



[Environment Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program TDA-01 Crop Safety

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**Acknowledgements
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Abstract

TDA-01 is a new active ingredient for foliar plant pathogens such as bacteria. The IR-4 Project has screened 3 different formulations, completing 28 crop safety trials on 9 environmental horticulture plant species or genera from 2017 through 2021. The first two formulations caused moderate to severe injury, so a third formulation was developed. For TDA-NC-1, only one crop (*Begonia sp.*) exhibited no injury after three consecutive foliar sprays applied at 2 week intervals. The eight other crops have been screened in less than three trials, so no conclusions can be drawn yet.

Introduction

TDA01 is a new active ingredient for foliar plant pathogens such as bacteria. The IR-4 Project has screened 3 different formulations, completing 28 crop safety trials on 9 environmental horticulture plant species or genera from 2017 through 2021.

Materials and Methods

Two formulations (TDA-01, TDA-02) came as two components to dilute together in water. TDA-01 was applied at 6 times biweekly at 76 g + 150 ml, 152 g + 300 ml, and 304 g + 600 ml per 100 gal. TDA-02 was applied 3 times biweekly at 50 + 100, 100 + 200 and 200 + 400 fl oz per 100 gal. The third formulation was premixed and diluted at 570, 1040, and 2080 g per 100 gal. A minimum of four plants per three blocks or ten plants per completely randomized design were required with many researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = no phytotoxicity; 10 = complete kill) at 1, 2, and 4 weeks after initial application. To view the more detailed materials and methods in the protocol 20-012 and 21-012, please see <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download protocols.

TDA-01 formulations were supplied to researchers (See list of researchers in Appendix 1) by TDA.

Results and Summary

Phytotoxicity

TDA-01 and TDA-02 caused moderate to significant injury and for some plants mortality at the highest tested rates (Table 1). TDA altered the formulation to improve crop safety performance. Thus, only results from TDA-NC-1 are discussed below.

Table 1. Crop safety overview of three TDA-01 formulations

Crop Latin Name	TDA-01	TDA-02	TDA-NC-1
<i>Begonia sp.</i>	3.0 (3 - 3) n1		1.0 (1 - 1) n3
<i>Capsicum annuum</i>			1.0 (1 - 1) n1
<i>Dahlia sp.</i>	3.0 (3 - 3) n1		1.0 (1 - 1) n1
<i>Euphorbia pulcherrima</i>	3.0 (3 - 3) n1		2.0 (2 - 2) n1
<i>Hydrangea sp.</i>			1.0 (1 - 1) n2
<i>Impatiens hawkeri</i>	3.0 (3 - 3) n1		1.5 (1 - 2) n2
<i>Pelargonium x domesticum</i>	3.0 (3 - 3) n1		2.0 (2 - 2) n1
<i>Pelargonium x hortorum</i>	4.0 (4 - 4) n1	4.0 (4 - 4) n1	1.0 (1 - 1) n1
<i>Zinnia elegans</i>	3.0 (3 - 3) n1	4.0 (4 - 4) n1	1.0 (1 - 1) n1

Based on the type and nature of injury seen with pesticide applications, tested plant species were placed into five categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) no or minimal transitory injury seen at the 1X

rate, but the 2X and/or 4X rates did cause significant phytotoxicity, 3) significant injury at the 1X rate sufficient to recommend growers not utilize TDA-NC-1, 4) more data are needed to make informed recommendations due to variable responses, and 5) less than three trials have been conducted.

TDA-NC-1 exhibited no or minimal negative impact on one species with drench applications (Table 2). Some minimal injury may be acceptable for growers, if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. For 12 genera / species, more information is needed either because only 1 or 2 trials were conducted (Table 6).

Please see Table 7 for a list of individual trial summaries for Broadform SC.

Table 2. List of TDA-NC-1 treated crops with no or minimal transitory injury.

Begonia sp.

Table 3. List of TDA-NC-1 treated crops with no injury at 1X but significant injury at 2X or 4X.

None

Table 4. List of TDA-NC-1 treated crops with significant injury at 1X.

