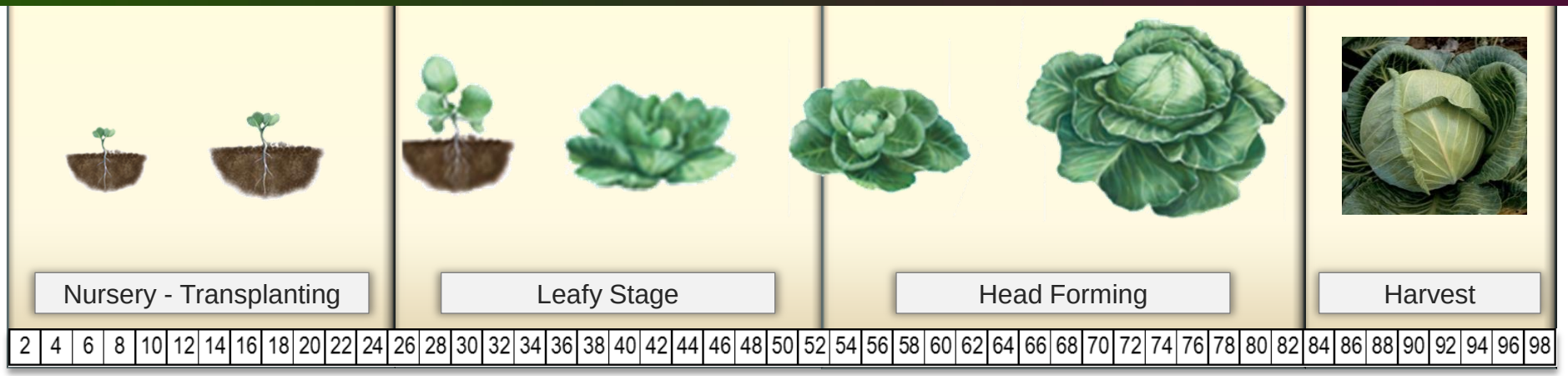
Italy Diamide Working Group

Country IRM strategy: *Helicoverpa armigera* & *Spodoptera* spp. on leafy vegetables

<u>IRM strategy</u> developed and recommended:

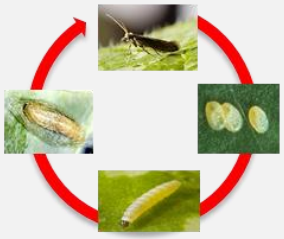
1. agreed in following Global IRM Group strategy, with some adaptation for the local conditions
2. The basic principle is to avoid treating consecutive generations of *Helicoverpa armigera* & *Spodoptera* spp. on leafy vegetables
3. Use treatment windows and avoid exposure of > 50% of crop cycle. Treatment window (“Finestra di impiego”) is considered 30 days average
4. For short cycle crops (<30-50 days) consider the duration of the crop cycle as a “treatment window”. Alternate to different modes of action during subsequent plantings at the same farm location
5. The following general scheme will be adapted to include diamide based products

4. Rotate by Mode of Action (MoA)

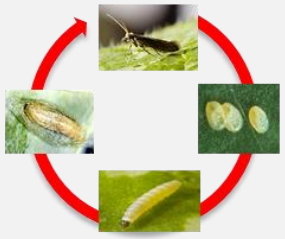


Diamond Back Moth

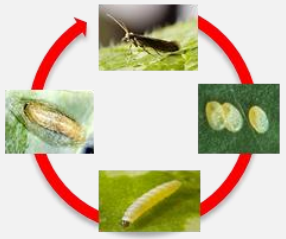
1st Generation



2nd Generation



3rd Generation



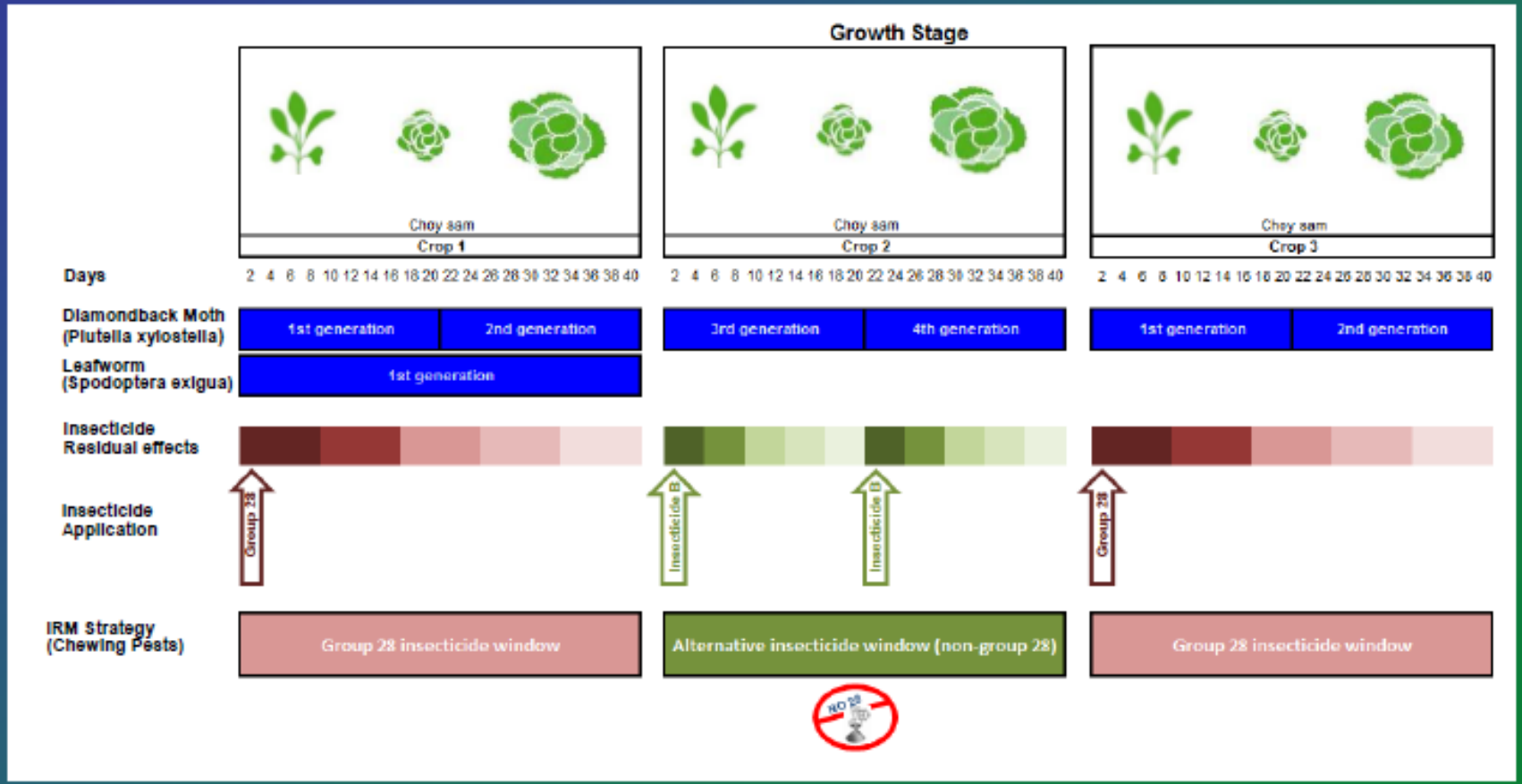
Insecticide Application

✗ Not recommended	MoA 1			
✓ Option 1	MoA 1	MoA 2	MoA 3	
✓ Option 2	MoA 1	MoA 2	MoA 1	

IRAC
Insecticide Resistance Action Committee

Guideline 4:
For Short Cycle Crops, a "Treatment Window" is a Crop Cycle

→ For short cycle crops (< 30-50 days), consider the duration of the crop cycle as a "treatment window". Alternate to different modes of action during subsequent plantings at the same farm location.



Cyantraniliprole based products

IRM

1. **Attach all recently finished or draft IRM strategies with phenology charts and supporting slides.**

2. **List your next priority of high risk insects and crops:**
    1. Whiteflies in protected crops
    2. Thrips on pepper and strawberry

Insecticide Resistance Action Committee

Italy Diamide Working Group

IRM strategies (Drafts)

Thrips – Frankliniella occidentalis

Whiteflies – Bemisia tabaci, Trialeurodes vaporariorum

Insecticide Resistance Action Committee

Italy Diamide Working Group

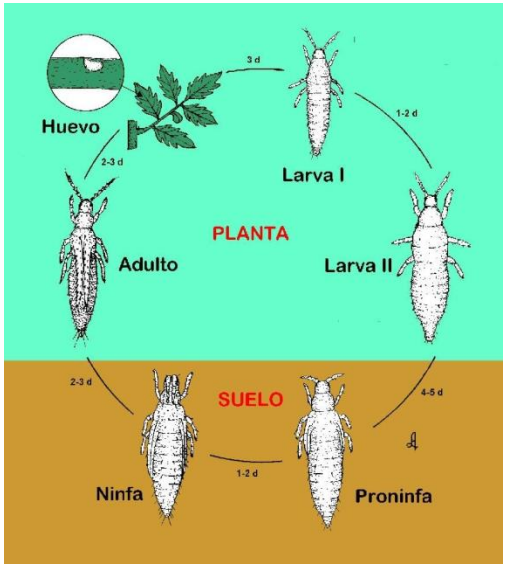
Frankliniella occidentalis

Life cycle

6-7 generations/year, with frequent overlapping of different generations; life cycle on average of 2-3 weeks

Biological potential of Frankliniella occidentalis with different temperatures.

Temperature (°C)	Cycle length (days)	Longevity (days)	Fecundity (eggs/female)
15	39	46	50
20	26	75	126
25	13	31	135
27	10	34	229
30	9	12	40
35	10	10	5



Resistence management reccomendations:

- Avoid to treat subsequent generations with the same MoA
- Do not apply products containing Cyantraniliprole more than 3? Times per crop cycle/year (to be define after check for Risk assessment)
- Alternate products from different chemicals MoA groups
- Apply the products according to the label reccomendation
- Do not apply products of the same chemical MoA group for more than 50% of the total crop cycle (short cycle)

Insecticide Resistance Action Committee

Italy Diamide Working Group

Whiteflies

Life cycle

7-10 generations/year, with frequent overlapping of different generations; life cycle on average of 3-4 weeks

	Temperature (°C)		
Stages	20	25	30
Egg	25.4 (15)	6.5 (4)	3.8 (2)
First instar	13.6 (6)	3.4 (2)	0.0 (0)
Second instar	5.3 (2)	7.1 (4)	4.0 (2)
Third instar	5.6 (2)	1.9 (1)	6.3 (3)
Fourth instar	5.9 (2)	3.9 (2)	4.4 (2)
Total	45.8 (59)	20.9 (62)	17.3 (52)

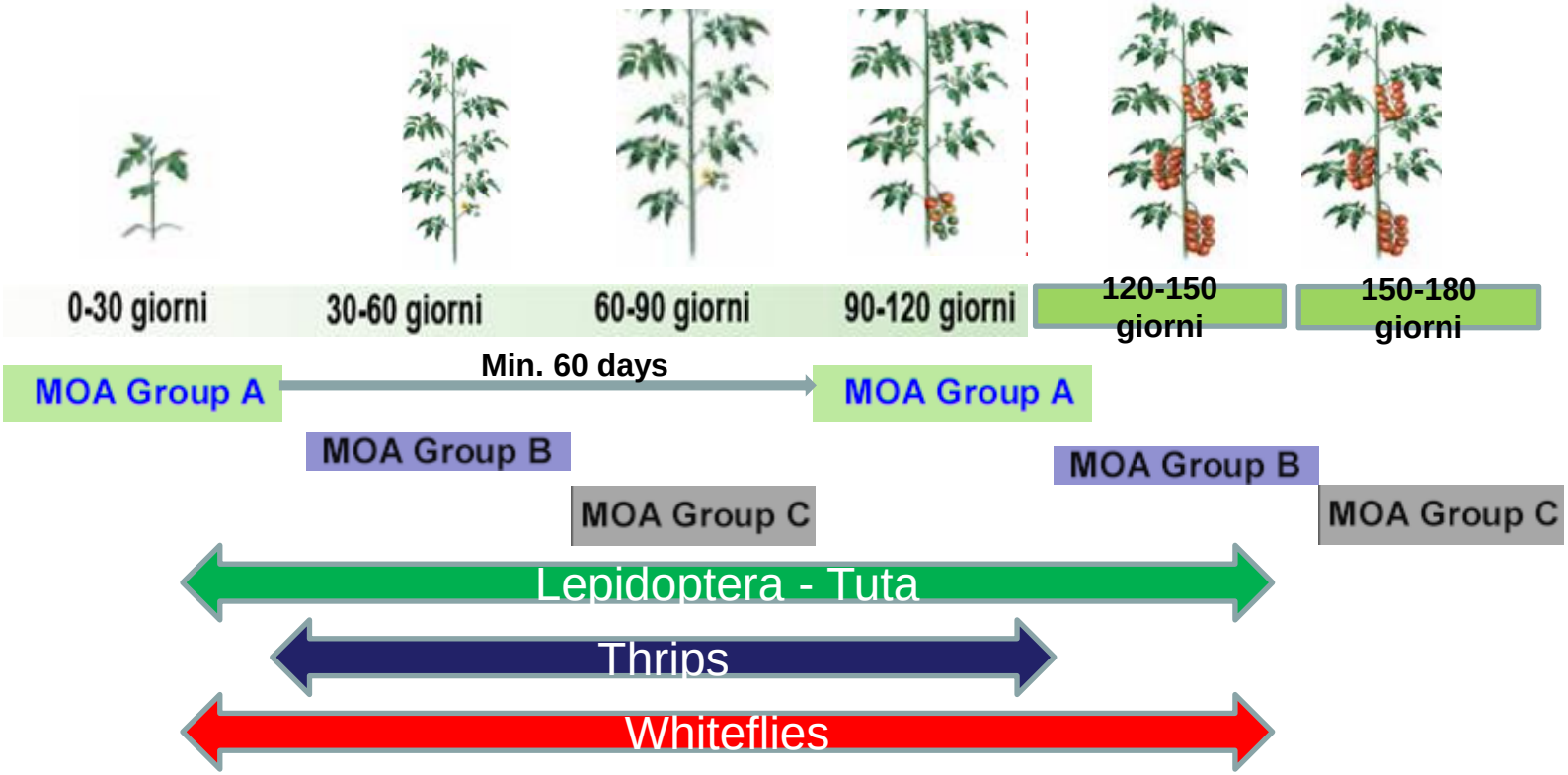
Resistence management reccomendations:

- Avoid to treat subsequent generations with the same MoA
- Do not apply products containing Cyantraniliprole more than 3? Times per crop cycle/year (to be define after check for Risk assessment)
- Rotate products from different chemicals MoA groups
- Apply the products according to the label reccomendation
- Do not apply products of the same chemical MoA group for more than 50% of the total crop cycle (short cycle)

Insecticide Resistance Action Committee

Italy Diamide Working Group

Window approach: could it fit with the sucking pest resistance management?



