RNA-based biocontrols Open Data - Beneficials

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Contents

1. Summary

The contents of this data package present the results from experiments investigating the safety of RNA-based biocontrols on beneficial non-target species. The datasets include biological screening data for the lead RNA-based biocontrol candidate for the Colorado Potato Beetle tested for mortality against common beneficial species such as bees and parasitic/predatory insects.

2. Metadata

Description of the dataset	The datasets include biological screening data for the lead RNA-based biocontrol candidate for the Colorado Potato Beetle tested for mortality against common non-target beneficial species (bees and parasitic/predatory insects).
Date of first publication	31st August 2016
Date of last update	30th June 2017
Date of next update	-
Frequency of updates	Periodically
License for re-using the data	The contents of this dataset and all supporting documentation are licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.
Text to use when citing the data	RNA-based biocontrols Open Data - Beneficials
URL to use when citing the data	www.syngenta.com
Data language	English
Key words	RNA-based biocontrol; Beneficials; *Aphidius colemani*; *Orius laevigatus*; *Typhlodromus pyri*; Bushbean; *Phaseolus vulgaris*; Honeybee; *Apis mellifera*;
Subject	RNA
Copyright year	2016
Copyright holder	Syngenta AG

3. Structure of the Data

3.1. Aphidius_colemani_Orius_laevigatus_Typhlodromus_pyri

Variable name	Definition	Unit	Type of data
species	Species of the test subject		String
stage	Growth stage of the test subject		String
food	Food type administered for the duration of the test		String
testType	Type of exposure to the test subject		String
treatedObject	Treatment vessel		String
method	Method of treatment		String
treatmentDate	Date of treatment application		Date
infectionDate	Date of test subject introduced to treated object		Date
evaluationDate	Date of observation		Date
infectionAfter	Count of days between treatment and infection		Integer
evaluationAfter	Count of days between treatment and evaluation		Integer
treatment	Treatment AI or control type		Categorical
ppmAI	Parts per million of active ingredient	ppm	Numeric
repNumber	Replication number		Integer
insectNumber	Number of test subjects		Integer
living	Number of alive test subjects		Integer
dead	Number of dead test subjects		Integer
mortalityPercent	Percentage of dead test subjects	%	Numeric
deadAverage	Mean percentage of dead test subjects across all replications	%	Numeric
deadAverageCorrected	Control corrected mean percentage of dead test subjects across all replications.	%	Numeric

3.2. Honeybee

Variable name	Definition	Unit	Type of data
species	Species of the test subject		String
testType	Type of exposure to the test subject		Categorical
treatment	Treatment or control type		Categorical
dosage	Dosage weight of treatment consumed by test subject	µg/bee	Numeric
day	Day of observation	day	Integer
mortalityPercent	Cumulative mortality of test subject	%	Numeric
consumedSucroseSol	Volume of sucrose solution consumed by test subject daily	µl/bee/day	Numeric
behaviourAbnorm	Number of test subjects observed with behavioural abnormalities	# of bees	Integer

4. Background and Methods

4.1. Aphidius_colemani_Orius_laevigatus_Typhlodromus_pyri

This dataset is the result of a study to assess the effect of the RNA-based biocontrol candidate for Colorado Potato Beetle on a selection of beneficial species *Aphidius colemani, Orius laevigatus, Typhlodromus pyri.*

The treatment object for this experiment was the bushbean plant (*Phaseolus vulgaris*). Each bushbean plant was reduced to 1 leaf. 6 bushbean plants at a time were then sprayed with compound solution and left to dry. Plants were treated in a spray application box where the nozzle moves 1 time horizontally over the plants and left to dry; 1 hour later the bushbean plants were returned to a greenhouse chamber at 20°C and 60 % relative humidity.

The bioassays were setup and rated using Syngenta's standard bioassay screening procedures, although this was not a GLP experiment.

***Aphidius colemani* Set Up**

The same day plastic dishes were prepared with 5 ml of water agar 1 %. A leaf disc was punched from each bushbean plant with a 5 cm diameter and stuck upper side up in the plastic dish, using insect glue around the border of each leaf disc. Each plastic dish was closed using a lid with a 0.5 cm diameter hole.

5 *Aphidius colemani* adults were added to each plastic dish. The plastic dishes were then covered up with a cotton filter soaked with a 20 % sucrose solution.

The plastic dishes were incubated for 2 and 4 days in a climate chamber at 21°C and 75 % RH, upper side down. 2 and 4 days after infestation the living and dead *Aphidius colemani* were counted.

***Orius laevigatus* Set Up**

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The same day plastic dishes were prepared with FLUON 100 % and 5 ml of water agar 1 %. A leaf disc was punched from each bushbean plant with a 5cm diameter each and stuck upper side up in the plastic dish, using insect glue around the border of each leaf disc. Some *Ephestia kuehniella* eggs and a paper triangle were added to each disc

5 *Orius laevigatus* adults were added to each plastic dish. The plastic dishes were then covered up with a cotton filter and a lid with three holes of 0.5 cm diameter

The plastic dishes were incubated for 2 and 4 days in a climate chamber at 25°C and 75 % RH, upper side up. 2 and 4 days after infestation the living and dead *Orius laevigatus* were counted.

***Typhlodromus pyri* Set Up**

The same day plastic dishes were prepared with a 5 cm diameter cotton pad and 9ml of water. A leaf disc was punched from each bushbean plant with a 3.5 cm diameter and stuck upper side up in the plastic dish, using insect glue around the border of each leaf disc.

Using forceps, a small piece of cotton wool was pulled through these leaf discs. 10 *Typhlodromus pyri* protonymphs were added to each plastic dish and some apple pollen. The plastic dishes were then covered up with a cotton filter and a lid with three holes of 0.5 cm diameter.

The plastic dishes were incubated for 3 and 7 days in a climate chamber at 27°C and 40 % relative humidity, upper side up. 3 and 7 days after infestation the living and dead *Typhlodromus pyri* were counted.

4.2. Honeybee

In an extended 10 day oral and contact bee screen test, 2 days old young worker bees (*Apis mellifera*) were exposed once to one dose rate of the lead construct and a control via an oral test (50% sucrose solution) and a contact test (thoracic application). During this experiment food consumption, bee mortality and behavioural effects were assessed daily. There were 3 replicates per dose rate with 10 bees/cage. The test conditions were 33±2°C and 50-70% relative humidity. No CO_2 - anaesthetization was used as young bees are easy to handle.

During the oral application the bees were fed once with treated 50% (w/v) sucrose solution. During the contact application droplets were placed on the dorsal honeybee thorax.

During the test after application, honeybees were provided continuously with untreated sucrose solution via syringes. Food consumption was assessed every 24 hours. Therefore syringes were weighed before and after administration to the bees. Syringes were replaced daily.

Cumulative mortality was calculated as the mean mortality of all the replicates per day. Consumed sucrose solution was calculated by {amount of sucrose solution lost from the syringe per day/(number of alive bees)}. Behavioural abnormalities was given by number of bees exhibiting symptoms per day.

5. Contact Information

For questions and inquiries regarding this dataset and documentation, please contact rna.data@syngenta.com.