

Norbarag 2021

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Bee careful





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Results of bioassays

Appel aphid

Potato aphid

Myzus persicae

Bioassay Method

Application in Pottertower

- 2 ml diluted product spray on Petri dishes placed into Potter tower,
- 6 rates+untreated
 - 4, 20, 50, 75, 100 and 150% of the registered field rate

Experiment

- 5 live adult aphids placed on leaf segments in each Petri dish
- Application
- Storage in a dark room at 18-20°C
- 8 replicated/rate
- Assessment 5h, 24h and 48h



BTL Bio-Test Labor GmbH

Dysaphis plantaginea, Rosy apple aphid

2019				Mortality at 100% N rate at 48h in%		
Country	Zip code	Origin	Crop	Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb
FR	37110	Dame Marie Les Bois	apple	No data	100	No data
FR	13750	Plan-d'Orgon	apple	100	100	100
FR	31270	Villeneuve-Tolosane	apple	100	100	100
DE	39359	Keindorf	apple	100	100	100
DE	39517	Tangerhütte	apple	100	100	100
DE	18184	Sagerheide	apple	100	100	100
PL	94-201	Lodz	apple	100	100	100
PL	96-230	Biala Rawska	apple	100	100	100
PL	05-555	Tarczyn	apple	100	100	100
PL	05-604	Zbrosza	apple	100	100	100

2020		Mortality at 100% N rate at 48h in%				
Country	Origin	Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb	acetamiprid	Thiaclopid
FR	Labastide du Temple	97,5	100	100	100	100
DE	Sagerheide	100	100	100	100	100
DE	Sanitz	100	100	100	100	100
PL	Tarczyn	100	100	no data	no data	no data



Aphis nasturtii, Potato aphid

2019				Mortality at 100% N rate at 48h in%		
Country	Zip code	Origin	Crop	Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb
FR	62860	Inchy en Artois	potato	100	97,14	94,38
FR	14190	Bretteville-Le-Rabet	potato	100	100	82,5
DE	41539	Dormagen	potato	100	100	12,08
DE	18190	Groß Lüsewitz	potato	100	100	17,5
DE	39359	Keindorf	potato	100	100	31,67
DE	6484	Quedlinburg	potato	100	100	82,5
DE	39356	Weferlingen	potato	100	100	40

2020		Mortality at 100% N rate at 48h in%				
Country	Origin	Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb	actemaiprid	thiacloprid
DE	Husberg	97,5	95	97,5	100	100
DE	Goldenstedt	87,5	100	30,63	100	100
DE	Sanitz	100	100	12,5	100	100

No resistance issue met for tau-fluvalinate, lambda-cyhalothrin, acetamiprid
Populations collected in Germany were resistant to carbamate

Myzus persicae (2019)



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- 16% of the collected populations were resistant to tau-fluvalinate, whereas 61% were resistant to lambda-cyhalothrin.
- ✓ So cross resistance between tau-fluvalinate and lambda-cyhalothrin was by far not the majority of the cases
- 44% of the collected populations were resistant to pirimicarb