- **For long crop cycle, window application could be ok**
- **For crops with short/medium grow cycle (60-90 days, eg. Zucchini, tomato short cycle fb eggplant), recomment to apply again Diamides with an interval of 60 days**
- **For short crop cycles (like lettuce), consider the crop cycle (around 30-50 days) as a window**

IRAC

Insecticide Resistance Action Committee

Italy Diamide Working Group

Conclusions/Actions meeting October 06 2015 1/2	when	who
New label text proposed for chlorantraniliprole based products IRM statement: • DuPont: submitted changes during the post-Annex one process (Oct 2014) • Syngenta: submitted changes during the post-Annex one process (Oct 2014) • The rule of 50% nr appls is to be considered in technical material (not on label) for specific pests/crops because not always adapted to local conditions	Done	Registration
Cyantraniliprole based products label text: Pending questions: • Check max. number of application of Group 28 products per window • Impact (residual activity) of soil application use on anti-R strategy recommendations	Before registration	R&D/ Registration
Spray programs (Chlorantraniliprole example) approved and included in technical communication • Cydia pomonella: confirmed (see slides) • Tuta absoluta: confirmed (see slides) • Helicoverpa armigera and Spodoptera spp. on leafy vegetables: confirmed (see slides)	Done	All

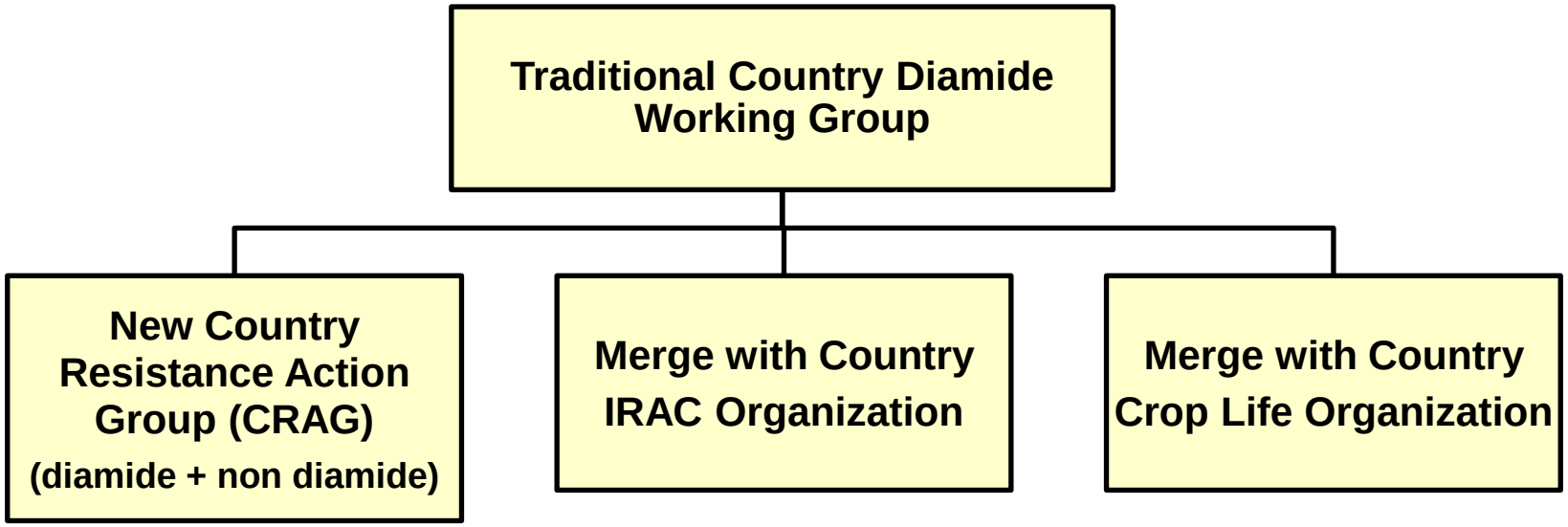
IRAC
Insecticide Resistance Action Committee

Italy Diamide Working Group

Conclusions/Actions meeting October 06 2015 2/2	when	who
Our next priorities of high risk insects and crops were defined: 1. Whiteflies in protected crops (*B. tabaci, T. vaporariorum*) 2. Thrips on pepper and strawberry (*F. occidentalis*) Strategy definition for these pests is ongoing (slides 28-30: first draft)	ASAP, before cyantranilip. registration	R&D, MKTG
Monitoring sensitivity. • Resistance on Tuta absoluta in Greenhouse tomato in Sicily was detected in 2014 and confirmed in 2015. Questions & Answers position paper for internal purposes was prepared. A specific communication plan was put in place. • Some rumors (lab studies) in Emilia Romagna were reported for a possible lower sensibility to chlorantraniliprole of Lobesia botrana in wine grapes in 2014 campaign. Not confirmed by field trials and field performance in 2015. Monitoring lab studies ongoing • No other complaints or field failure on other pests/crops	Done ASAP	 R&D, MKTG
Enlarge the invitation of next IRAC Working Group meeting to other companies (Basf, Bayer, DoW) to agree a common resistance managemen strategy for Tuta absoluta in Sicily	ASAP	R&D
Next meeting (F2F): Feb 2016 during Giornate Fitopatologiche 2016		

2014-2015 Transition of Country Diamide Working Groups to Broader Inter-Company Resistance Management Teams

Options Available



****Please comment on your current meeting structure.**

Have You:

- invited non-diamide company members to attend your country meetings? _____

- merged with your country IRAC or Crop Life organization? _____

- if you have done any of these…how is the new structure/process working out??

John Andaloro

Diamide Resistance Status and Chronology, September, 2016

	Country	Location	Insect	Crop	Status
1	Thailand	BangBuaThong	Plutella, DBM	Crucifers	Confirmed[1]
2	Philippines	Cebu	Plutella, DBM	Crucifers	Confirmed[1]
3	Taiwan[2]	Puyen & Xihu, Changhwa	Plutella, DBM	Crucifers	Confirmed[1,2]
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed
7	Malaysia	Cameroon Highlands	Plutella, DBM	Crucifers	Field Failures Observed-Data Available
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation-Data Available
9	Malaysia	Jahore	DBM	Crucifers	Field Failures Observed
10	Brazil	NE Brazil, Ceara	Plutella, DBM	Crucifers	Confirmed1
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues
13	Vietnam	Hanoi	DBM	Crucifers	Field failures observed
14	USA	Immokalee, Florida	Liromyza trifolli	Tomato	Confirmed[1]
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed
17	Indonesia	Pergalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data–Field observations
18	Indonesia	West Java	Rice Borer:Scirpophaga	Rice	Confirmed[1]
19	China	Hubei	RSB: Chilo supressalis	Rice	Confirmed[1]
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Diamide Resistance Status and Chronology, September, 2016

	Country	Location	Insect	Crop	Status
23	Canada		Leptinotarsa, CPB	Potato	Communication-Caydie Savinelli
24	RSA		Heliothis	Lettuce	RSA WG observation
25	RSA		Liriomyza	Tomato	RSA WG observation
26	Taiwan		Spodoptera, BAW	Scallions	Taiwan WG observation
27	Vietnam	Mekong	RLF	Rice	VN WG observation
28	Vietnam	Lan Dong	Maruca	Beans	VN WG observation
29	Vietnam	Red River Delta	Spodoptera(BAW), Heliothis armigera	Tomato	VN WG observation
30	USA	Mississippi, S.C.	DBM	Crucifers	DuPont observation; field failures
31	Brazil	Sao Paulo	Chrysodeixis includens	Soybean	Syngenta data
32	USA	Washington State	Oblique banded leafroller	Apple	Jay Brunner; field failures
33	Japan	Multiple	DBM	Crucifers	DuPont Kai partners field failures
34	Italy	Sicily	Tuta	GH Tomato	Field failures in 2014
35	USA	NC, GA, FL	Chrysodeixis includens	Soybean	P. Davis – Univ of ?? 2014 Field Failures
36	Puerto Rico		Chrysodeixis includens	Tomato?	P. Davis – Univ of ?? 2014 Field Failures
37	Greece	Crete	Tuta	GH Tomato	Field failures in 2015
38	Japan	Shizuoka	Oriental tea tortrix - Homona magnanima	Tea	Japanese Soc of Tea Science and Technology – Nov 2015
39	Japan	Shizuoka	Smaller tea tortrix – Adoxophyes honmai	Tea	Researcher confiems diamide R is incomplete dominance
40	Brazil	Bahia State	Spodoptera frugiperda	Corn	Celso Omoto
41	Brazil	Bahia	Leucoptera coffeella	Coffee	DuPont observations
42					
43					

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

2016 September: Country "R" Action Groups Established and Status

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial											
1	Dow – Jim Dripps	Australia*	0	1	2	3	4	5	6	7	8		10	11	12
2	DuPont-Andaloro	Argentina	0	1	2	3	4	5	6	7	8		10	11	
3	DuPont-Teixera	Brazil*	0	1	2	3	4	5	6	7	8	9	10	11	12
4	FMC/Cheminova-EricAndersen	Chile	0	1	2	3	4						?		
5	Syngenta-Senn	China*	0	1	2	3	4	5	6	7	8	9	10	11	12
6	Adama- Adeline Bertrand	France*	0	1	2	3	4						?		
7	Bayer-Godley	India*	0	1	2	3	4	5	6	7	8	9	10	11	
8	DuPont-Andaloro	Indonesia*	0	1	2	3	4	5	6	7	8	9	10	11	12
9	Adama- Adeline Bertrand	Israel*	0	1	2	3	4	5					?		
10	DuPont-Andaloro	Italy*	0	1	2	3	4	5	6	7	8	9	10	11	
11	DuPont-Andaloro	Japan*	0	1	2	3	4	5	6	7	8	9	10	11	
12	Korea – Jim Dripps	Korea	0	1	2	3	4	5	6	7	8	9	10	11	
13	DuPont-Andaloro	Malaysia*	0	1	2	3	4	5	6	7	8	9	10		
14	DuPont-Teixeira	Mexico	0	1	2	3	4						?		
15	DuPont-Bassi	Morocco*	0	1	2	3	4	5	6	7	8		10	11	
16	Bayer-Godley	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11	12
17	Dow-Maria Torne	Spain*	0	1	2	3	4	5	6	7	8		10	11	12
18	Syngenta-Senn	Thailand*	0	1	2	3	4	5	6	7	8	9	10		
19	Bayer – Nigel Godley	Turkey	0	1	2	3	4	5	6	7	8		10	11	
20	DuPont-Andaloro	USA*	0	1	2	3	4	5	6	7	8	9	10	11	12
21	Syngenta-Senn	Vietnam*	0	1	2	3	4	5	6	7	8	9	10	11	
22	Syngenta-Senn	Taiwan*	0	1	2	3	4	5	6	7	8		10	11	??
23	DuPont-Teixeira	South Africa	0	1	2	3	4	5	6	7	8		10	11	12

* Visited by member of the Global WG

1. Understand Objectives
2. Meet and Organze
3. Review Antitrust
4. Review Global Guidelines

5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA
7. Develop IRM Guideline Plan by Crop
8. Develop Communicate & Educate Plan

9. Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply
11. Work on more pests & crops
12. Transition from Diamide to IRM WG

Country Resistance Action Groups
Diamide WG → CRAG → Cntry IRAC → CL

- Who interacts with them? (Cntry IRAC and CL WG's)
- Who do they report to? (Cntry IRAC, Crop Life WG's)
  - Not any longer "Lep WG" teams
  - Lep and Sucking WG's; others?
- Agree….when necessary sub-teams can meet to discus single MoA issues.

Country Liaisons

Representative	Company	Country groups by company	Country	Country2	Country3	Country4	Country5
Adeline Bertrand	ADAMA	2	France	Israel			
Sebastian Coggiola	ADAMA						
Werner Heck	BASF	0					
Siddharth Tiwari	BASF						
Nigel Godley	Bayer	3	India	Philippines	Turkey		
Ralf Nauen	Bayer						
Eric Andersen	Cheminova/FMC	1	Chile				
Jim Dripps	Dow	3	Australia	Korea			
Maria Torne	Dow		Spain				
Andrea Bassi	DuPont	10	Italy	Morocco			
John Andaloro	DuPont		Argentina	Indonesia	Japan	Malaysia	USA
Luis Teixeira	DuPont		Brazil	Mexico	S Africa		
Nobuyuki Nonaka	N.Nohyaku	0					
Marie-Pierre Plancke	Nufarm	0					
Jan Elias	Syngenta	4					
Robert Senn	Syngenta		China	Thailand	Vietnam	Taiwan	
Daniel Zommick	Valent	0					
Dirk Ave	Valent						

Country Resistance Action Groups
(Formerly Diamide teams)
Reporting and Team Transition Status

	2015/16 Response	Transition Status
Argentina	YES	Yes. Started in 2014 inviting more companies including distributors
Indonesia	YES	Yes….broadly represented
Japan	YES	No…Diamide companies + ISK
USA	YES	Yes – integrated into US IRAC
Malaysia	NO	No - Lost members – no leader

Argentina

2016 ARGENTINA CRAG Report

TEAM STATUS

1.Met 3Q and 4Q 2015

Name the highest risk insects and crops the team is targeting:

1.Helicoverpa gelotopoeom (armigera, potentially) – Pseudoplusia / Soybean

2.Spodoptera / Corn (Potential)

Luciano Lecumberry	Bayer	luciano.lecumberry@bayer.com
Hernán Villegas (team leader 2016)	DuPont	hernan.villegas
Jorge Morre	DuPont	Jorge.Morre@dupont.com
Mattiolli, Martín	Syngenta	Alejo.Costa@syngenta.com
Liliana Cichon	Consultant	lcichon@correo.inta.gov.ar
Gamundi Juan Carlos	Consultant	jcgamundi@correo.inta.gov.ar
Daniel Igarzabal	Consultant	danieligarzabal@arnet.com.ar

RESISTANCE STATUS

1. See slide 7 and 8 that summarize all confirmed and suspicious populations reported by countries. Confirm or edit the information on the table.
   Did we miss something???

No significant issues involving diamides. This current campaign is very rainy (El Niño effect) with little pest pressure (even in Spodoptera in Hx/Bt corn).

2015-16 ARGENTINA CRAG Mtg – October 2015

	SUBCOMISION IRAC Argentina Minuta de la Reunión	PAG: 1 de 2

FECHA:	LUGAR:	HORA DE INICIO:
05 de Octubre de 2015	CASAFE	09.30 hs

PARTICIPANTES: Carlos Vassallo (DOW), Alejo Costa (SYNGENTA), Alberto Peper (MONSANTO), Hernán Villegas (DUPONT), Federico Elorza (CASAFE) y Fernando Perez Eseiza (CASAFE).

