IRAC-US Update

Graham Head

IRAC-US Interactions with EPA

- IRAC continues to meet annually with EPA (Biological and Economic Analysis Division and BPPD), as well as with the ESA liaison to EPA
  - BEAD provides economic analyses in support of pesticide regulation and is involved in discussion with all of the RACs and BPPD
- Increased focus on weed resistance led to BEAD's interest in resistance management plans generally and PR Notices for WRM and RM were issue last year focused on label language
  - IRAC-US provided comment on the PR Notices, focusing on limitations of labels (avoid overly specific and prescriptive language) and the need to provide useful information to all growers
- BEAD's focus otherwise is on education and voluntary approaches and new ESA liaison should be helpful here

IRAC-US Interactions with ESA

- IRAC has been meeting at least annually with ESA (Entomological Society of America) personnel (versus elected leadership) to ensure mutual understanding and increase collaboration where IRAC has expertise and interests
  - Common interest in vocational training, highlighting private sector opportunities and the role of the private sector in entomological issues
  - Ensure links to policy initiatives and the Fellow Program, particularly as related to Regulation, and enabled IRAC to suggest areas for future position statements
- Led to increased IRAC involvement and influence more generally in broader ESA initiatives
  - Discussions on global imperatives for entomology and ESA (and society)

Broader Educational Initiatives

- Annual symposium at the ESA meeting – this year at ESA in Denver: “New Tools and Tactics to Manage Insecticide Resistance”
  - Good mix of public and private sector speakers talking about new tools for insect control and for resistance characterization, and innovative tactics for IRM programs
- Participation in a working group developing resistance management programs for Iowa, along with ABSTC, academics and a range of other private and public sector stakeholders
- Regular IRM-related presentations and workshops at the annual NAICC meeting (facilitated by representation from NAICC on IRAC)

IRAC-US Funded Projects

- IRAC-US provides “seed money” for resistance management projects to public sector researchers
  - Based on scoping exercises, solicited proposals and unsolicited requests
- Current Projects
  - Maintenance of insect resistance database - Michigan State University, in conjunction with IRAC-International
  - Maintenance of resistant insect strains – Jeff Scott, Cornell University (see latest IRAC newsletter)
  - Assessment of resistance status and origin of US soybean looper populations from fields with performance issues – Jeff Davis, Louisiana State University, and Rod Nagoshi, USDA-ARS
  - Considering jointly funding resistance monitoring studies in Puerto Rico with local industry group PRABIA as part of broader initiative on IPM and windows programs for Puerto Rico

Monitoring with Soybean Looper

Table 2. 3rd instar SBL mortality (mean ± se) on DD diet

Insecticide	SBL colony	Mortality (%)
Belt SC		
	2016-AL	25.1 ± 3.9 de
	2016-GA	35.8 ± 1.6 c
	2016-LA	42.5 ± 1.6 b
	2016-MS	14.2 ± 2.1 f
	2016-SC-1	40.0 ± 1.9 bc
	2016-TN	29.4 ± 2.1 d
	2016-SC-2	21.9 ± 1.1 e
	LSU1	100.0 ± 0.0 a
Intrepid 2F		
	2016-AL	37.8 ± 2.3 b
	2016-GA	18.3 ± 1.0 fg
	2016-LA	36.7 ± 2.4 bc
	2016-MS	32.5 ± 1.6 cd
	2016-SC-1	20.8 ± 2.1 f
	2016-TN	24.4 ± 1.6 ef
	2016-SC-2	28.6 ± 1.6 de
	LSU1	100.0 ± 0.0 a