None

Table 5. List of TDA-NC-1 treated crops where more information is needed.

None

Table 6. List of TDA-NC-1 treated crops with less than 3 trials.

Capsicum annuum

Dahlia sp.

Euphorbia pulcherrima

Hydrangea sp.

Impatiens hawkeri

Pelargonium x domesticum

Pelargonium x hortorum

Zinnia elegans

Table 7. Detailed Summary of Crop Safety Testing with TDA01.

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 11/28/2022 are listed below.

PR #	Product (Active Ingredients)	Crop	Production Site	Researcher	State	Year	Application Type	Results
32956	TDA01 (TDA01)	Begonia (Begonia sp.) 'Dragon Wing Red'	Greenhouse	Freiberger	NJ	2017	Foliar	Minor to moderate injury (black spots on leaves) with 76 g + 150 ml, 152 g + 300 ml and 304 g + 600 ml per 100 gal applied 6 times biweekly; no growth reduction.
32958	TDA01 (TDA01)	Dahlia (Dahlia sp.) 'Grandalia Rose'	Greenhouse	Freiberger	NJ	2017	Foliar	Minor to moderate injury (black spots on leaves) and growth reduction increasing with rates (76 g + 150 ml, 152 g + 300 ml and 304 g + 600 ml per 100 gal) applied 6 times biweekly.
32965	TDA01 (TDA01)	Poinsettia (Euphorbia pulcherrima) 'Whitestar'	Greenhouse	Freiberger	NJ	2017	Foliar	Moderate injury (black spots on leaves) with 76 g + 150 ml, 152 g + 300 ml and 304 g + 600 ml per 100 gal applied 6 times biweekly.
32963	TDA01 (TDA01)	Impatiens, New Guinea (Impatiens hawkeri) 'Pure Beauty White'	Greenhouse	Freiberger	NJ	2017	Foliar	Minor injury (black spots on leaves) with 76 g + 150 ml and 152 g + 300 ml, moderate (some leaf curling) with 304 g + 600 ml per 100 gal applied 6 times biweekly; no growth reduction.
32959	TDA01 (TDA01)	Regal Geranium (Pelargonium x domesticum) 'Brocade Mrs. Pollock'	Greenhouse	Freiberger	NJ	2017	Foliar	Minor injury (browning on leaf edges) with 76 g + 150 ml and 152 g + 300 ml, moderate with 304 g + 600 ml per 100 gal applied 6 times biweekly; slight growth reduction at 4X.
32960	TDA01 (TDA01)	Geranium, Zonal (Pelargonium x hortorum) 'Maverick Scarlet'	Greenhouse	Freiberger	NJ	2017	Foliar	Moderate injury (black spots on leaves) with 76 g + 150 ml, 152 g + 300 ml and 304 g + 600 ml per 100 gal applied 6 times biweekly; moderate to severe growth reduction.
32966	TDA01 (TDA01)	Zinna, Elegant (Zinnia elegans) 'Zahara Strawberry'	Greenhouse	Freiberger	NJ	2017	Foliar	Minor injury (browning of leaf tips) and moderate growth reduction with 76 g + 150 ml and 152 g + 300 ml, moderate injury and severe growth reduction with 304 g + 600 ml per 100 gal applied 6 times biweekly.
33158	TDA02 (TDA01)	Geranium, Zonal (Pelargonium x hortorum) 'Pinto Premium White'	Greenhouse	Hausbeck	MI	2017	Foliar	Severe injury with 50 + 100, 100 + 200 and 200 + 400 fl oz per 100 gal applied 3 times.
33159	TDA02 (TDA01)	Zinna, Elegant (Zinnia elegans)	Greenhouse	Nansen	CA	2017	Foliar	Moderate to severe foliar injury, no flower injury, with 50 + 100, 100 + 200, and 200 + 400 fl oz per 100 gal applied 3 times biweekly; no growth reduction.
33968	TDA-NC-1 (TDA)	Begonia (Begonia sp.) 'Bada Bing White'	Greenhouse	Bodine	NJ	2021	Foliar	Virtually no injury with 570, 1,040 and 2,080 g per 100 gal
33968	TDA-NC-1 (TDA)	Begonia (Begonia sp.) 'Non Stop Red'	Greenhouse	Grunwald	OR	2021	Foliar	No injury, growth or flowering reduction when applied at 570, 1040, and 2080 g per 100 gal rates