AUSENTES: Fabiana Malacarne (ASA), Juan Carlos Lissarrague (Dow), Ruben Meoni (BAYER), Ricardo Fernández Pancelli (Basf), Albano Aranguren (ADAMA), Ana Signorini (DOW), Federico Ocampo (Monsanto), Martin Gries (BASF), Federico Mattioli (SYNGENTA), Daniel Courreges (SYNGENTA), Eduardo Perez (FMC), Fabián Giménez (FMC), Alfredo Ferzzola (FMC), Gabriel Zipeto (BASF), Guillermo Mentruyt (BASF), Guillermo Waldino Videla (BAYER), Jorge Deminiani (FMC), Jorge Morre (DUPONT), Marcelo Pucci (ADAMA), María Eugenia Cometti (DOW), Paula Bey (Dow), Sebastián Camba (FMC), Ulises Gerardo (DOW), Federico Landgraf (CASAFE).

Recomendaciones para manejo de plagas en maíz.
Se continuó trabajando sobre la revisión de la presentación que empleará en el seminario de especialistas del mes de noviembre, y se realizaron cambios sobre la misma. Se adjunta la presentación para verificar las modificaciones.

Seminario Nacional
Se acordó que el seminario será de una jornada y se confirmó que se realizará en las oficinas de Dupont en la localidad de Rosario.
Se elaboró un programa tentativo del seminario, que se adjunta a la presente minuta. Los paneles de cada disertante tendrán una duración de 20 minutos, en los cuáles la presentación serán 15 minutos y luego seguirán 5 minutos de preguntas. La elección de los disertantes se realizó teniendo en cuenta la especialidad en cada tema y al mismo tiempo intentando considerar las diferentes regiones del país.
Web
Se propuso ofrecer el espacio "Noticias" de la web de IRAC Argentina, a los especialistas que participen del seminario para que puedan publicar algunos de sus trabajos. Previo a ser subidos a la web, el grupo IRAC Argentina evaluará el trabajo a publicar y aprobará o no que se presente en la web del grupo.
Acciones
Los referentes de las empresas volverán a contactar a los especialistas que cada uno ya contactó, para confirmar la presencia al seminario.
Una vez confirmados los especialistas, entre todos confirmar la agenda.
Desde CASAFE se enviará invitación formal a los especialistas invitándolas a participar del seminario.
Entre todos terminar la presentación sobre recomendaciones de manejo de plagas en maíz, que se expondrá en el seminario.
Cada referente de las empresas confirmará la cantidad de asistentes de su compañía al seminario.
Próxima Reunión: 02 de Noviembre de 2015 a las 11.00 hs, en CASAFE

2016 ARGENTINA Diamide Working Group Report

PROGRESS

1. State progress to place IRM language on all Diamide labels DONE

2. State progress developing a Mode of Action communication plan
    1. Communication in Technical Meetings with sales force, custOmers / technical advisors / other. ONGOING.
    2. IRM language in technical materials (brochures; etc) ONGOING.
    3. IRM language in all companies labels ONGOING.

3. State progress developing an implementation plan (training)
    1. Technical training of Diamide IRM in AAPRESID (most important technical event in Ar
    2. Create a Technical brochure about Diamide IRM to be issued by IRAC 28 WG Argentina.

1. If in the "Green" Phase then state progress with training program to implement stages 6,7, and 8
    1. Reinforce communication to sales force, tech advisors, etc.
    2. Technical training of Diamide IRM in AAPRESID (most important technical event in Ar)

2015-16 Transition of Country Diamide Working Groups to Broader Inter-Company Resistance Management Teams

Options Available

Traditional Country Diamide Working Group

(most country teams are still here)

New Country Resistance Action Group (CRAG)

(diamide + non diamide)

Merge with Country IRAC Organization

Merge with Country Crop Life Organization

****Please comment on your current meeting structure. Have You:**

- **invited non-diamide company members to attend your country meetings?:** YES
- **merged with your country IRAC or Crop Life organization?:** YES
- **if you have done any of these…how is the new structure/process working out??**

Microsoft Word
7 - 2003 Documen

2015-16 ARGENTINA CRAG *ACCOMPLISHMENTS*

CRAG Joint Training of Customers on B.t. Corn (Spodoptera focus)

Agenda "Taller IRAC Argentina: recomendaciones de manejo de plagas en Maíz con foco en *Spodoptera frugiperda*"		
Hora	**Disertante**	**Tema**
09:30 a 10:00	Recepción	
10:00 a 10:15	Federico Elorza	Presentación Grupo IRAC Argentina. Objetivos del Seminario
10:15 a 10:35	Macarena Casuso, Marita Simonella y Enrique Lobos	Líneas de investigación y situación en el NEA.
10:35 a 10:55	Daniela Vitti	Líneas de investigación y situación en el NEA.
10:55 a 11:15	Augusto Casmuz	Líneas de investigación y situación en el NOA.
11:15 a 11:35	Adriana Saluso	Líneas de investigación y situación en el Litoral.
11:35 a 11:55	Evangelina Perotti	Líneas de investigación y situación en el Zona Núcleo.
11:55 a 12:15	Fernando Flores	Líneas de investigación y situación en el Zona Centro
12:15 a 12:35	Nicolás Iannone	Líneas de investigación y situación de *Diatraea* sp. y/o *Dichelops* sp en el Zona Norte de Bs. As.
12:35 a 12:55	Daniel Igarzábal	Líneas de investigación y situación en el Zona Córdoba
12:55 a 14:00	Almuerzo	
14:00 a 14:30	Ramiro Oviedo Bustos	Estado de situación de plagas del Maíz en Argentina
14:30 a 15:00	Carlos Vasallo	Presentación de recomendaciones grupo IRAC Argentina
15:00 a 16:00	Carlos Vasallo	Discusión y cierre

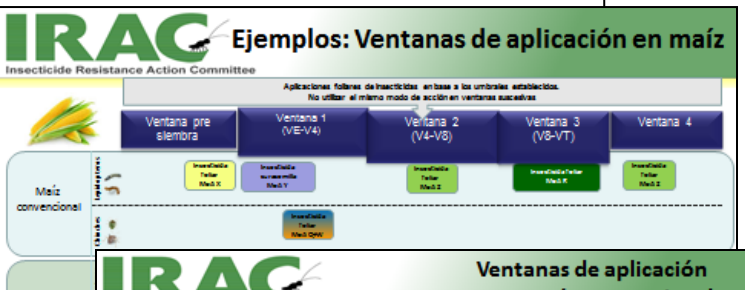
2015-16 ARGENTINA CRAG *ACCOMPLISHMENTS*

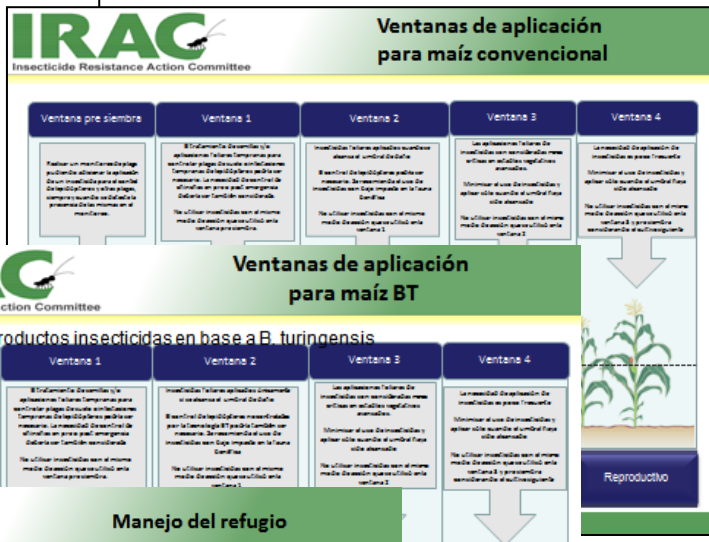
CRAG Joint Training of Customers: BMP IRM of Row Crops

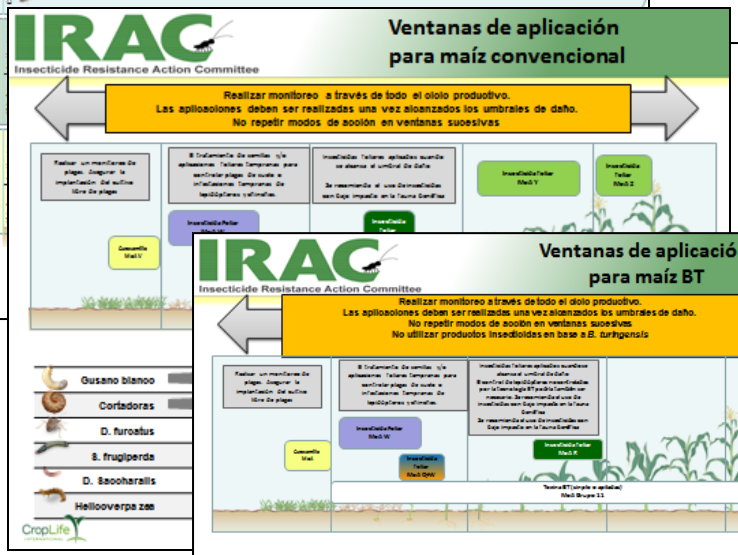
Asistentes Seminario IRAC				
N°	Nombre y Apellido	Institución	Observaciones	Presenta
1	Enrique Lobos	UNSE	citó pasaje, se sacó pasaje y se envió por e	"Resistencia, más que un
2	Daniela Vitti	NTA Reconquist	Solicitó alojamiento desde la noche previa	"Insectos Plagas en Maíz:
3	Diego Szwarc	NTA Reconquist	Solicitó alojamiento desde la noche previa	Situación en el norte de
4	Melina Almada	NTA Reconquist		
5	Evangelina Perotti	INTA Oliveros		Líneas de investigación y situación en el Zona Núcleo.
6	Juan Carlos Gamund	INTA Oliveros		
7	ael Antonio López	Monsanto		
8	Maria Laura Ramos	Monsanto		
9	Marcos Machado	Monsanto		
10	Damian Angel Grimi	Monsanto		
11	Alberto Peper	Monsanto		
12	Fernando Flores	TA Marcos Juar	Solicitó alojamiento desde la noche previa	Evaluación del daño de *Spodoptera* y *Helicoverpa* en materiales
13	Alejo Costa	Syngenta		
14	Federico Mattioli	Syngenta		
15	Federico Elorza	CASAFE	Solicitó alojamiento desde la noche previa	upo IRAC Argentina. Objetivo
16	ernando Perez Eseiz	CASAFE	Solicitó alojamiento desde la noche previa	
17	Carlos Vassallo	DOW	Solicitó alojamiento desde la noche previa	de recomendaciones grupo IR
18	Ana Signorini	DOW		
19	uan Carlos Lissarragu	DOW		
20	Martín Gríes	BASF		
21	Fabiana Malacarne	ASA		
22	Adriana Saluso	INTA Paraná		Situación de FAW en zona Litoral
23	uan Carlos Velázque	INTA Paraná		
24	Jorge Morre	DUPONT		
25	Hernán Villegas	DUPONT		
26	Daniel Igarzabal	HALCON	Solicitó alojamiento desde la noche previa	la oruga cogollera en el norte
27	Alberto Peralta	HALCON		
28	Augusto Casmuz	EEAOC	citó pasaje, se sacó pasaje y se envió por e	"Situación de Spodoptera frugiperda en el cultivo de
29	Luciano Lecumberri	BAYER		
30	amiro Oviedo Busto	AAPPCE		Estado de situación de
31	Nicolás Iannone	NTA Pergamino		*Diatraea* y *Dichelops.*
32	Alfredo Ferzzola	FMC		
33	Juan Carlos Alvarez	BASF		
34	Daniel Rolón	BASF		
35	José María Cárcamo	BASF		

2015-16 ARGENTINA CRAG *ACCOMPLISHMENTS*

CRAG Joint Training of Customers: IRM BMP's for Row Crops







2015-16 ARGENTINA CRAG *ACCOMPLISHMENTS*

Joint CRAG
IRM BMP Training
Fotos del evento

Insect Expert advisors/ researchers to validate our IRAC recommendations.

2013-14 ARGENTINA Diamide Working Group Report

ACCOMPLISHMENTS

1. Attach all recently finished or draft IRM strategies with phenology charts and supporting slides.

See next slides

1. State successes around accomplishing any of the responsibilities of the Diamide WG (label MoA, label language, alignment with local experts, addition of more insects)

    1. IRM strategy and best practices validated with local technical referents (L. Cichon (Pomefruits); J.C Gamundi (Soybean and corn); M. Sosa (Cotton)
    2. Label language and communications through technical materials and training by the companies.

2. List your next priority of high risk insects and crops..

    1.Helicoverpa gelotopoeom (armigera, potentially) – Pseudoplusia / Soybean
    (Main crop or Ar, with large area planted / treated).

    2.Spodoptera / Corn (Potential)
    (Expected increased use of Diamides due to the Resistance Breakdown to Bt genetic technology)

2015-16 ARGENTINA Aligned IRM Communications

DuPont Coragen
protección de cultivos

DuPont AgroSoluciones

VERSATILIDAD DE USO.

PREPARACIÓN Y COMPATIBILIDAD

Coragen® es compatible con otros productos y formulaciones usados comúnmente.

Al preparar la mezcla de aplicación agregar los diferentes productos, según su tipo de formulación, en la siguiente secuencia:

1. Bolsas hidrosolubles;
2. Gránulos dispersables;
3. Polvos mojables;
4. **Coragen®** y otros productos formulados como SC (suspensión concentrada base acuosa);
5. Concentrados solubles;
6. Suspensiones concentradas (base oleosa);
7. Concentrados emulsionables;
8. Adjuvantes, surfactantes, aceites, fertilizantes solubles, antiderivas, etc.

INSTRUCCIONES DE PREPARACIÓN

1. Cargar el tanque de la pulverizadora con agua limpia o filtrada, hasta aproximadamente 1/3 de su capacidad.
2. Agregar directamente al tanque de aplicación la cantidad requerida de **Coragen®** según dosis de uso y superficie a tratar.
3. Mezclar enérgicamente con el agitador para dispersar completamente el producto.
4. Completar la carga de agua del tanque, y mantener el removedor o el retorno en funcionamiento hasta la total homogeneidad del preparado.

IMPORTANTE: Utilizar agitación mecánica; no utilizar agitación por aire. Preparar únicamente el producto estimado para aplicar en el día. No es conveniente dejar producto preparado de un día para el otro.

EQUIPOS, VOLÚMENES Y TÉCNICAS DE APLICACIÓN

Coragen® puede ser aplicado mediante pulverizaciones foliares utilizando equipos terrestres o aéreos convencionales. Para lograr un resultado eficaz se recomienda utilizar un caudal no menor de 80-100 l/ha en equipos terrestres y se deberá trabajar con una presión de 60 a 80 lb/pulg² (4,2 a 5,5 bar). En el caso de equipos aéreos se recomienda un caudal mínimo de 10 l/ha. Calibrar el equipo de modo tal de lograr una cobertura de 50-70 gotas/cm² de superficie foliar. Los equipos pulverizadores deben estar correctamente calibrados, con sus picos limpios y en condiciones de lograr una cobertura buena y uniforme. El equipo debe estar provisto de un agitador mecánico adecuado, o con una bomba capaz de producir un exceso de flujo, de modo de mantener una remoción constante a través del retorno. El equipo de aplicación debe estar limpio y libre de cualquier depósito de producto que se haya aplicado previamente. Es conveniente verificar el correcto funcionamiento del equipo previo a la aplicación y calibrarlo con agua, sobre un terreno con similares características a donde se va a utilizar.