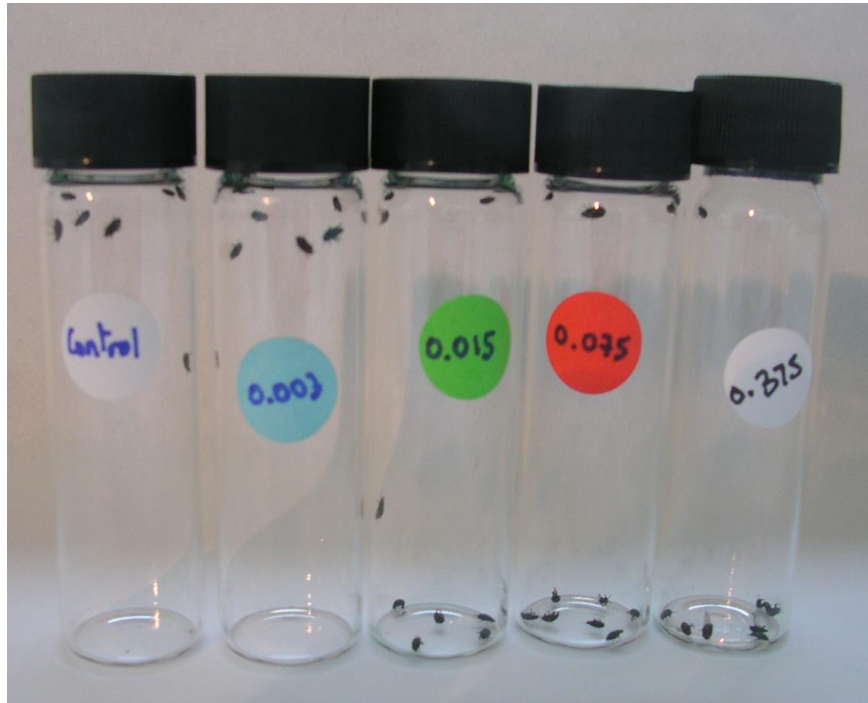
Country	Zip code	Origin	Crop	Mortality at 100% N rate at 48h in%		
				Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb
PL	63-000	Winna Gora C	Oil seed rape	23,7	10	97,5
IT	81050	Frankolise	Peach	27,5	7	100
DE	39439	Gusten	Oil seed rape	35	35	22,5
PL	64-608	Parkovo	Oil seed rape	45,28	22,71	31,25
PL	63-000	Winna Gora B	Oil seed rape	52,5	30	92,5
PL	63-800	Otowko	Oil seed rape	62,5	67,5	17,5
PL	63-000	Winna Gora A	Oil seed rape	63,5	52,5	85,8
FR	28000	Chartres	Oil seed rape	80,42	67,5	68,33
FR	37360	Rouziers de Touraine	Rape volunteers	85	68,96	85
HU	7754	Boly	Oil seed rape	86,25	54	77,9
DE	17209	Vipperow	Oil seed rape	90	7,5	7,5
CZ	68353	Saratice	Oil seed rape	90	32,5	21,25
PL	63-000	Dobroczyń	Oil seed rape	90	80	61,25
DE	29690	Marklendorf	Sugar beet	92,9	40	72,5
DE	85368	Moosburg	Oil seed rape	95	42,23	44,38
FR	51400	Les Grandes Loges	Oil seed rape	95	60,63	100
FR	60190	Rouvilliers	Sugar beet	95,8	80,83	89,38
PL	63-800	Gola Gostyn	Oil seed rape	97,5	42,5	75
FR	80200	Peronne	Oil seed rape	97,5	72,5	97,5
DE	59494	Soest	Sugar beet	97,5	82,5	80
PL	58-230	Gola Dzierzoniowski	Oil seed rape	97,9	42,5	42,5
DE	23769	Fehman	Oil seed rape	100	37,08	100
DE	33818	Leopoldshöle	Oil seed rape	100	52,5	100
DE	41539	Dormagen	Sugar beet	100	57	100
FR	51150	Toms sur Marne	Oil seed rape	100	61,25	100
DE	33098	Paderbom	Oil seed rape	100	81,88	100
DE	6493	Radisleben	Pepper	100	91,88	37,08
FR	62860	Quéant	Oil seed rape	100	95	100
DE	4720	Gadewittz	Oil seed rape	100	97,5	100
SP	28001	Madrid	Pepper	100	100	100
IT	71042	Cerignola	Peach	100	100	54,11
DE	17139	Malchin	Oil seed rape	100	100	42,5
DE	6467	Hoym	Oil seed rape	100	100	70
DE	91052	Erlangen	Oil seed rape	100	100	100
DE	6484	Quedlinburg	Oil seed rape	100	100	81,88
FR	14190	Bretteville Le Rabet	Sugar beet	100	100	100

Myzus persicae (2020)

- 45% (16% in 2019) of the collected populations were resistant to tau-fluvalinate, whereas 88% (61% in 2019) were resistant to lambda-cyhalothrin.
- ✓ So cross resistance between tau-fluvalinate and lambda-cyhalothrin was not found in all populations
- 44% (44% in 2019) of the collected populations were resistant to pirimicarb
- No resistant population to acetamiprid