IRAC-US Efforts in Puerto Rico:
Partnering with PRABIA

Graham Head

Addressing a common problem

Heavy insecticide use for FAW in corn

aplicacion	estado	pesticides	active ingrdient		mode of action
1	V3	Dimethoate Asana	Dimethoate;esfenvalerate	fall armyworm leafhoppers, aphids	1,3
2	v3	Lorsban 4E	Chlorpyrifos	fall armyworm	1
3	v4	Permethrin + Larvin	permethrin Thiodicarb	fall armyworm and egg masses, aphids	1,3
4	v4	Asana Lannate 90S	Methomyl	fall armyworm, aphids	1
5	V6	Lorsban 4E	Chlorpyrifos	fall armyworm	1
6	V6	Asana XL + Larvin	Esfenvalerate Thiodicarb	fall armyworm and egg masses, aphids	1,3
7	V7	Permethrin+Sevin	permethrin carbaryl	fall armyworm	1,3
8	v7	Tombstone + Lannate 90S	Cyfluthrin Methomyl	fall armyworm, aphids	1,3
9	v7	Lorsban granular	Chlorpyrifos	fall armyworm	1
10	V8	Tracer	spinosad	fall armyworm	5
11	v8	Thionex Xentari Dipel	Endosulfan Bt Bt	fall armyworm;aphids,leaf hoppers	2,11
12	v8	Lorsban granular	Chlorpyrifos	fall armyworm	1
13	V9	Permethrin+Sevin	permethrin carbaryl	fall armyworm	1,3
14	v9	Avaunt Dipel Xentari	indoxacarb	fall armyworm	22A
15	v10	Asana Intrepid 2F	esfenvalarate Methoxifenocide	fall armyworm	3,18A
16	V10	Ecotec AG Xentari Dipel	S-Cyano Rosemary & peppermint oil	fall armyworm;aphids,leaf hoppers	una
17	V11	Tracer	spinosad	earworm, fall armyworm	5
18	v12	Intrepid 2F AzaDirect Sniper	Methoxyfenozide Bifentrin Neem	fall armyworm	3, 18A, 18B
19	Poll. 1	Avaunt Carbaryl	Indoxacarb Carbaryl	fall armyworm	1, 22
20	Poll. 1	Permethrin Thionex	Permethrin Endosu;lfan	fall armyworm;aphids,leaf hoppers	2,3
21	Poll. 2	Asana Avaunt	esfenvalerate indoxacarb	fall armyworm	3,22
22	Poll. 2	Intrepid 2F Tombstone	Methoxyfenozide Cyfluthrin	fall armyworm	3,18A
23	Poll. 3	Tracer	spinosad	earworm, fall armyworm	5
24	Poll. 3	Mustang Sevin	S-cyano Carbaryl	fall armyworm	1,3
25	Sen	Warrior Xentari Dipel	Lambda-cyhalothrin Bt Bt	earworm, fall armyworm	1,11,11
26	Sen	Oberon UFoil	Spiromesifen	earworm, fall armyworm, aphids, thrips	23
27	Sen	Permethrin Thionex	Permethrin Endosulfan	earworm, fall armyworm, aphids, thrips	2,3
28	Sen	Larvin Tilt	Thiodicarb Propiconazole	eggs, foliar diseases	1
29	Sen	Malathion Tombstone	Malathion Cyfluthrin		1,3

Limited registered products

- Seven MOA available
- Four MOA effective during the flowering to harvest phase: (pyrethroids, carbamates, spynosyns and diamides)
- However pyrethroids and carbamates not used by seed companies as their REI interferes with de-tasseling activities

Brand name	Common name	IRAC MOA Group
Evergreen, Mustang Max, Permethrin, Pounce, Sniper, Tombstone, Warrior, Asana XL, Capture, Hero	Pyrethrin+PBO, Z-cypermethrin, permethrin, bifenthrin, cyfluthrin, lambda-cyhalothrin, esfenvalerate, Z-cypremethrin+bifenthrin	3
Tracer, Radiant	Spinosyns	5
Dipel DF	Bt	11
Intrepid 2F	Methoxyfenozide	18A
Lannate, Sevin, Larvin	Methomyl, carbaryl, thiodicarb	1A
Lorsban, Malathion	Chlorpyrifos, malathion	1B
Belt, Coragen	Flubendiamide, Rynaxypyr	28

Possible Area-wide Rotation for Corn

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Year 1	No Pyrethroids (3)	No OPs or Car (1)	No Spinosad (5)	FALLOW	No Indoxacarb (22)	No Methoxy fenozide (18)
Year 2	No endosulfan (2)	No Spiromefsin (23)	No Pyrethroids (3)	FALLOW	No OPs or Car (1)	No Spinosad (5)

Outcomes of Original Funding

- IRAC worked with UPR and funded a Masters student to assay across chemistry classes
- Encouraged industry participation in regular meetings
- Initial apparent commitment from the University but really only the Extension Lead
- Then … university imploded and the students went on strike. No support for project
- Seed Association did not take it seriously
- With the advent of Rynaxypyr registration, the growers had a tool that works well
- Funding discontinued