PREVENCIÓN DE RESISTENCIA.

IRAC

En cualquier población de insectos pueden existir individuos naturalmente resistentes a **Coragen®** u otros insecticidas, producto de la variabilidad genética normal.
Estos individuos pueden eventualmente tornarse dominantes en la población de insectos si se usan repetida y reiteradamente los mismos insecticidas. Como consecuencia se va reduciendo sistemáticamente la efectividad de los tratamientos.

GRUPO	28	INSECTICIDA

Coragen® pertenece al Grupo 28 de la clasificación de modos de acción de insecticidas de IRAC.
El uso repetido de **Coragen®** u otro insecticida del Grupo 28, ya sea solo o en mezclas con otros principios activos puede favorecer la selección de los individuos naturalmente resistentes.
Para evitar la proliferación de tales biotipos resistentes deben emplearse las siguientes estrategias de manejo de resistencia:

- El uso de insecticidas debe realizarse en el contexto de un programa de Manejo Integrado de Plagas (MIP), contemplando el monitoreo y observancia de umbrales, control biológico, técnicas de confusión sexual, etc.
- Rotar el uso de **Coragen®** (o cualquier otro producto perteneciente al Grupo 28 de insecticidas) con productos de diferentes modos de acción para controlar la misma plaga en generaciones sucesivas.
- No realizar más de 2 aplicaciones de **Coragen®** o cualquier otro producto del mismo modo de acción (grupo 28 de IRAC) por generación de una misma plaga. Aplicaciones a la próxima generación de dicha plaga deben realizarse con un producto de diferente modo de acción.
- Cuando no sea posible determinar las generaciones de las plagas con precisión, no realizar más de 2 aplicaciones en un período de 30 días (ventana activa). En las aplicaciones siguientes a ese período rotar con productos de diferente modo de acción (ventana inactiva).
- Contactar los organismos técnicos especializados (INTA) y de extensión locales de cada zona.
- Información adicional sobre prevención de resistencias a insecticidas en insectos puede encontrarse en www.irac-online.org (Comité de Acción sobre Resistencia a Insecticidas).

DUPONT
Los milagros de la ciencia

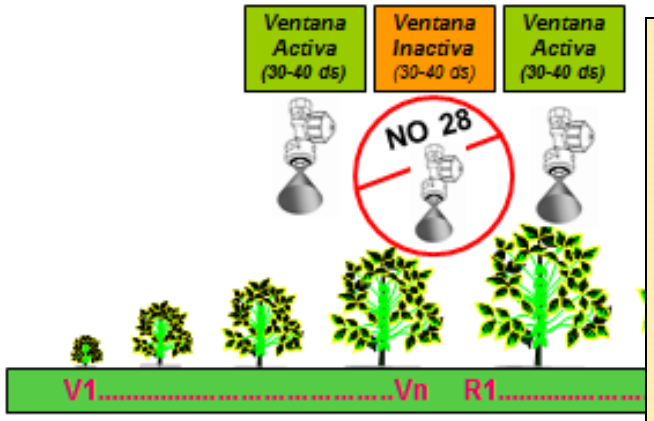
2015-16 ARGENTINA Aligned IRM Communications

Coragen®
Manejo de Resistencia

DUPONT

IRAC
Insecticide Resistance Action Committee

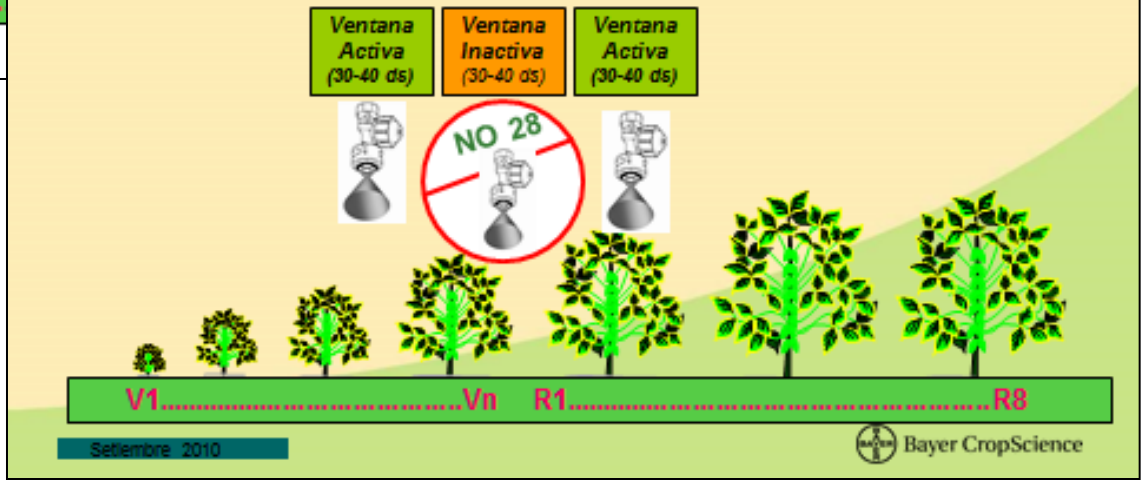
Estrategia de "Alternancia de Ventanas" (Versión 1)



IRAC
Insecticide Resistance Action Committee
Argentina Diamide Working Group

BELT

Estrategia de "Alternancia de Ventanas" (Versión 1)



Setiembre 2010

Bayer CropScience

Indonesia

2015-16 INDONESIA CRAG

TEAM STATUS

1.Date team was formed: Oct 29, 2009, Feb 2014 became CRAG with CL interactions on MoA activities

2. Meetings in October, 2015 and February, 2016

1.Name the highest risk insects and crops the team is targeting:

1.Lepidoptera 2. Sucking Insects

2.List team members

No	Name	Company	Email
1	Erwin Cuk Surahmat	Syngenta	erwin.cuk_surahmat@syngenta.com
2	Vicki Rizki Arneldi	Syngenta	vicki.rizki_arneldi@syngenta.com
3	Iskandar Zulkarnain	Dupont	iskandar.zulkarnain@dupont.com
4	Fei Ling	Dupont	fei.ling@dupont.com
5	Iwan Rahwanudin	Dow	IRahwanudin@dow.com
6	M Yuli Irianto	Dow	MMIrianto@dow.com
7	Nugroho Adi	Nufarm	nugroho.adi@id.nufarm.com
8	Gandung Martono	Nufarm	gandung.martono@id.nufarm.com
9	Aminudin Teibang	Nufarm	aminudin.teibang@id.nufarm.com
10	Feby Aryana	Bayer	feby.aryana@bayer.com
11	Murdiyanto	BASF	murdiyanto@basf.com
12	Dudi Krisyanto	FMC	dudy.kristyanto@fmc.com

2015-16 INDONESIA CRAG - *PROGRESS*

1. Record your stage of progress using stage numbers…..12
2. State progress placing Mode of Action Icon on label.
   DuPont & Syngenta have applied MoA icon on Diamide re-registered product labels. 25 Feb 2016; joint meeting with Regulatory Committee from Crop Life Indonesia: agreed to advocate government to **make MoA number in label mandatory** for all pesticide companies. I have met MoA Pesticide Committee Technical Team Coordinator (Prof Dadang) and he fully support for this action.
3. State progress placing IRM language on all Diamide labels Dupont & Syngenta has applied IRM language on Diamide product label
4. State progress placing Max # of Apps/Season on all Diamide labels Dupont & Syngenta has applied Max # application on Insecticides product label
5. State progress developing a Mode of Action communication plan Communication draft on Resistance is available, will be published by Crop Life.
6. State progress developing an IRM Implementation Plan (communication/training)
   - Train The Trainers event occurred in Oct 2015; Alignment with local experts ongoing.
   - Meeting with Stewardship Committee from Croplife Indonesia: agreed to incorporate **resistance training material** into CLI member Stewardship training material. Will use recent IRAC Grower Benefits and YouTube. Already being translated.

2015-16 INDONESIA CRAG - *RESISTANCE STATUS*

MoA Group	Location	Insect	Crop	Status
28	Brebes (Central Java); Probolinggo (East Java)	Spodoptera exigua (BAW)	Shallot	Confirmed
28	West Java	Scirphophaga incertulas (YSB)	Rice	Confirmed
28	Sulawesi	Plutella xylostella (DBM)	Cabbage	Confirmed

MoA Group	Location	Insect	Crop	Status
4	Java	Brown Planthopper	Rice	No published report – Field failure observations
1, 2, 3, 6, 22	Java	Spodoptera exigua	Shallot	No published report – Field failure observations

2015-16 INDONESIA CRAG – Mtg Minutes

Minutes of Meeting Joint TRAC – CRAC
Thursday, February 25, 2016 @ R&D Station Syngenta Cikampek

Redi Fajar Kurniawan (RFK)	• **Found that from Monsanto's side it is beneficial for BT and seeds product which Syngenta, Monsanto and DuPont share** • **Agree with RP that CropLife Indonesia should start with its 2/3 market share and hope for the best that generic companies will follow**
AP	• **Explains that aside from government and industry support, it would be good to have the support from external independent scientists and association e.g. PEI (Indonesia Entomologist Unity)** • **Would not want to have Australia condition which is very severe toward Indonesia in the future. There it is common to find double-knock agent**
NN	• **Explains how Pesticide Committee work: by compiling report most found within Indonesia and conclude that resistency indication took place in certain areas**
AP	• **Offered that Monsanto's can take leading role when resistency in weed incidence arise, whether in the form of study or survey**
NN	• **Take one example of perferofos**
Conclusion	• **Who to approach: Prof Dadang (Chief of Technical Team, Pesticide Committee); Prof. Nanik & Dr. Sukisman (expert scientist); CropLife Indonesia Member companies Country Leaders** • **What to give: resistency management incorporation in pesticide labeling (group classification numbering code & Resistency Management Statement)** • **When to act: approach Dadang on 1st / 2nd week of March** • **Supporting documents needed to be supplied:** **-. Labeling from other countries (best practice)** **-. Active ingredient classification from IRAC, FRAC & HRAC** **-. Scientific resistency report cases in Indonesia status**

2015-16 INDONESIA CRAG – Mtg Minutes

Participants: **Technical Regulatory Affairs Committee**	1. Mayang Sari Marchiany (DuPont) 2. Arunika Anggradewi (Dow AS) 3. Maylina (BASF) 4. Maria Astriani (DuPont) 5. Silviya Wiltin (Bayer) 6. Niken (FMC) 7. Wiji Astuti (Syngenta) 8. Vicky Rizky Arneldi (Syngenta) 9. Redi Fajar Kurnia (Monsanto) 10. Askif Pasaribu (Monsanto) 11. Nanin (Syngenta)
Country Resistance Action Committee:	1. Erwin Cuk Surahmat (Syngenta) 2. Fei Ling (DuPont) 3. Rudolf Panjaitan (CropLife Indonesia)
Erwin Cuk Surahmat	• Start as IRAC initially to discuss about diamide as active ingredient, evolve into wider resistancy campaign→changed into CRAC
Rudolf Panjaitan (RP)	• Explains chronological development of joint regulatory – resistancy action • Bring about the purpose of the meeting and what the outcome would be and to whom the outcome of the meeting will be given to
ECS	• Classification of grouping is based on mode of application i.e. whether it is determined as group 3A or 18 or 6
Mayang Sari Marchiany (MSM)	• Asked whether it would be possible to explain where those Group Classification refers to, so that it would be clearer to the audience
ECS	• Reference for group classification is based on IRAC document • Organophosphate is the active ingredient less found in cross-resistency and multiple-resistency issues
Askif Pasaribu (AP)	• Explains that at grass root level farmers tend to classify groups not based on scientific body/reference rather to name of product such as for herbicide: round-up • Utters about curremt “cross-resistent” issue in targeted organisms
ECS	• Explains that the strategic approach chosen is based on existing resistency strategy starting with lepidopteran type • Further, it will be focused on insect and then fungicide and finally to weed • Explains the difference of “cross-resistance (CR)” and “multiple-resistance (MR)”: CR is resistancy between active ingredients within the same classification group; MR is resistancy between active ingridient from different classification group

Minutes of Meeting
Joint TRAC – CRAC
Thursday, February 25th, 2016 @ R&D Station Syngenta Cikampek

2015-16 INDONESIA CRAG – Mtg Minutes

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Fei Ling (FL)	• Sensed that it is necessary to explain basics of resistancy management to the newly exposed (CRAC) regulatory staff
Nanin Noorhajati (NN)	• Bring about the benefit of resistancy management towards the company business sustainability • Further explains that its benefit will be propelled to the customer which in turn will gain trust toward the company
ECS	• Put on one example of Syngenta's product which consists of 2 active ingredient mixture: "Group 28/4 Insecticide"
Arunika Anggradewi (AA)	• Express from the company side, if this policy is to be impelemented, what would be the impact on companys' business, how many companies have complied voluntarily to the idea
ECS	• So far 2 companies (DuPont and Syngenta) have complied and voluntarily show group classification number on the label of all pesticide products
MSM	• Explains beside advocating to central government it is needed to also align advocacy policy down to the lowest level of government officials (Dinas level in rural areas)
AA	• Utters that it would be advantageous if CropLIfe made official announcement to country leaders
RP	• Approach the issue with Country Leaders Gathering inviting resistancy committee to explain the policy to top management • In terms of other companies at large (mainly generic) propose FKLA be utilized to discuss about resistancy campaign so that more and more companies take part
NN	• Explains most of the times company is the party being blamed when resistancy issue arise in the country • That said, it is important to guard the idea inside the heads of decission & policy maker so that they will not go astray of the targeted outcome which is sustainable business practice

Japan

2015-16 JAPAN Diamide Working Group Report

TEAM STATUS

1. Date team was formed: **Jan 2009…Still a Diamide WG**
2. Number of meetings **Sept, Dec 2015; March 2016**
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✓DBM on cabbage; Tortrix complex on Tea

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Name	Company	E-mail address
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Shinji Sugii	Syngenta Japan K.K.	shinji.sugii@syngenta.com
Masashi Ataka	Bayer CropScience K.K.	Masashi.ataka@bayer.com
Masayuki Morita	Ishihara Sangyo Kaisha	m-morita@iskweb.co.jp
Shigeki Okamoto	ISK Bioscience K.K.	sh-okamoto@iskweb.co.jp
Nobuyuki Nonaka (Leader)	Nihon Nohyaku CO.,LTD.	nonaka-nobuyuki@nichino.co.jp
Shinsuke Fujioka	Nihon Nohyaku CO.,LTD.	fujioka-shinsuke@nichino.co.jp

2015-16 Japan Diamide WG: Meeting memo

Objectives IRM technical brochure December 22, 2015 at Nihon Nohyaku

Participants 【BCS KK】Ataka【DuPont KK】Shima【Syngenta Japan KK】Sugi 【Ishihara BioScience】Okammoto【Nihon Nohyaku】Nonaka, Fujioka

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2015-16 Japan Diamide Working Group Report

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Appl Entomol Zool (2014) 49:529–534
DOI 10.1007/s13355-014-0283-x

ORIGINAL RESEARCH PAPER

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Toru Uchiyama · Akihito Ozawa

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Keywords *Adoxophyes honmai* · Insecticide resistance · Diamide · Flubendiamide · Chlorantraniliprole

Introduction

The smaller tea tortrix, *Adoxophyes honmai* Yasuda, is one of the most destructive lepidopteran pests of tea, as is the oriental tea tortrix *Homona magnanima* Diakonoff. The damage caused by the larvae of these species delays the growth of new leaves and reduces yields if the insects experience an outbreak (Minamikawa and Osakabe 1979).