Country	Origin	Mortality at 100% N rate at 48h in%		
		Tau-fluvalinate	Lambda-cyhalothrin	Pirimicarb
SP	Villarrasa	17,5	5	100
SP	Las Chinas	22,5	7,5	100
IT	San Marzano Oliveto	35	10	28,13
PL	Miedniewice/skierniewice	40	15	40
FR	Chalons sur Marne	45,83	62,5	35
IT	Dugliolo	47,5	43,33	83,13
DE	Braunschweig	58,75	57,5	65
SP	Campo de Mirra	59,58	25,21	100
IT	Dugliolo	59,79	33,33	85
DE	Braunschweig	60	15	22,5
IT	Acate	60	43,75	67,5
SP	Calahorra	67,5	17,5	92,5
SP	Zaragoza	70	33,75	97,5
FR	Morisel	72,5	37,5	12,5
NL	ND Zwaagdijk-Oost	77,5	12,5	100
IT	Carinola	80,42	35	80
FR	Saint Hilaire le Petit	81,88	54,38	95
DE	Teuchern	85	70	70
BE	Herne	86,88	71,25	
DK	Kettinge	87,5	52,5	100
SP	Montesa	87,5	27,5	100
PT	Castelo Novo	87,5	27,5	100
DK	Holeby	90,83	55	100
BE	Enghien	92,5	53,13	100
SE	Vallakra/Helsingborg	95	45	
NL	Biddinghuizen	96,67	17,5	15
DK	Gedser	97,5	72,5	95
FR	Chalons sur Marne	97,5	100	100
GR	Liparo	97,5	71,88	100
NL	Emmeloord	97,92	67,5	
DE	Braunschweig	100	100	7,5
IT	Roma	100	100	22,5
GR	Galatodes	100	87,5	17,5
IT	Castel Maggiore			40
IT	Budrio di Longiano			37,5

Vial tests (IRAC 11)



dosage (ng ai/cm ²)	
0	Untreated
15	20% lambda-cyhalothrin
30	40% lambda-cyhalothrin
75	100% lambda-cyhalothrin
150	200% lambda-cyhalothrin
19.2	4% tau-fluvalinate
96	20% tau-fluvalinate
192	40% tau-fluvalinate
480	100% tau-fluvalinate

