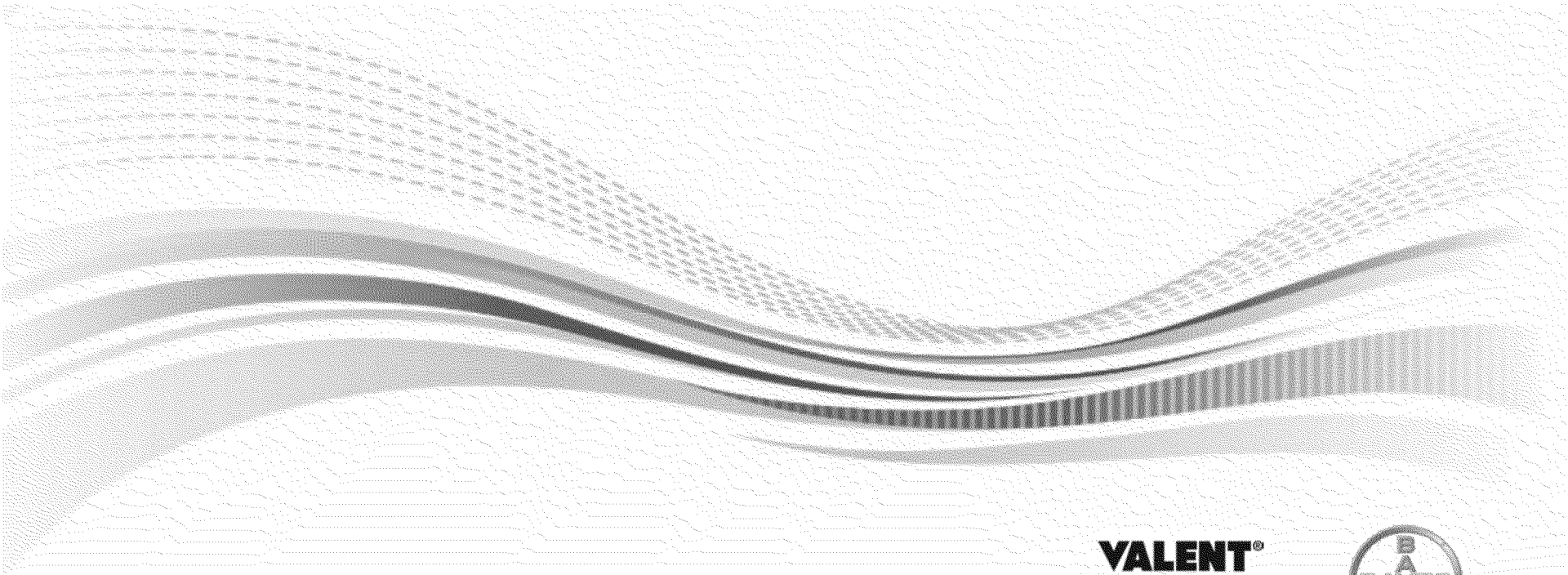
Dietary pollinator risk assessment following use on crops only producing pollen – E.g. Potatoes



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Refined Tier 1 Potatoes – Soil application at planting (0.2 lb ai/A)

Matrix[1]	Acute ECC (ppb)[2]	Chronic EEC (ppb)[3]
Pollen	**188**	**92.6**
Anthers	47.1	27.0

[1] Refers to hand collected samples
[2] EEC as maximum reported concentration among all individual replicates following application
[3] EEC as maximum average concentration among all individual sampling events following application

Refined Tier 1 Potatoes – Foliar appl. at BBCH 31-59 (0.05 lb ai/A)

Matrix[1]	Acute ECC (ppb)[2]	Chronic EEC (ppb)[3]
Pollen	**116**	**76.1**
Anthers	21.8	17.4

[1] Refers to hand collected samples
[2] EEC as maximum reported concentration among all individual replicates following application
[3] EEC as maximum average concentration among all individual sampling events following application

Use of Toxicity Data in the RA

Description	Tox Endpoint Reported Study	**Tox Endpoint used in RA**	MRID#
Adult oral LD50	0.00368 µg /bee	**0.00368 µg /bee**	454224-26
Adult contact LD50	0.0439 µg /bee	**0.0439 µg /bee**	
Adult oral NOAEL	10 µg /L diet/day (equivalent to 0.0038 µg /bee mean intake accumulated over test period)	**0.0038 µg /bee**	484149-01
Larval LD50	--	**> 15000 µg /kg diet/day (highest concentration tested)**	488768-01
Larval NOAEL	680 µg /kg diet/day	**680 µg /kg diet/day**	

- Bee-REX model considers tox endpoints in µg ai/bee only
- Larval study conducted according to Huang method (2009)
  - Endpoints in µg ai/g-diet
  - Excess of diet provided, not 100% consumed
  - Difficult estimation of consumption rate -> not possible an accurate conversion to µg ai/bee

Refined Tier 1 – Soil application at planting (0.2 lb ai/A)

Measurement endpoint	Caste	Effect	EEC (µg/kg)	Pollen Consumption	Exposure	Endpoint	RQ*	LOC
Honey Bees (Apis mellifera)								
Individual survival (adults)	Nurse bees	Acute Oral LD50	188	9.6 mg/day	1.80 ng/bee	3.68 ng/bee	0.49	0.4
		Chronic NOEC	92.6		0.88 ng/bee	3.8 ng/bee	0.23	1
Brood size and success	Larva	Acute LD50	188	2.9% of diet (9.6/140+9.6)	5.45 µg/kg diet	> 15000 µg/kg diet	<0.0004	0.4
		Chronic NOEC	92.6		2.68 µg/kg diet	680 µg/kg diet	0.0039	1

*Risk Quotients calculations:

- Adults: Bee-REX model
- Larvae: Tox endpoint in µg /kg-diet / residues in % consumed pollen from total diet

Refined Tier 1 – Foliar appl. at BBCH 31-59 (0.05 lb ai/A)

Measurement endpoint	Caste	Effect	EEC (µg/kg)	Pollen Consumption	Exposure	Endpoint	RQ*	LOC
Honey Bees (Apis mellifera)								
Individual survival (adults)	Nurse bees	Acute Oral LD50	116	9.6 mg/day	1.11 ng/bee	3.68 ng/bee	0.30	0.4
		Chronic NOEC	76.1		0.73 µg/kg diet	3.8 ng/bee	0.19	1
Brood size and success	Larva	Acute LD50	116	2.9% of diet (9.6/140+9.6)	3.364 µg/kg diet	> 15000 µg/kg diet	<0.0002	0.4
		Chronic NOEC	76.1		2.21 µg/kg diet	680 µg/kg diet	0.0032	1

*Risk Quotients calculations:

- Adults: Bee-REX model
- Larvae: Tox endpoint in µg /kg-diet / residues in % consumed pollen from total diet

Conclusions

- Exposure characterization:
  - Potato crop not honeybee attractive. Sweet potato requires pollination for breeding only (small % of the total acreage) – USDA 2014
  - Crop producing pollen only, and not in all varieties
    - Difficulties to obtain potato pollen for residue analysis
    - In this case, anthers are not a good surrogate
- Effect characterization:
  - Endpoints reported for larval toxicity in µg /kg-diet, but can be directly compared with residues in pollen

- **Dietary risk can be addressed at Tier 1 (individual bees) level with refined exposures**