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Tea Research Center, Shizuoka Research Institute of Agriculture and Forestry, Kikugawa, Shizuoka 439-0002, Japan
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To date, no declines in the susceptibility of *A. honmai* to insecticides have been reported outside Japan. In the Makinohara area, some field populations of *A. honmai* have developed resistance to various classes of insecticides, including carbamates in 1986 (Ozaki and Takeshima 1984) and organophosphates and synthetic pyrethroids in 1997 (Kosugi 1999). In addition, Kosugi (1999) reported early indications of reduced susceptibility to benzoylurea and diacylhydrazine (DAH) analogs of insect growth regulators (IGRs) in 1997. Several new insecticides, including diamides, were registered recently and are already widely used in Shizuoka Prefecture for *A. honmai* control.

Diamides are a new class of insecticides (Lahm et al. 2007; Tohnishi et al. 2005). They are specific to lepidopteran pests and act on muscle contraction by binding to the ryanodine receptor and interfering with the receptor's role in calcium homeostasis (Cordova et al. 2006; Ebbinghaus-Kintscher et al. 2006). In Japan, flubendiamide and chlorantraniliprole were registered as diamide insecticides in 2007 and in 2009, respectively, for lepidopteran pests. Flubendiamide and chlorantraniliprole were first used in the tea fields of Shizuoka Prefecture in 2007 and 2010, respectively, to control *A. honmai* and *H. magnanima*.

High levels of resistance to diamides were reported only in the diamondback moth, *Plutella xylostella* L., in China (Wang and Wu 2012), the Philippines, and Thailand (Troczka et al. 2012). There have been no reports of resistance to diamides in other pests. In the present study,

2015-16 Japan Diamide Working Group Report

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2015-16 Japan Diamide Working Group Report

What is going well?

- ✓ **Good communication of WG companies with local researchers contribute to revising spray calendars based on the information about effective materials on behalf of diamides.**
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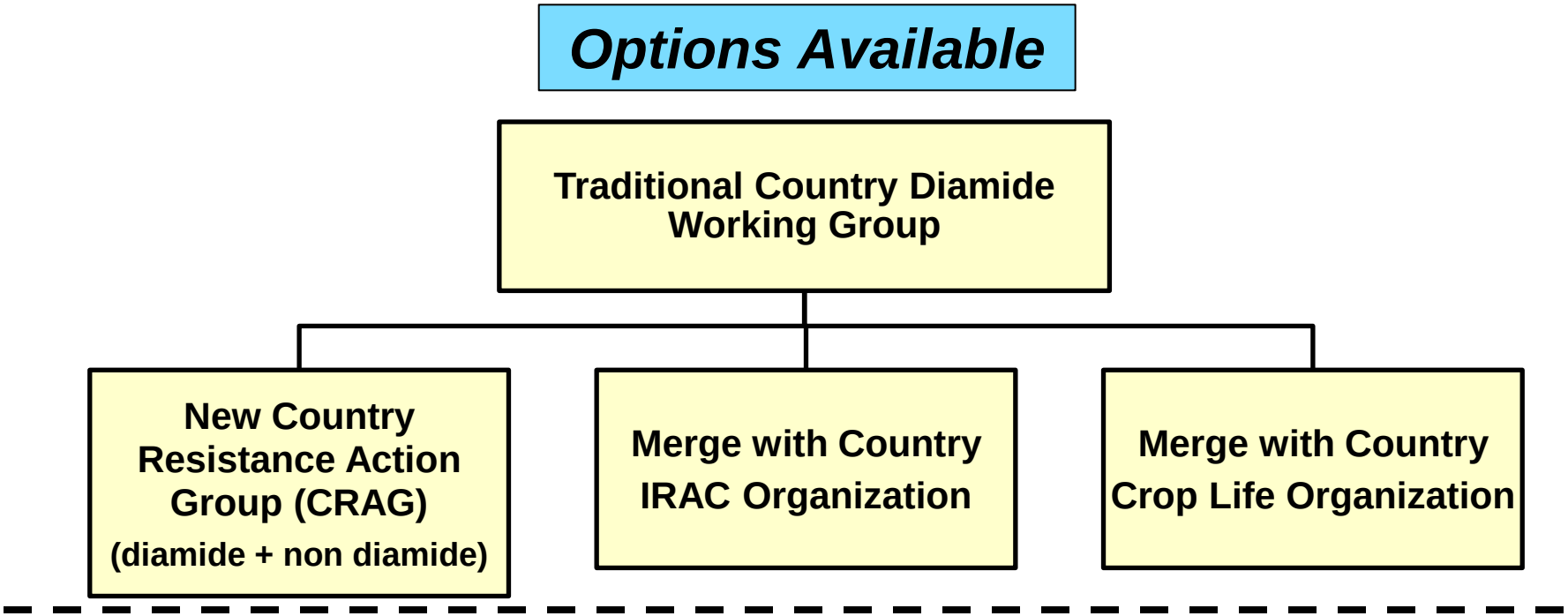

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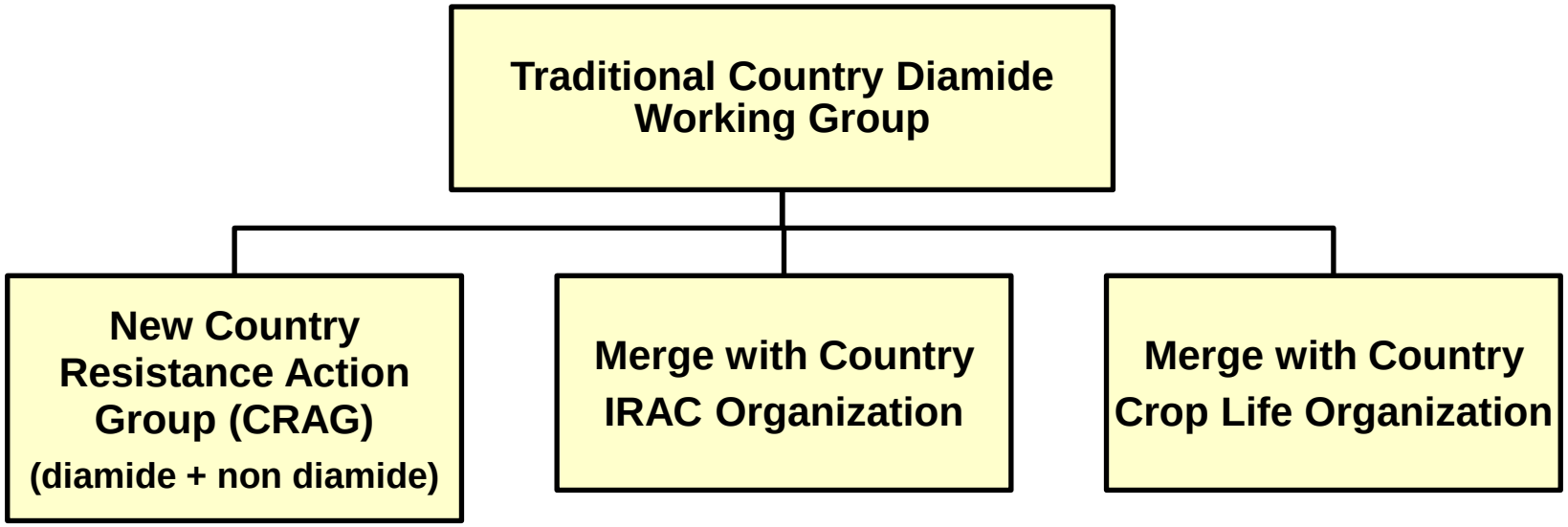

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2015-16 USA CRAG

TEAM STATUS

1.Date team was formed:_February 2009; Joined USA IRAC team in2015

2.Number of meetings in 2015/16 face to face and teleconferences

3.Name the highest risk insects and crops the team is targeting:__vegetables, Diamond Back Moth, Beet Armyworm, Leafminer, Looper

RESISTANCE STATUS

Confirmed Resistance

1. Updated the DBM report to confirmed resistance in MS and SC
2. OBLR – a possible emerging situation that should be watched.

List additional insect markets that are suspicious, rumors, field failures and explain why.

1. **Suspicious Soybean Loopers in NC – laboratory studies underway. Reported by NCSU that population was not controlled by Diamides, collected samples and analyzing in Monheim by BCS now. Could have been application pattern failure.**

2015-16 USA CRAG

Name	Company	E-Mail
Peter J. Porpiglia	AMVAC Chemical Corporation	PeterP@amvac-chemical.com
Amanda Beaudoin	Bayer CropScience	amanda.beaudoin@bayer.com
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Brad Hopkins	Dow AgroSciences	bwhopkins@dow.com
Hector Portillo	DuPont Crop Protection	hector.e.portillo@usa.dupont.com
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Sean Whipple	ISK Biosciences	whipples@iskbc.com
Rob Hummel	Mitsui/ Landis International	rhummel@landisintl.com
Graham Head	Monsanto LLC	graham.p.head@monsanto.com
James Adams	Nichino America	jadams@nichino.net
John Wrubel	Nisso America Inc.	j.wrubel@nissoamerica.com
Caydee Savinelli	Syngenta Crop Protection, LLC	caydee.savinelli@syngenta.com
Ron Estes	Valent USA Corp.	Ronald.Estes@valent.com

2015-16 USA IRAC - *ACCOMPLISHMENT*

Insecticide Resistance Action Committee – US

16 November 2015 – 8:00 AM – 1:00 PM

Hyatt Regency Minneapolis, Greenway J

Amvac –Peter Porpiglia
Bayer – Amanda Beaudoin, Chris Sansone
BASF – Rebecca Willis
Dow AgroSciences – Brad Hopkins, Nick Storer
DuPont – Hector Portillo, Clint Pilcher
FMC – Lamar Buckelew (absent)
ISK Biosciences – Sean Whipple
Monsanto – Graham Head
Mitsui – Tim Joseph
Nichino – Scott Ludwig
Nisso America – John Wrubel (absent)
Syngenta – Caydee Savinelli
Valent – Ron Estes, Daniel Zommick (both absent)
NAICC – Jim Steffel

- IRAC-US Symposium Review – C. Savinelli
- ICE Symposium Update and opportunities at ICE

2015-16 USA IRAC - ***ACCOMPLISHMENT***

- **ESA Resistance Management Policy Statement – B. Hopkins**
  - IRM document – ag, human health, animal health
  - Led by Beth Grafton- Cardwell, Anders Huseth, Moneen Jones
  - Policy Document – for Congress, funding
  - Why is ESA doing this – no strong anti-pesticide views.
  - Science policy committee – satisfied with the current version.
  - Process – take to governing committee
  - Actionable items – fund projects for additional tools, education – IPM & IRM. Specialty crops.
  - Concerns about what is the ask?
  - Spring meeting – Invite the ESA science policy fellows to learn about IRAC. Reach out to Tom Anderson about setting up a meeting.
- **EPA and Resistance Management - All**
  - CRW SAP Rootworm Management & Resistance for traits
  - EPA drafted a proposal – including language around soil insecticide uses on traits. Growers were using soil insecticides on traits and believing that it was an IRM management tool. Cannot be seen as trying to control soil insecticide use with trait labels.
  - EPA is still very interested in some language – soil insecticide use should be discouraged. Has gone to lawyers of ABSTC for evaluation. Advisory language and will not be on seed bag tag.
  - IRAC International has positions on both chemistry and traits in combination.
  - ABSTC Deck should be circulated within IRAC. Worked with NCGA.

End of January – Docket responses.

2015-16 USA IRAC - ***ACCOMPLISHMENT***

- **Resistance Issues – All**
  - Soybean Looper
    - Jeff Davis Update – send presentation - Soybean Looper
    - Puerto Rico – potential to send samples to Jeff Davis – once a month sampling
    - Application management - add Clint, Amanda. Do universities have soybean breeding farms?
  - DBM, Codling Moth – DuPont is planning on doing additional sampling for diamides.
  - Jeff Scott Proposal – resistance using Drosophila for characterizing other studies. Will take on funding for taking on diamondback moth. Asked for one year of funding. What is the long term plan? Agree to funding for this work. Graham Head will talk to Jeff Scott.
  - Discussion – What should IRAC to address these issues in Puerto Rico

- **ISU initiative around resistance management -** P. Porpiglia
  - Need feedback for from IRAC-US regarding this proposal.

Liriomyza in Florida - 2015

From: Scott Ferguson [mailto:scott@atoconsult.com]
Sent: Tuesday, March 29, 2016 12:33 PM
Subject: TOR leafminer results

I have completed my bioassay work with the TOR leafminer strain that you sent me in late December. The results were:

Coragen: **highly resistant**

Exirel: **normal susceptible**

Platinum/Actara: resistant

Trigard: **normal susceptible**

AgriMek: **normal susceptible**

Radiant: **normal susceptible**

Scott Ferguson, Ph.D.
Atlantic Turf & Ornamental Consulting
2940 3rd Street SW
Vero Beach, FL 32968
772-643-5658

Screening Soybean Looper Collections for Resistance to Diamide Chemistries

Jeffrey A. Davis Louisiana State University Agricultural Center

Submitted to IRAC Diamide Working Group

Objective

The objective of the proposed project was to conduct resistance screenings for detection, evaluation, and baseline data establishment of diamide (flubendiamide and chlorantraniliprole) resistance in soybean looper (SBL). The proposed study also generated baseline data on methoxyfenozide, spinetoram, and spinosad (representing different classes of insecticides).

Approach

To evaluate strains of soybean loopers collected from North Carolina in 2014 where field resistance to diamide chemistries had occurred and compare those to laboratory strains.

Results 2014

Soybean looper samples. We collected soybean looper (SBL) larvae from three locations within the North Carolina soybean growing region with help from D. Reisig (NCSU) in 2014 (Table 1). **Table 1. Collection information for North Carolina Soybean Loopers**

Colony	Location	Date Collected	Additional Information
NC14-1	35.73602, -76.63870	11-Sep-14	No insecticides applied
NC14-2	35.68642, -76.66030	11-Sep-14	Pyrethroid applied 3 wk prior to collection
NC14-3	35.56068,-76.22929	10-Sep-14	9 oz/A Besiege applied on September 2, 2014

Unfortunately, only 2 out of 428 (0.5%) SBL larvae collected reached adult and those were both male (Table 2). From our past research, we have seen mortality from natural enemies ranging from 12 to 88% (Brown 2012). From these collections, 1.4% was parasitized by Copidosoma truncatellum. There was very high levels (21%) of PiNPV (Pseudoplusia includens nuclear polyhedrosis virus) detected. These did not differ amongst collections (18 to 25%). We are unsure why there was so much mortality. Collection and transportation can have an effect on mortality but from our past collections (29 collections over 5 years); mortality has averaged only 9%.