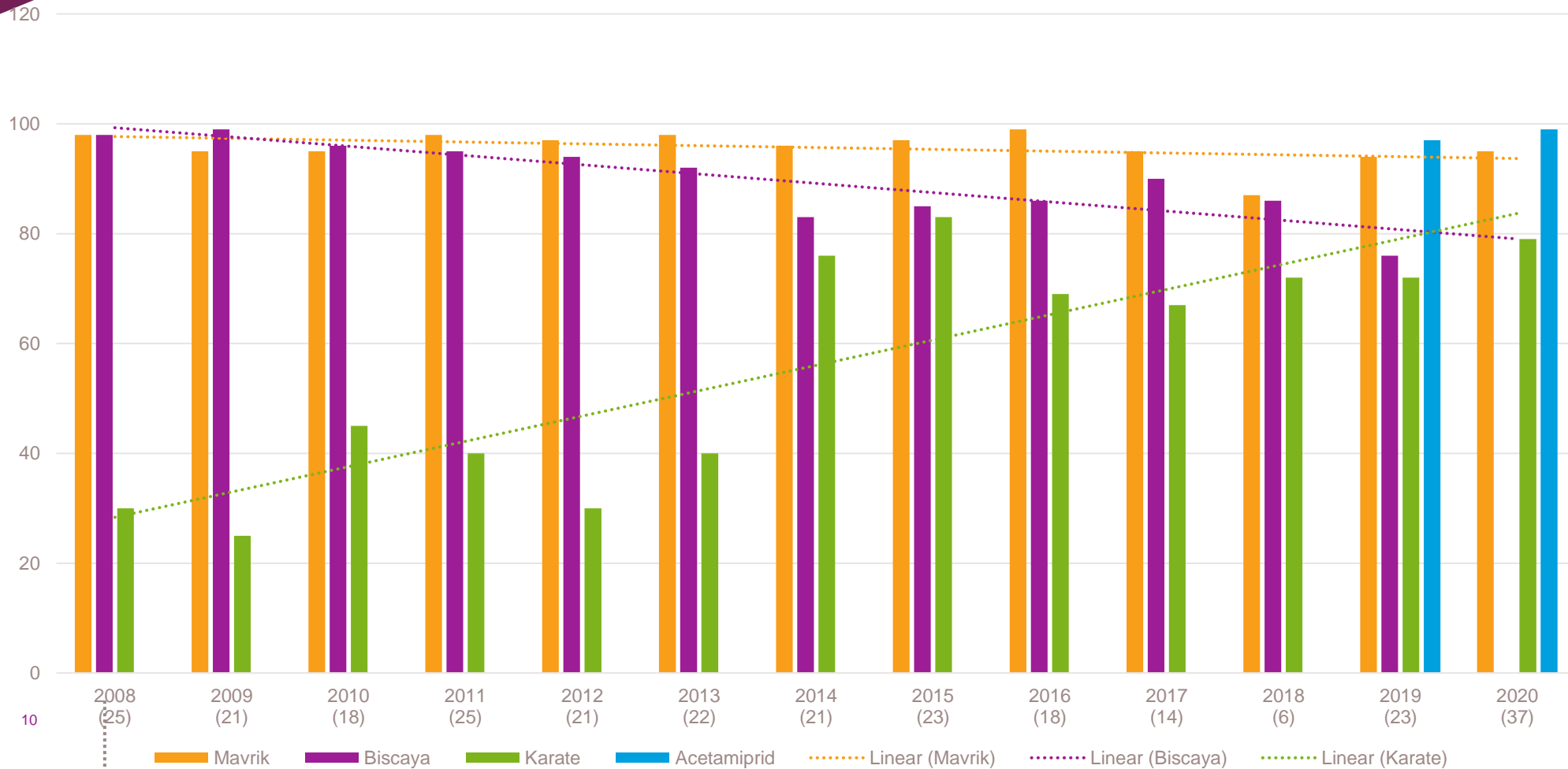
Tau-fluvalinate and lambda-cyhalothrin (% mortality)

Country	Location	Lambda-cyhalothrin	Tau-fluvalinate	Tau-fluvalinate
		IRAC classification	Mortality at 100% FR	Mortality at 20% FR
Czech Republic	Zabreh na Morave	5	100	69,8
Czech Republic	Nechanice	4	100	90
France	Saint Clément à Arnes	3	100	95,23
France	Noyant de Touraine	4	100	55,91
Germany	Worken	5	86,61	2,08
Germany	Liepen	5	95,23	4,55
Germany	Nasseböhla (Wildenhain)	4	100	79,44
Germany	Hünstetten (Görsroth)	4	100	87,85
Germany	Sagerheide	5	92,5	23,61
Germany	Thulendorf	5	100	61,22
Germany	Keindorf	4	100	77,9
Germany	Lanz	3	100	95
Germany	Mieste	5	100	76,11
Germany	Zarnow	4	100	100
Germany	Nebelin	5	97,5	85
Poland	Dmosin Drugi	5	97,7	58,75
Poland	Moraków	5	100	57,5
Poland	Wiskienica Dolna	5	100	54,7
Poland	Katy	5	97,5	39,64
Denmark	Viborg	4	100	97,5
Denmark	Silkeborg	4	95,86	97,5
Denmark	Ringsted	4	100	97,5
Denmark	Korsør	3	100	97,73
Denmark	Særslev	4	100	95
Denmark	Otterup	3	100	100
Denmark	Bogense	4	100	79,5
Denmark	Middelfar	4	97,73	90,45
Sweden	Vikingstad	2	100	100
Sweden	Eslöv	4	100	85,45

