

# Classical biological control of *Diaphorina citri* Kuwayama in citrus crop in Brazil

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Brazil is the world's largest producer of oranges, amounting to about 30% of the world's production of sweet orange and 50% of orange juice. The country's share in this commodity chain is about US \$14.6 billion annually, generating approximately 350 thousand jobs. Brazilian citrus is threatened by yet another exotic pest, which arrived in 2004: the Asian citrus psyllid *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae), vector of the citrus disease huanglongbing (HLB or citrus greening), caused by the bacteria *Candidatus Liberibacter* spp. Current chemical control practices for this psyllid involves ineffective and expensive application of insecticides in orchards. This research aims to develop and /or adapt technologies that focus on the biological control of *D. citri*, and HLB. The exotic bioagent *Diaphorencyrtus aligarhensis* (Hymenoptera: Encyrtidae) was imported from California-USA through California Department of Food and Agriculture (CDFA) to "Costa Lima" Quarantine Facilities of Embrapa Meio Ambiente in December 2016. The bioagents were reared in cages on *D. citri* which were cultured on curry leaf plants *Berbera (Murraya) koenigii* (Sapindales: Rutaceae). The production of the first generation of *D. aligarhensis* in Brazil occurred between Jan 16th and Feb 1st 2017 (611 adults). Colonies of these adults of *D. aligarhensis* have been established to perform competition experiments with another exotic parasitoid present in Brazil, *Tamarixa radiata* (Hymenoptera: Eulophidae), in order to fulfill the requirements prior to approval for release of *D. aligarhensis* in citrus orchards.



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## Introduction

Brazil is the world's largest producer of oranges, amounting to about 30% of the world's production of sweet orange and 50% of orange juice. The country's share in this commodity chain is about US \$14.6 billion annually, generating approximately 350 thousand jobs. Brazilian citrus is threatened by yet another exotic pest, which arrived in 2004: the Asian citrus psyllid *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae), vector of the citrus disease huanglongbing (HLB or citrus greening), caused by the bacteria *Candidatus Liberibacter* spp. Current chemical control practices for this psyllid involves ineffective and expensive application of insecticides in orchards.

## Objective

This research aims to develop and /or adapt technologies that focus on the biological control of *D. citri*, and HLB.



Photo: C. N. Souza

**Figure IV.** Adult of the pest *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae) in citrus orchards or on curry leaf plants *Bergera (Murraya) koenigii*

## Material and Methods

The exotic bioagent *Diaphorencyrtus aligarhensis* (Hymenoptera: Encyrtidae) was imported from California-USA through California Department of Food and Agriculture (CDFA) to "Costa Lima" Quarantine Facilities of Embrapa Meio Ambiente in December 2016. The bioagents were reared in cages on *D. citri* which were cultured on curry leaf plants *Bergera (Murraya) koenigii* (Sapindales: Rutaceae).

## Results

The production of the first generation of *D. aligarhensis* in Brazil occurred between Jan 16<sup>th</sup> and Feb 1<sup>st</sup> 2017 (611 adults) **Table I**. Colonies of these adults of *D. aligarhensis* have been established to perform competition experiments with another exotic parasitoid present in Brazil, *Tamarixia radiata* (Hymenoptera: Eulophidae), in order to fulfill the requirements prior to approval for release of *D. aligarhensis* in citrus orchards.

**Table I.** Production of the first generation of *Diaphorencyrtus aligarhensis* in Brazil. Period: Jan 16<sup>th</sup> and Feb 1<sup>st</sup> 2017.

Photo: J. W. Herreid



**Figure I.** Adult of a female of the exotic parasitoid *Diaphorencyrtus aligarhensis* (Hymenoptera: Encyrtidae)

Photo: L. A. N. Sá



**Figure III.** Cages of rearing *Diaphorina citri* on curry leaf plants *Bergera (Murraya) koenigii*

Photo: J. W. Herreid



**Figure II.** Adult of a male of the exotic parasitoid *Diaphorencyrtus aligarhensis* (Hymenoptera: Encyrtidae)

		<i>Diaphorencyrtus aligarhensis</i> emerged	
	Dates 2017	Number of adults	
January	16 <sup>th</sup>	1	
	17 <sup>th</sup>	19	
	18 <sup>th</sup>	25	
	19 <sup>th</sup>	30	
	20 <sup>th</sup>	26	
	21 <sup>st</sup>	16	
	22 <sup>nd</sup>	42	
	23 <sup>rd</sup>	40	
	24 <sup>th</sup>	60	
	25 <sup>th</sup>	72	
February	28 <sup>th</sup>	110	
	29 <sup>th</sup>	80	
	30 <sup>th</sup>	60	
	01 <sup>st</sup>	30	
	<b>Total adults</b>		<b>611</b>

## Conclusion

The use of *D. aligarhensis* will be initiated in order to perform the biotests of competition between another exotic parasitoid present in Brazil, *Tamarixia radiata* (Hymenoptera: Eulophidae), in order to request the releases of *D. aligarhensis* in citrus orchards.

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