Three soybean looper reference colonies maintained by Davis' laboratory; colony LSU1, obtained in 1975 and never exposed to any diamides (Newsom et al. 1980), colony LSU2, collected in the 1990s (Baur and Boethel 2002), and MR08 collected in 2008 from a failure of methoxyfenozide to control soybean loopers below economic threshold in Louisiana (Hardke et al. 2009), were evaluated using 96 hr diet-incorporated bioassays to generate baseline data on technical grade flubendiamide, chlorantraniliprole, methoxyfenozide, spinosad, and spinetoram (Table 3 and 4).

Screening Soybean Looper Collections for Resistance to Diamide Chemistries
Jeffrey A. Davis Louisiana State University Agricultural Center
Submitted to IRAC Diamide Working Group

Results 2015

- Because strains of soybean loopers collected from NC in 2014 failed to establish in the laboratory, collections were solicited from cooperators when they suspected field failures in 2015. We received strains from AR, MS, and NC, where applications of Besiege at 9 oz/A failed to provide adequate control. In addition, we made collections in GA, LA, and TN from fields which had not been sprayed. We are currently evaluating these collections using 96 hr diet-incorporated bioassays to determine lethal concentrations. We had sufficient F1 larvae to test AR, MS, and TN with technical grade chlorantraniliprole (Table 5). Resistance ratios (RR) were calculated using the formula LC50 field strain/LC50 LSU1 (Table 5). Preliminary data indicates there has been a significant shift in susceptibility to chlorantraniliprole in US SBL populations in 2015 compared to previous years. We hope to continue this research in the upcoming year.

- **Table 5. Susceptibility of 2015 strains of SBL to chlorantraniliprole diet incorporated bioassays 96 h after exposure**

Colony	N	LC50 (95% CL) in ppm	RR
AR15	630	33.106 (25.017 - 58.271)	34.1
MS15	630	31.774 (23.104 - 52.069)	32.7
TN15	630	11.945 (9.639 - 15.366)	12.3

Luis Teixeira

Mexico

No new activities to report

Team:

1. **Meetings:** 2 meetings:1 F2F and 1 Audio - F2F 1st March 22 2013, -28th 2013 at Homero office. Audio 7 September 2015
2. **Target insects and crops:** Plutella (crucifers); Liriomyza (peppers)
3. **Country IRAC group open to all companies:** in process

Mexico Diamide Working Group Report

for 2012 through 4Q 2015

PLEASE COMPLETE BY APRIL 04, 2016
Return to your country liaison

- Your input is needed for annual reporting to the International IRAC committee meeting held March.
- Your report documents your team's progress, status of diamide resistance, markets that pose potential resistance issues, and identify support you may need from the Global Diamide team.
- Please fill out pages 2-5 as completely as possible and attach requested documentation on completed or drafted IRM strategies.

2012-15 Mexico Diamide Working Group Report

TEAM STATUS

1.Date team was formed: Feb, 27th, 2009

2.Number of meetings in 2015 - 2 meetings :1 Audio (August 7), 1 F2F 7 September 2015

3. Other activities: Meeting COTECO (Brassicas producers), Oct 8

4.Name the highest risk insects and crops the team is targeting: Plutella (crucifers); Liriomyza (peppers)

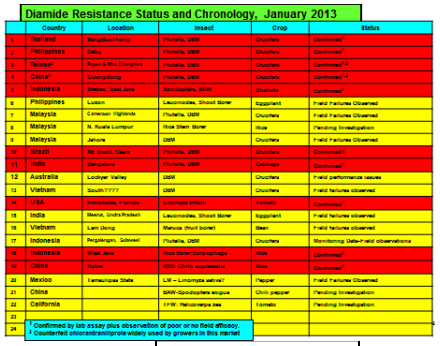
5.List team members and current coordinator:

- Bayer – Francisco Santos -> francisco.santos1@bayer.com
  - Elias Tapia -> elias.tapia@bayer.com
- Syngenta- Guillermo Elizalde -> guillermo.elizalde@syngenta.com
  - Daniel Carrasco -> daniel.carrasco@syngenta.com
- DuPont - Jose del Refugio Muñoz -> jose-del-refugio.munoz@dupont.com.
  - Julio Cesar Toledo – julio.toledo@dupont.com

RESISTANCE STATUS

1. See slide 6 that summarizes all confirmed and suspicious populations reported by countries. Confirm or refute if your country is on the chart.

2. List additional insect markets that are suspicious, rumors, field failures and explain why.

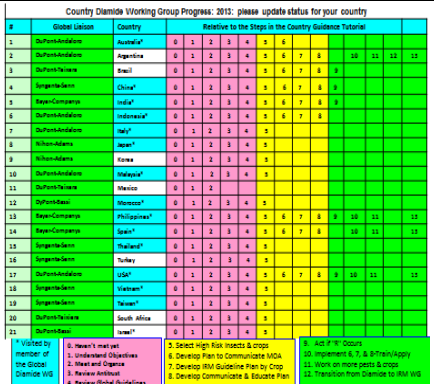

Diamide Resistance Status and Chronology, January 2013

	Country	Location	Insect	Crop	Notes
1	Thailand	Nonpetchaburi	Plutella, DBM	Crucifers	Confirmed[1]
2	Philippines	Ubiu	Plutella, DBM	Crucifers	Confirmed[1]
3	Taiwan[2]	Puyan & Wufu,Changhua	Plutella, DBM	Crucifers	Confirmed[1,2]
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed
7	Malaysia	Cameron Highlands	Plutella, DBM	Crucifers	Field Failures Observed
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation
9	Malaysia	Jahore	DBM	Crucifers	Field Failures Observed
10	Brazil	Sp, Brasil, Ceara	Plutella, DBM	Crucifers	Confirmed[1]
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues
13	Vietnam	South????	DBM	Crucifers	Field failures observed
14	USA	Immokalee, Florida	Liriomyza trifolii	Tomato	Confirmed[1]
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed
16	Vietnam	Lam Dong	Manuca (fruit borer)	Bean	Field failures observed
17	Indonesia	Pangalengan, Sidowal	Plutella, DBM	Crucifers	Monitoring Data-Field observations
18	Indonesia	West Java	Rice Borer/Spodoptera	Rice	Confirmed[1]
19	China	Hubei	IRSD: Chilo suppressalis	Rice	Confirmed[1]
20	Mexico	Tamaulipas State	LM = Liriomyza sativae	Pepper	Field Failures Observed
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation
22	California		FAW: Helicoverpa zea	Tomato	Pending Investigation
23					
24	[1] Confirmed by lab assay plus observation of poor or no field efficacy; [2] Counterfeit chlorantraniliprole widely used by growers in this market				

slide 6

2012-15 Mexico Diamide Working Group Report

PROGRESS


Country Diamide Working Group Progress: 2013: please update status for your country

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial
1	DuPont-Andalore	Australia*	0 1 2 3 4 5 6
2	DuPont-Andalore	Argentina	0 1 2 3 4 5 6 7 8 10 11 12 13
3	DuPont-Talisma	Brazil	0 1 2 3 4 5 6 7 8 9
4	Syngenta-Sanmi	China*	0 1 2 3 4 5 6 7 8 9
5	Bayer-Compamyo	India*	0 1 2 3 4 5 6 7 8 9
6	DuPont-Andalore	Indonesia*	0 1 2 3 4 5 6 7 8
7	DuPont-Andalore	Italy*	0 1 2 3 4 5
8	Nihon-Adama	Japan*	0 1 2 3 4 5
9	Nihon-Adama	Korea	0 1 2 3 4 5
10	DuPont-Andalore	Malaysia*	0 1 2 3 4 5
11	DuPont-Talisma	Mexico	0 1 2
12	DuPont-Sassi	Morocco*	0 1 2 3 4 5
13	Bayer-Compamyo	Philippines*	0 1 2 3 4 5 6 7 8 9 10 11 12
14	Bayer-Compamyo	Spain*	0 1 2 3 4 5 6 7 8 10 11 12
15	Syngenta-Sanmi	Thailand*	0 1 2 3 4 5
16	Syngenta-Sanmi	Turkey	0 1 2 3 4 5
17	DuPont-Andalore	USA*	0 1 2 3 4 5 6 7 8 9 10 11 12
18	Syngenta-Sanmi	Vietnam*	0 1 2 3 4 5
19	Syngenta-Sanmi	Taiwan*	0 1 2 3 4 5
20	DuPont-Talisma	South Africa	0 1 2 3 4 5
21	DuPont-Sassi	Israel*	0 1 2 3 4 5

* Visited by member of the Global Diamide WG

0. Haven't met yet
1. Understand Objectives
2. Meet and Organize
3. Review Antitrust
5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA
7. Develop IRM Guideline Plan by Crop
8. Develop Communicate & Educate Plan
9. Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply
11. Work on more pests & crops
12. Transition from Diamide to IRM WG

1. **Record your stage of progress using stage numbers (slide 3) .**_____

2. **If you are in the planning phase (yellow) what prevents you from moving to the implementation phase (green)?** _____

slide 5

3. **State progress to place IRM language on all Diamide labels :** Ever green review, pending new formulations

See template

4. **State progress developing a MoA communication plan** _____

5. **State progress developing an implementation plan (training)** _____

6. **If in the "Green" Phase then state progress with training program to implement stages 6,7, and 8**

2012-15 Mexico Diamide Working Group Report

What is going well?

- The IRM languages for all labels has been established for pioneer active ingredients
- Implemetation of a standard presentation for all companies (plan to communicate properly MoA).
- Strategy to communicate and educate

Challenges Slowing Progress?

- **Implementation strategy to communicate and educate**.
- Develop and implement strategies IRM strategies on pest and crop core.
- Work to generate the base line with susceptible population in core crops and pests, mainly in peppers in Tamaulipas state due at security issues.

Please state your proposal/request to support your country Diamide WG:

e.g. harmonize label, common label wording, monitoring, training, develop IRM strategies.

- Within country:

Monitoring Strategy and program

- **From global Diamide WG or IRAC:**

Guideline to develop and implement IRM strategies on core crops

Presence in local forum to extend the IRM strategies with core users

2012-15 Mexico Diamide Working Group Report

ACCOMPLISHMENTS

1. **Attach all finished or draft IRM strategies with phenology charts and supporting slides. See slides 7 and 8 as examples of IRM charts.**

2. **State successes around accomplishing any of the responsibilities of the Diamide WG (label MoA, label language, alignment with local experts, addition of more insects)**
    1. **First Diamide formulations with Label statements about label MoA and language according with IRAC guideline and commitment to review according with pest and crops are added.**

3. **List your next priority of high risk insects and crops…**
    1. **Heliothis – Tomato/Peppers**
    2. **Spodoptera – Tomato/Peppers**

4.- Reviewed Standard PPT presentation to be used as part of the educational material training by every one of the companies involved.

Country Diamide Working Group Progress: 2015

Please Update Status For Your Country

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial												
1	DuPont-Andaloro	Australia*	0	1	2	3	4	5	6						
2	DuPont-Andaloro	Argentina	0	1	2	3	4	5	6	7	8		10	11	12
3	DuPont-Teixera	Brazil	0	1	2	3	4	5	6	7	8	9			
4	Syngenta-Senn	China*	0	1	2	3	4	5	6	7	8	9			
5	Bayer-Companys	India*	0	1	2	3	4	5	6	7	8	9			
6	DuPont-Andaloro	Indonesia*	0	1	2	3	4	5	6	7	8				
7	DuPont-Andaloro	Italy*	0	1	2	3	4	5							
8	Nihon-Adams	Japan*	0	1	2	3	4	5							
9	Nihon-Adams	Korea	0	1	2	3	4	5							
10	DuPont-Andaloro	Malaysia*	0	1	2	3	4	5							
11	DuPont-Teixera	Mexico	0	1	2	3	4	5	6	7	8				
12	DyPont-Bassi	Morocco*	0	1	2	3	4	5							
13	Bayer-Companys	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11	12
14	Bayer-Companys	Spain*	0	1	2	3	4	5	6	7	8		10	11	12
15	Syngenta-Senn	Thailand*	0	1	2	3	4	5							
16	Syngenta-Senn	Turkey	0	1	2	3	4	5							
17	DuPont-Andaloro	USA*	0	1	2	3	4	5	6	7	8	9	10	11	12
18	Syngenta-Senn	Vietnam*	0	1	2	3	4	5							
19	Syngenta-Senn	Taiwan*	0	1	2	3	4	5							
20	DuPont-Teixiera	South Africa	0	1	2	3	4	5							
21	DuPont-Bassi	Israel*	0	1	2	3	4	5							

* Visited by member of the Global Diamide WG

0. Haven't met yet
1. Understand Objectives
2. Meet and Organze
3. Review Antitrust
4. Review Global Guidelines
5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA
7. Develop IRM Guideline Plan by Crop
8. Develop Communicate & Educate Plan
9. Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply
11. Work on more pests & crops
12. Transition from Diamide to IRM WG

Diamide Resistance Status and Chronology, January 2013

	Country	Location	Insect	Crop	Status
1	Thailand	BangBuaThong	Plutella, DBM	Crucifers	Confirmed[1]
2	Philippines	Cebu	Plutella, DBM	Crucifers	Confirmed[1]
3	Taiwan[2]	Puyen & Xihu, Changhwa	Plutella, DBM	Crucifers	Confirmed[1,2]
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed
7	Malaysia	Cameroon Highlands	Plutella, DBM	Crucifers	Field Failures Observed
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation
9	Malaysia	Jahore	DBM	Crucifers	Field Failures Observed
10	Brazil	NE Brazil, Ceara	Plutella, DBM	Crucifers	Confirmed1
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues
13	Vietnam	South????	DBM	Crucifers	Field failures observed
14	USA	Immokalee, Florida	Liromyza trifolli	Tomato	Confirmed[1]
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed
17	Indonesia	Pergalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data–Field observations
18	Indonesia	West Java	Rice Borer:Scirpophaga	Rice	Confirmed[1]
19	China	Hubei	RSB: Chilo supressalis	Rice	Confirmed[1]
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation
23					
24					