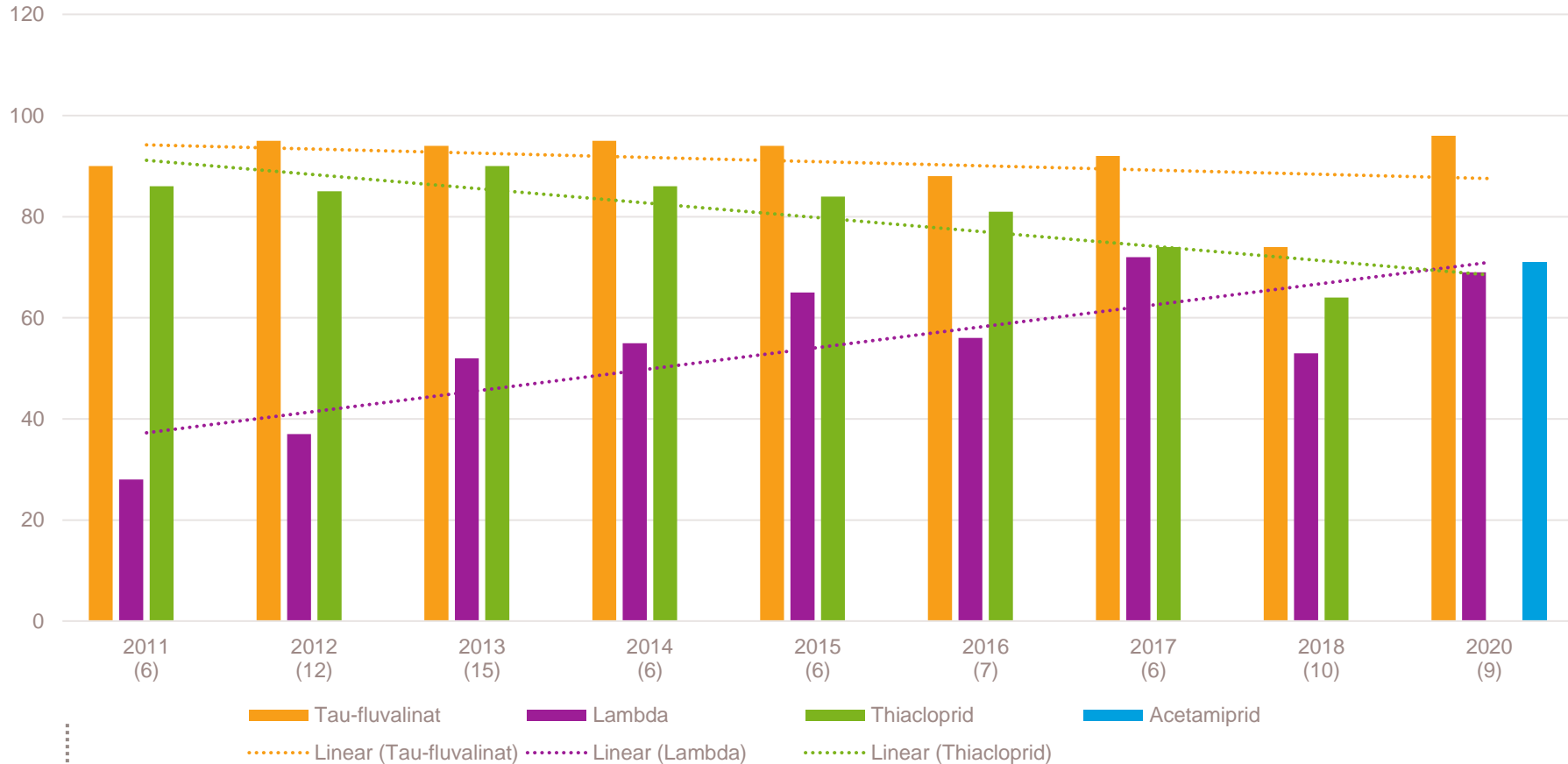
Based on % mortality no cross resistance between lambda-cyhalothrin and tau-fluvalinate
3 populations in DE to monitor