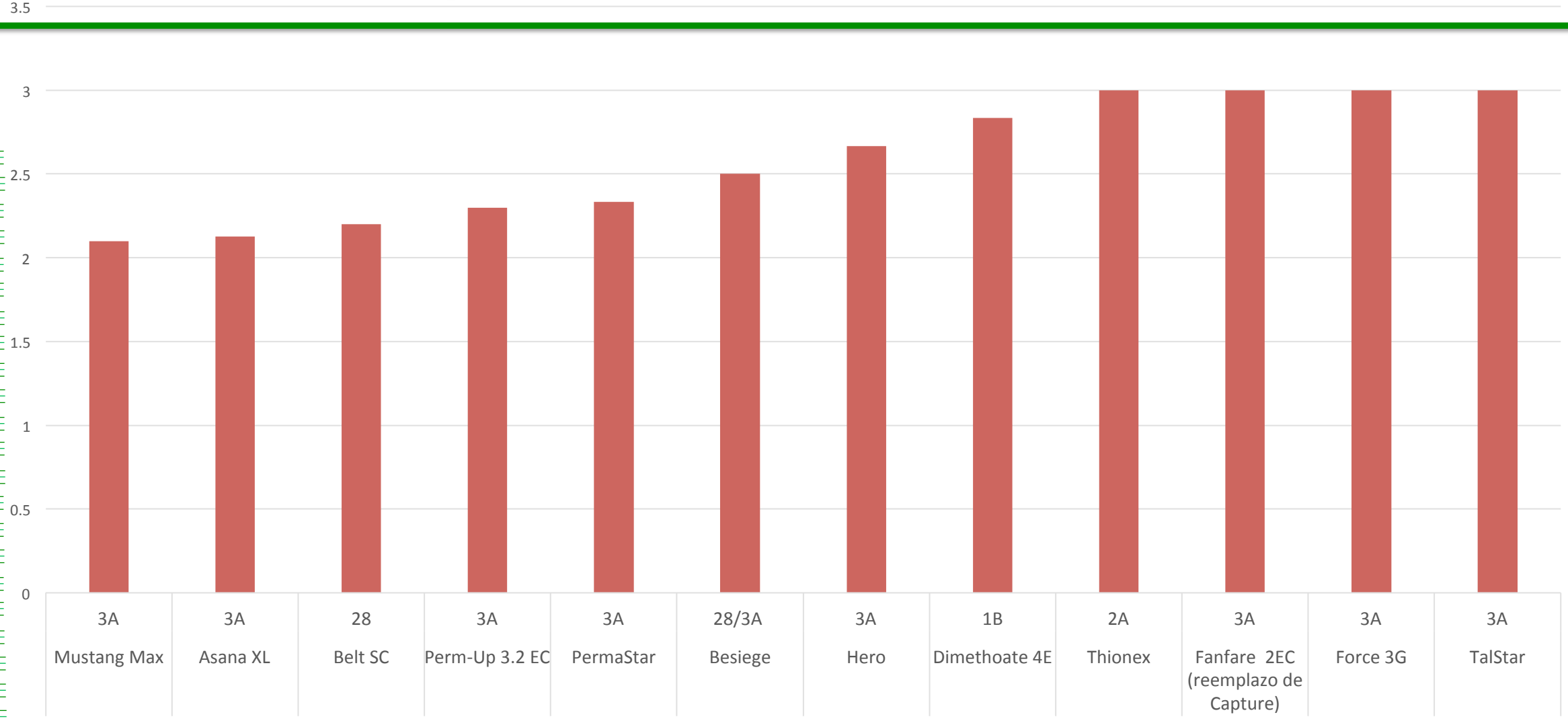
Goals of current task force

- Need has returned: must preserve efficacy of available FAW and SBL insecticides by developing sound IPM programs
  - Windows programs for key crops
  - Resistance monitoring
- Building stronger links to the local industry: ensure commitment from PRABIA members to lead implementation of recommended IPM/IRM programs and related work streams
  - IRAC commitment to work with PRABIA and provide assistance/expertise where needed
- Ultimately expand to other stakeholders such as vegetable growers, University extension and research, farm advisors and pesticide distributors/dealers

Progress thus far

- Organizational structure: regular calls with consistent PRABIA and IRAC participation, and additional local representation
- Windows program: draft being developed with primary focus on corn and soybeans. Need for more tools identified so registration options for certain key chemistries being investigated. Efficacy studies are being planned to verify recommendations are effective
- Resistance monitoring: companies have shared their data and a proposal from David Mota-Sanchez (MSU) is being considered. A central concern is how to create a sustainable program
- Another face to face meeting is planned for mid June to provide additional training and reinforce commitment

FAW Mean ranking (0-5) for 5 companies



FAW window program for corn

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Month	Acres - 2016	Peak Insect Damage - Fall Armyworm	Insecticide	Mode of Action	Ear Injection Group 5 - Spinosyn Need % of Crop in Ear
January	157.6	High	Proclaim	6 - Emamectin	5- Spynosins/Biologicals
February	101.61	Medium	Rimon	15- Benzoylureas	5- Spynosins/Biologicals
March	87.95	Medium	Coragen	28-Diamide	
April	68.74	Medium		18- Intrepid	
May	20.33	Low		1A - Carbamate 1B - Organophosphate	
June	33.77	Low		3A - Pyrethroid/Biologicals	
July	31.13	Low		3A - Pyrethroid/Biologicals	
August	27.71	Low		3A - Pyrethroid/Biologicals	
September	8.15	Low		3A - Pyrethroid/Biologicals	
October	162.75	Medium		18 - Intrepid	
November	358.27	High		Group 22 - Avaunt - TBD	
December	431.09	High		28 - Diamide	5- Spynosins/Biologicals