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

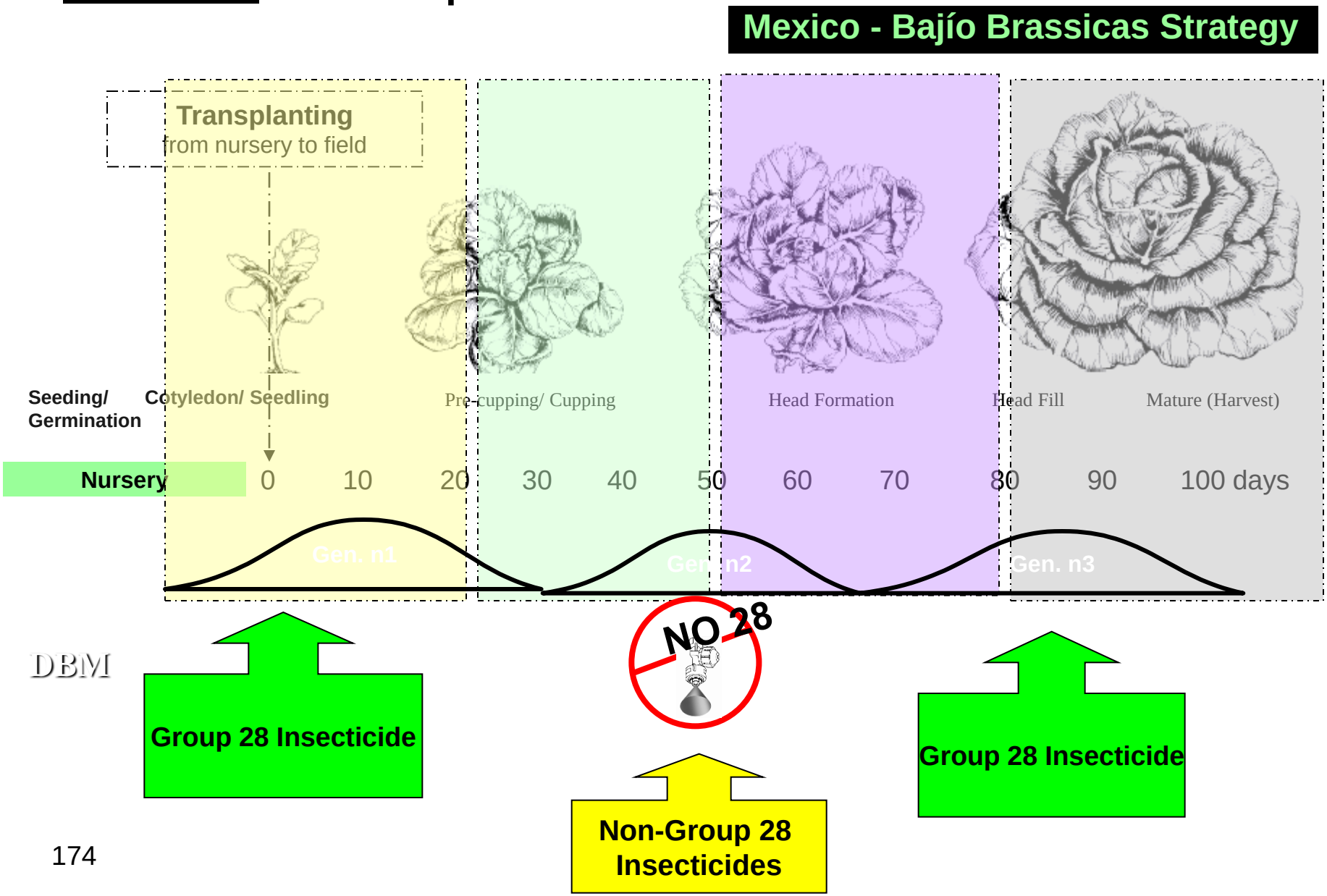
IRM -Guideline Plan by Crop
IRAC 28

Brassicas

&

Peppers

Mexico WG Update



Mexico – IRM – Peppers – Liriomyza sativae

1. El primer bloque activo cubre la primer generación pionera, cuya duración del ciclo de vida es generalmente más larga
2. La duración de los bloques subsecuentes debe durar el equivalente a la duración del ciclo de la plaga, el cuál es alrededor de 15 días con la posibilidad de tener generaciones traslapadas.
3. El objetivo es evitar bloques activos largos en las etapas más susceptibles del cultivo y de la plaga, evitando aplicaciones consecutivas.

Brazil

2015 (your country) Country Resistance Action Group

TEAM STATUS

1.Date team was formed: Feb, 27th, 2009

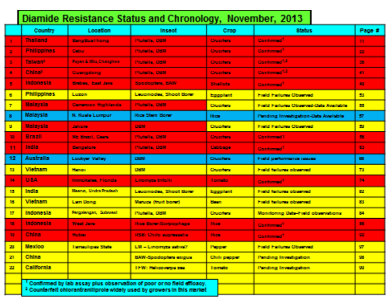
2.Number of meetings in 2015: 3 meeting (2 at IRAC-BR meeting and 1 diamide WG)

3.Name the highest risk insects and crops the team is targeting: Plutella xylostella (crucifers), Tuta absoluta (tomato), Chrysodeixis includens (Soybean/Cotton), Leucoptera coffeella (coffee), Neoleocinodes elegantalis (tomato), Helicoverpa armigera (soybean/cotton/tomato), Spodoptera frugiperda (cotton, corn and soybean)

4.List team members and current coordinator:

- Bayer – Daniela Okuma (daniela.okuma@bayer.com)
- Bayer – Felipe Sulzbach (felipe.sulzbach@bayer.com)
- Bayer – Francisco Lozano – (francisco.lozano@bayer.com)
- DuPont – Fabio Andrade Silva (fabio-m-andrade.silva@dupont.com)
- DuPont – Rosana Serikawa (rosana.serikawa@dupont.com)
- Syngenta – Henrique Ferreira (henrique.ferreira@syngenta.com)
- Syngenta – Julio Fatoretto (julio.fatoretto@syngenta.com)
- Syngenta – Giorla Moraes (giorla.moraes@syngenta.com)

RESISTANCE STATUS



Diamide Resistance Status and Chronology, November, 2013

	Country	Location	Insect	Crop	Status	Page #
1	Thailand	Bangbuathong	Plutella, DBM	Crucifers	Confirmed[1]	11
2	Philippines	Cebu	Plutella, DBM	Crucifers	Confirmed[1]	22
3	Taiwan[2]	Puyan & Xihu, Changhua	Plutella, DBM	Crucifers	Confirmed[1,2]	36
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]	41
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]	49
6	Philippines	Luzon	Leucinodes, Shoot Borer	Eggplant	Field Failures Observed	53
7	Malaysia	Cameron Highlands	Plutella, DBM	Crucifers	Field Failures Observed-Data Available	55
8	Malaysia	N. Kuala Lumpur	Rice Stem Borer	Rice	Pending Investigation-Data Available	57
9	Malaysia	Johore	DBM	Crucifers	Field Failures Observed	59
10	Brazil	NE Brazil, Ceara	Plutella, DBM	Crucifers	Confirmed1	58
11	India	Bangalore	Plutella, DBM	Cabbage	Confirmed[1]	63
12	Australia	Lockyer Valley	DBM	Crucifers	Field performance issues	66
13	Vietnam	Hanoi	DBM	Crucifers	Field failures observed	73
14	USA	Immokalee, Florida	Liriomyza trifolii	Tomato	Confirmed[1]	74
15	India	Meerut, Uttar Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed	82
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed	83
17	Indonesia	Pangalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data-Field observations	84
18	Indonesia	West Java	Rice Borer:Scirpophaga	Rice	Confirmed[1]	86
19	China	Hubei	RSB: Chilo suppressalis	Rice	Confirmed[1]	92
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed	97
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation	98
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation	99

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

slide 7,8

1. **See slide 7 and 8 that summarize all confirmed and suspicious populations reported by countries. Confirm or edit the information on the table. Did we miss something???** No

2. **List additional insect markets that are suspicious, rumors, field failures and explain why.** Based in high use of Diamides may be *Helicoverpa armigera* and *Spodoptera frugiperda* need special attention. Reported by Celso Omoto at Bahia state some frequency of individual for *Spodoptera frugiperda*. Also there is some failure control of Chlorantraniliprole for *Leucoptera coffeella* at Bahia state. Decrease of control of *Chrysodeixis includens* for diamides in different region

2015 (your country) Country Resistance Action Group

PROGRESS

1. **Record your stage of progress using stage numbers (slide 9) ._____**
2. **If you are in the planning phase (yellow) what prevents you from moving to the implementation phase (green)? _____**
3. **State progress placing Mode of Action Icon on label:** IRAC-BR is working with ANDEF to include for all labels
4. **State progress placing IRM language on all Diamide labels:** each company has their own communication in accordance with global guidelines
5. **State progress placing Max # of Apps/Season on all Diamide labels:** There is an IRAC program in place to have IRM presentation done by the main researcher in different region approaching the main resistance causes
6. **State progress developing a Mode of Action communication plan:** each company has their own communication in accordance with global guidelines and educational action by governmental agencies and also private cooperators
7. **State progress developing an IRM Implementation Plan (communication/training):** each company has the IRM communication and the guidelines is presented after each presentation
8. **If in the "Green" Phase then state progress with training program to implement stages 6,7, and 8_____**

2015 (your country) Country Resistance Action Group

What is going well?

- IRAC-BR is engaged to implement and provide guidance for IRM
- Control some pest off label (Liriomyza on tomato and melon and Spodoptera on soybean)
- Bt soybean approval as new mode of action
- Bt cotton adoption as new mode of action
- Authorities is aware about IRM issues
- Partnership with researcher and consultants

Challenges Slowing Progress?

- More knowledge for the consultant in adoption of IPM
- High use of application based on calendar and not insect scout
- Low technical level of head cabbage grower (crucifers)
- High use of smuggling emamectin benzoate
- Application timing of vegetables, soybean and many other label crops
- Off label use
- Commercialization model in Brazil (dealers)
- Common pests across crops and Crop dynamic allow to grow crop across the year (green bridge)
- High pest population dynamics (migration, polyphagous, many hosts)
- High pressure of *Chrysodeixes includens*
- High adoption of Bt can change the pest dynamics in many crops
- Issue of some Bt cotton event s to control *H. armigera*
- High tank mixture use without rational logical
- One IRM action to minimize high use is to evaluate product availability

<u>Please state your request for support (what do you need):</u> e.g. harmonize label, common label wording, monitoring, training, develop IRM strategies and communications.

- Within country:

- Alignment of application of diamides on critical areas restricted by company
- Revise the commercial strategy of all companies, reinforce IPM concepts
- Diamides Sub-group now belongs to the Lep IRM Group of IRAC-BR

- From global Diamide WG or IRAC:

- Extended Action Diamide IRM program from other regions
- Work with grower association and other association to provide guidance on IRM

2015 (your country) Country Resistance Action Group

ACCOMPLISHMENTS

1. **Attach all recently finished or draft IRM strategies with phenology charts and supporting slides.**
    1. Approval IRM strategies for soybean, corn and cotton

2. **State successes around accomplishing any of the responsibilities of the Diamide WG (label MoA, label language, alignment with local experts, addition of more insects)**
    1. Local program by company about IRM strategies
    2. Common Insect Monitoring methodology across species throughout IRAC-BR

3. **List your next priority of high risk insects and crops..**
    1. Focus on other pests and crops (heliothines / soybean / cotton)
    2. Coffee leaf miner (Leucoptera coffeella) / coffee
    3. Spodoptera frugiperda (corn / cotton)

Diamide Resistance Status and Chronology, MARCH 2015

	Country	Location	Insect	Crop	Status
1	Thailand	BangBuaThong	Plutella, DBM	Crucifers	Confirmed[1]
2	Philippines	Cebu	Plutella, DBM	Crucifers	Confirmed[1]
3	Taiwan[2]	Puyen & Xihu, Changhwa	Plutella, DBM	Crucifers	Confirmed[1,2]
4	China[2]	Guangdong	Plutella, DBM	Crucifers	Confirmed[1,2]
5	Indonesia	Brebes, East Java	Spodoptera, BAW	Shallots	Confirmed[1]
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14	USA	Immokalee, Florida	Liromyza trifolli	Tomato	Confirmed[1]
15	India	Meerut, Undra Pradesh	Leucinodes, Shoot Borer	Eggplant	Field failures observed
16	Vietnam	Lam Dong	Maruca (fruit borer)	Bean	Field failures observed
17	Indonesia	Pergalengan, Sulawesi	Plutella, DBM	Crucifers	Monitoring Data–Field observations
18	Indonesia	West Java	Rice Borer:Scirpophaga	Rice	Confirmed[1]
19	China	Hubei	RSB: Chilo supressalis	Rice	Confirmed[1]
20	Mexico	Tamaulipas State	LM – Liriomyza sativa?	Pepper	Field Failures Observed
21	China		BAW-Spodoptera exigua	Chili pepper	Pending Investigation
22	California		TFW: Helicoverpa zea	Tomato	Pending Investigation

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Diamide Resistance Status and Chronology, MARCH 2015

	Country	Location	Insect	Crop	Status
23	Canada		Leptinotarsa, CPB	Potato	Communication-Caydde Savinelli
24	RSA		Heliothis	Lettuce	RSA WG observation
25	RSA		Liriomyza	Tomato	RSA WG observation
26	Taiwan		Spodoptera, BAW	Scallions	Taiwan WG observation
27	Vietnam	Mekong	RLF	Rice	VN WG observation
28	Vietnam	Lan Dong	Maruca	Beans	VN WG observation
29	Vietnam	Red River Delta	Spodoptera(BAW), Heliothis armigera	Tomato	VN WG observation
30	USA	Mississippi	DBM	Crucifers	DuPont observation; field failures
31	Brazil		Pseudoplusia (loooper)	Soybean	Syngenta data
32	USA	Washington State	Oblique banded leafroller	Apple	DuPont data – Jay Brunner; field failures
33	Japan		DBM	Crucifers	DuPont Kai partners field failures
34	Italy	Sicily	Tuta absoluta	Tomato	Wide spread in greenhouse production
35	Brazil	Sao Paulo	Chrysodeixes inlcudens	Soybean	Confirmed[1] and communicated among all companies
36	Brazil	Bahia	Spodoptera frugiperda	Corn	Confirmation under investigation
37	Brazil	Bahia	Leucoptera coffeella	Coffee	Confirmation under investigation

[1] Confirmed by lab assay plus observation of poor or no field efficacy.
[2] Counterfeit chlorantraniliprole widely used by growers in this market

Cntry "R" Action Group Progress: March 2015

Please Update Status For Your Country

#	Global Liaison	Country	Relative to the Steps in the Country Guidance Tutorial											
1	DuPont-Andaloro	Australia*	0	1	2	3	4	5	6	7	8		10		
2	DuPont-Andaloro	Argentina	0	1	2	3	4	5	6	7	8		10	11	12
3	DuPont-Teixera	Brazil*	0	1	2	3	4	5	6	7	8	9	10	11	12
4	DuPpont-Teixeira	Chile	0	1	2	3	4								
5	Syngenta-Senn	China*	0	1	2	3	4	5	6	7	8	9	10		
6	DuPont- Bassi	France*	0	1	2	3	4								
7	Bayer-Godley	India*	0	1	2	3	4	5	6	7	8	9	??		
8	DuPont-Andaloro	Indonesia*	0	1	2	3	4	5	6	7	8	9	10		
9	DuPont-Andaloro	Italy*	0	1	2	3	4	5	6	7	8	9	10		
10	DuPont-Andaloro	Japan*	0	1	2	3	4	5	6	?	?	9	?		
11	Syngenta-Senn	Korea	0	1	2	3	4	5							
12	DuPont-Andaloro	Malaysia*	0	1	2	3	4	5	6	7	8	9	10		
13	DuPont-Teixera	Mexico	0	1	2	3	4								
14	DuPont-Bassi	Morocco*	0	1	2	3	4	5	6	7	8		10	11 ?	
15	Bayer-Godley	Philippines*	0	1	2	3	4	5	6	7	8	9	10	11	12
16	Bayer-Godley	Spain*	0	1	2	3	4	5	6	7	8		10	11	12
17	Syngenta-Senn	Thailand*	0	1	2	3	4	5	6	7	8				
18	Syngenta-Senn	Turkey	0	1	2	3	4	5	6	7	8		10		
19	DuPont-Andaloro	USA*	0	1	2	3	4	5	6	7	8	9	10	11	12
20	Syngenta-Senn	Vietnam*	0	1	2	3	4	5	6	7	8	9	10	11?	
21	Syngenta-Senn	Taiwan*	0	1	2	3	4	5	6	7					
22	DuPont-Teixiera	South Africa	0	1	2	3	4	5	6	7	8		10		
23	DuPont-Bassi	Israel*	0	1	2	3	4	5							