Pollen Beetle monitoring Denmark – Sverige

100 % field dosage



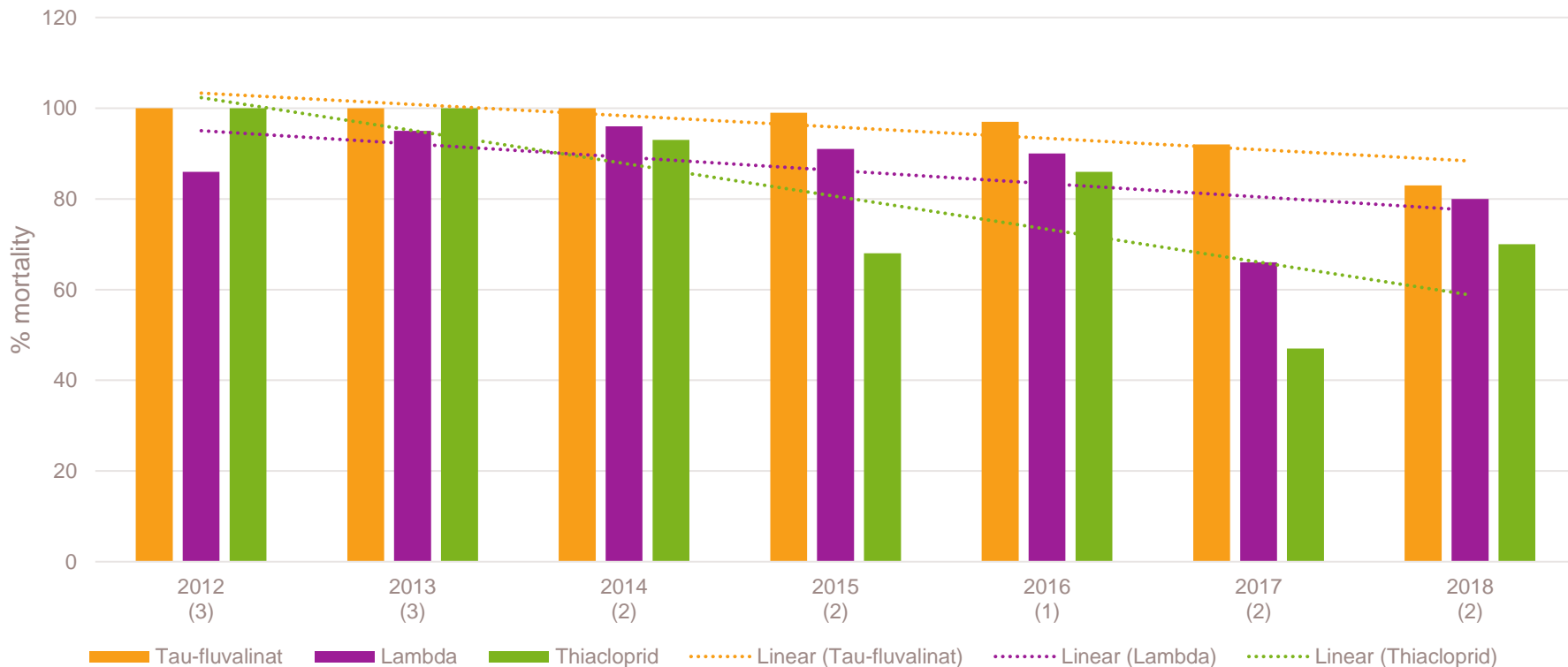
Pollen Beetle monitoring 100 % field dosage Lithuania