33968	TDA-NC-1 (TDA)	Begonia (Begonia sp.) 'Bada Boom Bronze Leaf Rose'	Greenhouse	Gu	TX	2020	Foliar	No significant injury with 570, 1040 and 2080 g per 100 gal applied 3 times biweekly.
32967	TDA-NC-1 (TDA)	Cayenne Pepper (Capsicum annuum)	Greenhouse	Cochran (IA)	IA	2019	Foliar	No injury or growth reduction with 50 + 100, 100 + 200 and 200 + 400 fl oz per 100 gal applied 3 times weekly.
33969	TDA-NC-1 (TDA)	Dahlia (Dahlia sp.) 'Sincerity 51-C	Greenhouse	Gu	TX	2020	Foliar	No significant injury with 570, 1040 and 2080 g per 100 gal applied 3 times biweekly.
34619	TDA-NC-1 (TDA)	Poinsettia (Euphorbia pulcherrima)	Shadehouse/ Lath House	Cheng	HI	2020	Foliar	No injury or growth reduction with 5.7, 11.4 and 22.8 fl oz per 100 gal + Silwett applied 3 times biweekly.
33970	TDA-NC-1 (TDA)	Poinsettia (Euphorbia pulcherrima) 'Prestige Red-13C	Greenhouse	Gu	TX	2020	Foliar	No significant injury with 570 and 1040, minor with 2080 g per 100 gal applied 3 times biweekly.
33975	TDA-NC-1 (TDA)	Hydrangea (Hydrangea sp.) H. macrophylla 'Monmar'	Field Container	Fraelich	GA	2022	Foliar	No injury and no impact on flowers or plant growth with 570, 1040, and 2080 g per 100 gal.
33975	TDA-NC-1 (TDA)	Hydrangea (Hydrangea sp.) 'Ruby Slippers'	Field Container	Grunwald	OR	2020	Foliar	No injury, growth or flowering reduction at 570, 1040, and 2080 g per 100 gal rates
33971	TDA-NC-1 (TDA)	Impatiens, New Guinea (Impatiens hawkeri) 'Apollo Ruby Red'	Greenhouse	Bodine	NJ	2021	Foliar	Virtually no injury with 570, 1,040 and 2,080 g per 100 gal
33971	TDA-NC-1 (TDA)	Impatiens, New Guinea (Impatiens hawkeri) 'Hot pink'	Greenhouse	Grunwald	OR	2021	Foliar	No injury, growth or flowering reduction when applied at 570, 1040, and 2080 g per 100 gal rates
33972	TDA-NC-1 (TDA)	Regal Geranium (Pelargonium x domesticum) 'Elegance Purple Majesty-18C	Greenhouse	Gu	TX	2020	Foliar	No significant injury with 570 and 1040, minor with 2080 g per 100 gal applied 3 times biweekly.
33867	TDA-NC-1 (TDA)	Geranium, Zonal (Pelargonium x hortorum) 'Patriot Bright Red'	Greenhouse	Ong	TX	2019	Foliar	No significant injury or growth reduction with 5.7, 11.4 and 22.8 g per 100 gal applied biweekly.
33973	TDA-NC-1 (TDA)	Zinna, Elegant (Zinnia elegans) 'Profusion mix'	Greenhouse	Grunwald	OR	2021	Foliar	No injury, growth or flowering reduction when applied at 570, 1040, and 2080 g per 100 gal rates

Label Suggestions

We suggest that as the label is developed lists of plants with no injury or with limited but acceptable transitory injury be included as part of the directions for use. Based on IR-4 research so far, it is recommended the following crop be added to a list of acceptable crops.

Begonia sp.

Appendix 1: Contributing Researchers

Mr. Dave Bodine <i>(past affiliate)</i>	USDA-ARS Cream Ridge Experiment Station Cream Ridge, NJ 08514
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