* Visited by

0. Haven't met yet
1. Understand Objectives

5. Select High Risk Insects & crops
6. Develop Plan to Communicate MOA

9. Act if "R" Occurs
10. Implement 6, 7, & 8-Train/Apply

South Africa

To	**Participants:** Desireé van Heerden (DvH) – Syngenta Andrew Bennett (AB) - Monsanto Tanya Joffe (TJ) – Syngenta Riaan van der Merwe (RvdM) - DuPont **Apologies:** Jan van Vuuren (JvV) – Bayer Andries Fourie (AF) - DuPont
Copy To	Luis Teixeira (LT) and CropLife ZA
Concerning	**Agenda of DWG, South Africa held at 11:00 on 18 March 2016 at Knoppieslaagte, Bayer, South Africa**

1.	**Welcome**
	The Chairman welcomed all participants. Special thanks to Reagan Riley for the facility and Syngenta SA for the refreshments.
2.	**Attendance list**
	An attendance list was circulated. Apologies received are listed above.
3.	**Minutes of the previous meeting**
	No Minutes of the previous DWG meeting held on 5 June 2015 available.
4.	**Matters arising from the minutes**
	Points from the previous meeting 5 June 2015 **Diamides in sugarcane:** • Various meetings were held between industries and roll players to make sure labels are clear, explain resistance, find usable spray programs and clarify applications. Involved were the two diamide sugarcane registration holders; DuPont and Syngenta, the Sugarcane Research Institute SASRI, Registrar and distribution network (agents). Workshops and farmers days were used to support one face and message to the sugar industry in South Africa to assure that the chemical diamide group would not be misused. Point for the meeting 18 March 2016 - Feedback to LT - Actions for 2016 – DvH

5. DWG feedback requested - LT

5.1 Updated contact info

- List updated - attached.

5.2 Reports and Minutes

- **An interim report on possible stinkbug resistance - attached**

  Title: Investigation of possible pyrethroid resistance development in two-spotted stinkbug, *Bathycoelia distincta* (Hemiptera: Pentatomidae) on Macadamia in South Africa.
  Researcher: Mr. Dev. Fourie
  Organisation: University of the Free State
  Funding: obtained from the International Resistance Action Committee (IRAC) with Croplife International as liaison.

- **IRAC ZA minutes 13 Nov 2015**

  Minutes attached.

5.	DWG feedback requested - LT

3. Resistance development/Suspected problems

Points covered in the IRAC Minutes of 13 Nov 2015, attached.

- Wheat – Bollworm – pyrethroids
- Various chemicals and crops – Red spider mite and two-spotted spider mite
- Grapes, Citrus, Macadamias - False codling moth
- Tomatoes – whiteflies – various chemicals

The previous few years South Africa experienced very dry conditions with low rainfall and high temperatures. 2015 was also an extreme year with a very strong El Nino influencing the weather patterns. In some areas it was the driest in 80 years. These conditions caused numerous pest outbreaks and high populations of especially in mites, thrips, whitefly and stalk borers were recorded. The stalk borers in the Western maize/corn growing area were not seen as a shift in resistance/sensitivity to mainly pirethroids and diamides but mainly high populations due to a shortage of food, no dry land maize/corn was planted early and only plantings under pivot irrigation existed. Applications were not up to standard and herbicides for early weed control were mixed with insecticides for stalk borer control and fungicides for early disease control. Many of these applications were broad band and not directed at the plant, with lower than normal or recommended water volumes. Many fields were not prepared and minimum tillage was used contributing to the early season pest pressure. Application is a concern for the group because registrations dosages and practices are not followed.

6.	**Actions 2016**

6.1 Diamide Actions

- **Workshop requests**: After the previous Diamide resistance workshop held in 2013 requests were received to repeat this workshop in different areas of South African. Areas; Hoedspruit, Strydomblok and Swartwater. Plan roadshow for **3Q2016**. Next meeting - planning, electronic invites, venues, spread word through ClopLife Exco, distribution network and agents of LAC and Nulandis.
- **Popular articles**: AB to contact the Agricultural writers, RvdM & AF to prepare an article for Groente & vrugte/Vegetables & Fruit, TJ & DvH one for Grain SA by **June 2016.** Also consider placement in Farmers Weekly and Landbou Weekblad. Topics no legal drench registration, long exposure, mixing partners already showing a shift in sensitivity, copy registered mixtures (e.g. Indoxacarb and cypermethrin to copy Ampligo), etc. send all drafts to DvH.
- **Broacher**: DvH to draft broacher covering diamide guidelines by **May 2016.**
- **Documents on CropLife ZA web page:** all previous training, articles etc. 3Q2016.
- **Farmer's days and training**: always include good practices and resistance development – all.
- **Watchdog**: report all illegal activities to meeting to take action and report to Registrar.

6.	**Actions 2016**
	6.2 IRAC actions to be discussed next meeting • **Resistance testing:** A great concern is the fact that no facility in South Africa can currently do resistance testing, no cultures are kept as reference or baseline studies done, we can only report suspected cases no resistance or shifts in sensibility. The ARC (Agricultural Research Council) in Potchefstroom under great financial pressure, Assistants of Dr A. Erasmus no longer financed. Industry as whole need an independent body to do testing and concentrate on problem cases identified during previous year/s. DvH to discus with Dr. Kobie de Ronde (Syngenta) SANSOR possible involvement, feedback next meeting. • **ETS audits**: report on possible benefit if companies do get audits, e.g. yearly, DuPont every 2 years, etc. • **Resistance clause on labels**: ask possible retired entomologists, e.g. Dr. J Brits to review labels, some of the registrations are very old and wording out of date.
7.	**2016 Meeting dates**
	NEXT IRAC MEETING – 3 June 2016 **Knoppieslaagte Bayer @ 11h00** **NEXT DIAMIDE MEETING - 3 June 2016** **Knoppieslaagte Bayer @ 09h00 - 11h00**

Robert Senn

China

Country Resistance Action Groups (CRAGs)

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Feedback China

Minutes of China **Diamide WG Workshop**
中国双酰胺工作组会议纪要

4th December, 2015

Nanjing, China

2015年12月4日

中国，南京

IRAC

Participants
参加人员

Xiaomei ZHANG, CLC	张晓玫，植保（中国）协会
Shuai ZHANG, NATESC	张帅，全国农技推广中心
Jingliang SHEN, NAU	沈晋良，南京农业大学
Shunfan WU, NAU	吴顺凡，南京农业大学
Zhiwei Du, Nichino	杜志伟，日本农药公司
Rong SONG, Syngenta	宋荣，先正达公司
Chuxin SHI, Syngenta	施楚新，先正达公司
Yafeng CHEN, Du Pond	陈亚锋，杜邦公司
Quansheng HU, Bayer	胡全胜，拜耳公司
Shaoming ZHANG, JSPPS	张绍明，江苏省植保站

Resistance Monitoring Result (NAU)

二化螟对双酰胺的抗性监测 (南农大)

Resistance of
iamides in SSB 201

Resistance Monitoring Result (Syngenta)

二化螟对双酰胺的抗性监测 (先正达)

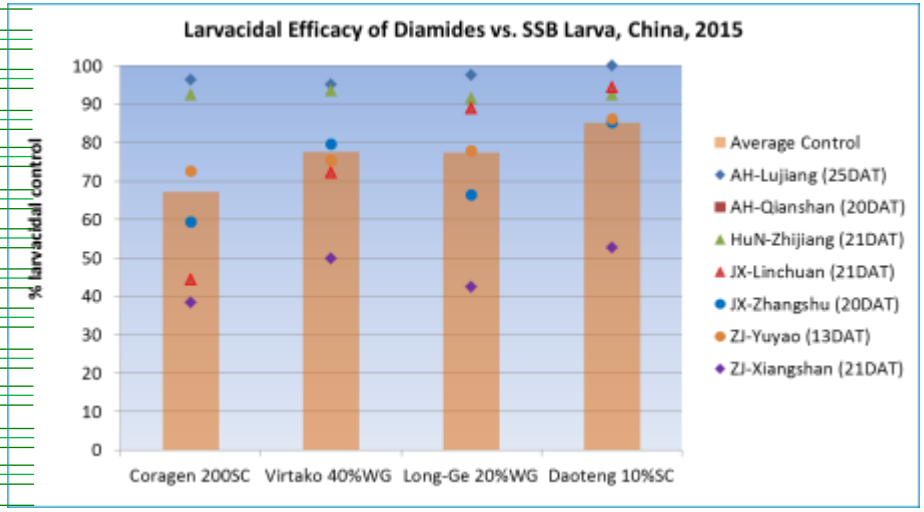
- 请楚新将结果链接在这里，谢谢

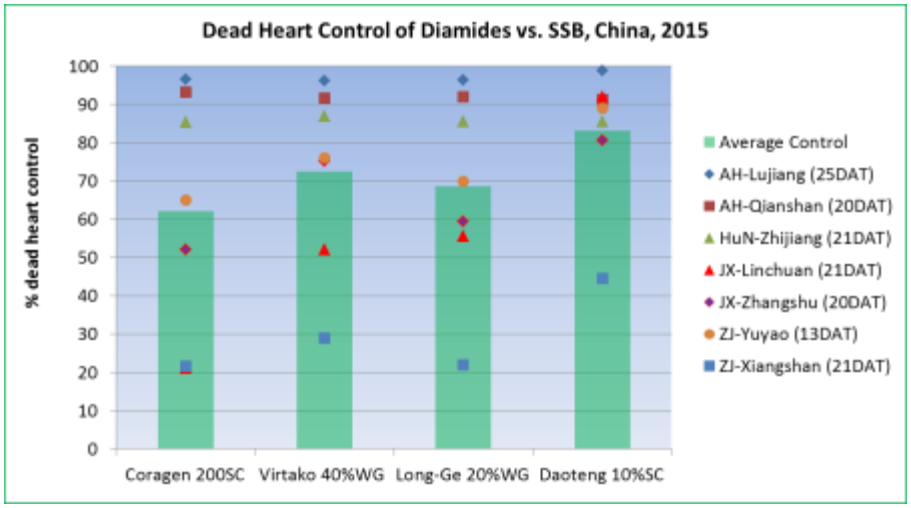
Pls Chuxin put the attachment here

Resistance
itoring_2015_China

Field Performance of Diamides vs. SSB

双酰胺类防治二化螟联合田间试验





- 请宋荣将总结链接在这一页。谢谢

Ple Song Rong put attachment here

Combined Trial
nary of Diamide_2(

IRAC

Training 2015
培训2015

- All member companies have done the pesticide resistance management in different level meetings, which makes more and more users know what the resistance is and how to use the rotation of pesticides with different MOAs.
- 各成员公司在本公司的不同级别会议上均进行了杀虫剂抗性管理的培训。这些培训让越来越多的使用者了解了什么是抗性以及如何通过科学地轮换用药来延缓抗性的产生。
- Diamides (China) Working Group asked by NATESC introduced the Diamides resistance management in two national meetings (Xiaogan of Hubei and Yongfu of Guangxi).
- 双酰胺（中国）工作组应NATESC之邀两次全国会议上介绍上双酰胺类抗性管理（湖北孝感和广西永福）。

Adobe Acrobat Document

Adobe Acrobat Document

Suggestions to Activity 2016
2016年工作建议

- All of us thought the Diamides Resistance Monitoring in last 6 years (2010-2015) was very significant and this kind of cooperation was efficient and fruitful.
- 于会者一致认为过去6年的双酰胺类抗性监测的多方合作十分有意义并富有成效。
- After 6-year resistance monitoring, what more activities should be done in next step should be discussed.
- 大家一致认为，继6年的合作以后，我们应当继续这种形式的合作。
- Training on resistance management is still meaningful and necessary in future in China.
- 害虫抗药性管理的培训未来在中国仍有必要，也有意义。
- The possibility of cooperate in the E-fate study of Diamides or others.
- 大家还讨论了未来在双酰胺或其它类别杀虫剂的环境安全方面合作的必要性和可能性。
- Dr. XM Zhang confirmed the group’s achievement and proposed further wishes and requirements.
- 张晓玫主席对双酰胺(中国)工作小组的工作给予了肯定，同时对未来提出了希望和要求。

Taiwan

Country Resistance Action Groups (CRAGs)
–
Feedback Taiwan

- Names of the working group members

  Ans : No change this year in 2016.

  Leader: James Kuo (DuPont) james.kuo@dupont.com

  Coordinator : Anita Hsu (Nihon Nohyaku) anitayyhsu@gmail.com

  Member: Ted, Huang (Syngenta) ted.huang@syngenta.com

  Member: Wenyi, Lin (Bayer) wenyi.lin@bayer.com

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Taiwan

2-3 meeting per year; Highlights of last meeting minutes:

I. Review last meeting minutes:

A. II. Company updated status:

DuPont and Syngenta will summarize yearly trainings and works in the end of 2015.

III. Education materials:

A. Carson: Provide education material after Syngenta conference in November.

B. Ted: Provide current CropLife ppts.

C. Wenyi and Anita: Prepare of CropLife poster. (Re-design, translation, amount, and etc.)

BAPHIQ (Bureau of Animal and Plant Health Inspection and Quarantine) resistance group meeting in Fe 2016

IV. 2016 plans:

Complete the education materials and launch a WDG IRAC member in-housed training.

Will raise proposal to ask CLT board meeting support education training materials budget

After established the education materials and plans, invite BAPHIQ and TACTRI to join.

Compile new resistance developments, concerns, or issues in a short email

Ans: No issue at this moments.

Vietnam

Vietnam

- No activities in 2015
- Company monitoring on leaffolder was done in Mekong delta

- Actions discussed with Nguyen Thi Mai Chi (Syngenta head R&D Vietnam)

  Invite all international companies (Bayer, DuPont, Dow, Adama, BASF, FMC,…)

  Follow the IRAC guideline for country working groups.

Thailand

Thailand

- No activities within TH IRAC working group since 2013
- Some concerns about diamides in rice which has sign to start resistant due to use rate is higher than previous years