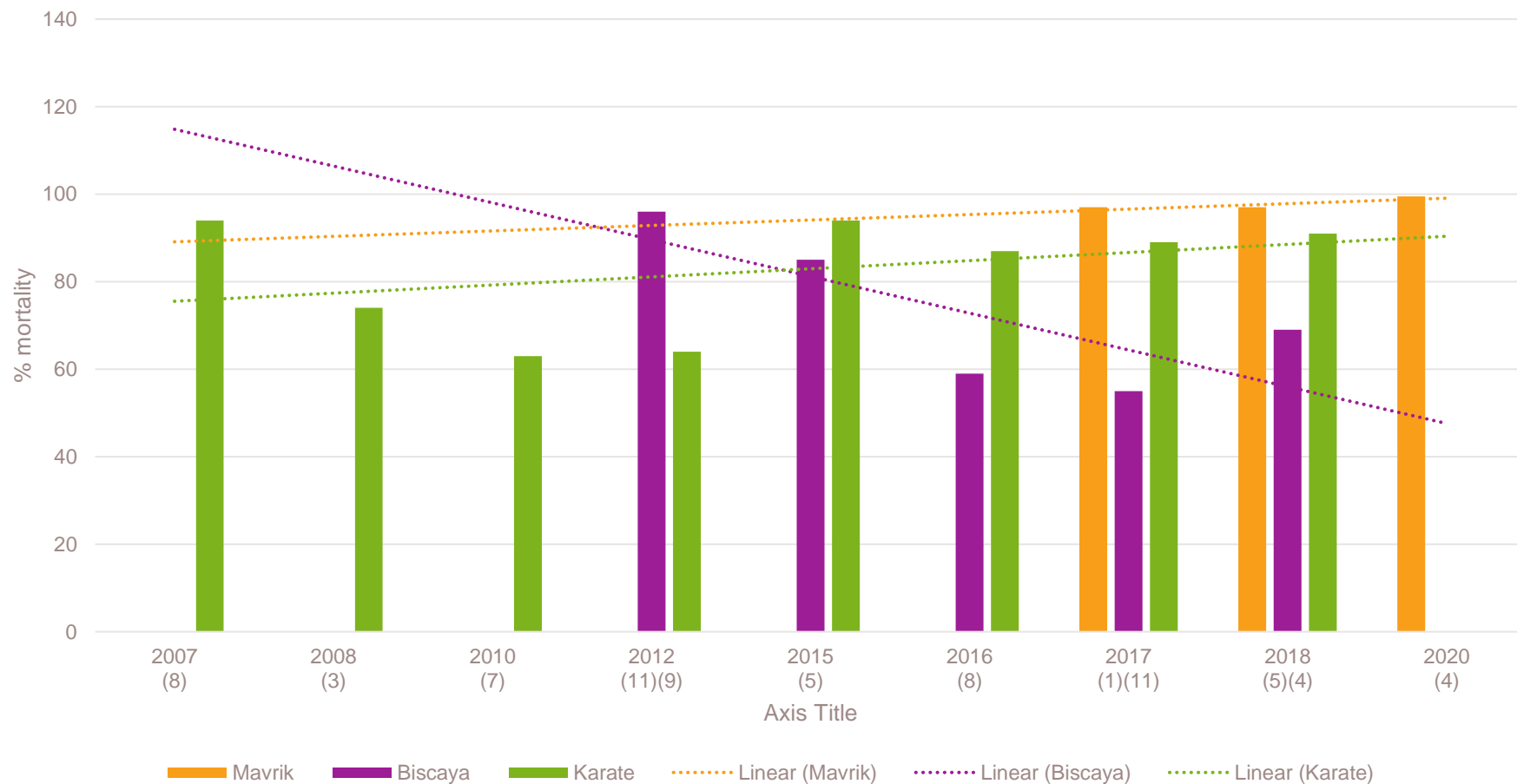
Pollen Beetle monitoring 100 % field dosage Latvia



Pollen Beetle monitoring 100 % field dosage Estonia



Pollen Beetle monitoring 100 % field dosage Norway



IRAC position

GROUP 3: The occurrence of resistance to pyrethroid insecticides (Group 3A) has been recorded in all of the Maritime EPPO region countries. The first reports of pyrethroid resistance were reported in 1999 in France, but have subsequently been reported across most European countries. In the Maritime zone at least 60% of all populations are considered resistant, but in most countries this figure is greater than 90% (1). Resistance is primarily based on enhanced metabolism through the over expression of the CYP6BQ23 P450 enzyme (3) The level of resistance expressed is known to significantly reduce the performance of most pyrethroid based insecticides, although some pyrethroids such as tau-fluvalinate, bifenthrin and etofenprox are significantly less affected and may still provide effective control of some pyrethroid resistant populations (2). A second less common mechanism of pyrethroid resistance has also been identified in populations of pollen beetle from Denmark and Sweden. The L1014F *kdr* mutation is known to affect the performance of all pyrethroid insecticides (4).



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Thank you for your attention
Simply. Grow. Together.