NAPPO

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Proposed Action

- 1.1 Purpose of the release (reflects the title of the petition and provides more detail of what is expected).
- 1.2 Need for the release (explains why the agent is being introduced).
- 1.3 Reasons for choice of the entomophagous biological control agent.
- 1.4 Specific location of rearing/containment facility and name(s) of qualified personnel operating the facility.
- 1.5 Timing of the release (approximate date of release), as well as factors that affect the timing of release (e.g. life stage of target pest or of biological agent to be released, season, agricultural practices, weather).
- 1.6 Location of initial release (including geographic coordinates).
- 1.7 Methods to be used after agent importation (e.g., rearing, multiplication, release).
- 1.8 Methods to be used for disposing of any host material, pathogens, parasites, parasitoids, and hyperparasitoids accompanying an import.
- 1.9 Agencies or individuals that will be involved in the release and monitoring.

Silverleaf Whitefly – *Bemisia tabaci*

Eretmocerus hayati

1.1 Purpose of the release (reflects the title of the petition and provides more detail of what is expected).

- *Bemisia tabaci* is a serious greenhouse pest of vegetable and ornamental plant production. Current parasitoids that can be reared on *Trialeurodes vaporarium*, greenhouse whitefly are not as effective as *Eretmocerus hayati* silverleaf whitefly

- Barr, C.L., and B.M. Drees. 1992. The poinsettia strain of sweetpotato whitefly. Texas Nursery 23: 8-12.
- **Goolsby, J. A**., Ciomperlik, M. A., Legaspi, B. C., Jr., Legaspi, J. C. and Wendel, L. E. Laboratory and field evaluation of exotic parasitoids of *Bemisia tabaci* (Gennadius) (Biotype "B") (Homoptera: Aleyrodidae) in the Lower Rio Grande Valley of Texas. Biological Control 12:127-135. 1998.

1.2 Need for the release (explains why the agent is being introduced).

- Current parasitoids such as *Eretmocerus eremicus* that can be reared on *Trialeurodes vaporarium*, greenhouse whitefly are not as effective as *Eretmocerus hayati* silverleaf whitefly
- **Goolsby, J. A**., Ciomperlik, M. A., Legaspi, B. C., Jr., Legaspi, J. C. and Wendel, L. E. Laboratory and field evaluation of exotic parasitoids of *Bemisia tabaci* (Gennadius) (Biotype "B") (Homoptera: Aleyrodidae) in the Lower Rio Grande Valley of Texas. Biological Control 12:127-135. 1998.

1.3 Reasons for choice of the entomophagous biological control agent.

- *Eretmocerus hayati* is a specialist parasitoid of *B. tabaci*. It has performed well many different climates and location worldwide.

- **Goolsby, J. A**., DeBarro, P. J., Kirk, A. A., Sutherst, R., Canas, L., Ciomperlik, M. A., Ellsworth, P., Gould, J., Hoelmer, K. A., Naranjo, S. J., Rose, M., Roltsch, W., Ruiz, R., Pickett, C. and Vacek, D. Post-release evaluation of the biological control of *Bemisia tabaci* biotype "B" in the USA and the development of predictive tools to guide introductions for other countries. Biological Control 32:70-77. 2004.

1.4 Specific location of rearing/containment facility and name(s) of qualified personnel operating the facility.

- The parasitoid will be imported into the USDA-APHIS Moore Airbase Arthropod Containment Facility (#34), in Edinburg, TX. Mr. Albino Chavarria is the quarantine supervisor.

1.5 Timing of the release (approximate date of release), as well as factors that affect the timing of release (e.g. life stage of target pest or of biological agent to be released, season, agricultural practices, weather)

- The initial release will take place in early November when *B. tabaci* populations in greenhouse poinsettias are detectable.
- E. hayati oviposits into 2nd instar *B. tabaci*
- Adult male and female *E. hayati* in a 50:50 sex ration will be released
- Greenhouses will be maintained at 27C and free of insecticide residues

1.6 Location of initial release (including geographic coordinates).

- Initial releases will be made in greenhouses in Alamo, TX
- N 26° 23’ 55” W 98 ° 20’ 39”

1.7 Methods to be used after agent importation (e.g., rearing, multiplication, release).

- Agent will be mass reared in greenhouses on *B. tabaci* infested eggplant, progeny will be shipped as pupae

1.8 Methods to be used for disposing of any host material, pathogens, parasites, parasitoids, and hyperparasitoids accompanying an import.

The parasitoids, E. hayati is reared on B. tabaci, but unparasitized whitefly will not be included in the initial shipment. It is possible to float parasitized whitefly in water, unparasitized wf sink. Further, we will inspect *B. tabaci* in the shipment at 20X to confirm they are parasitized with E. haytai. Contaminant facultative hyperparasitioids such as *Encarisa sophia* produce visible meconia.

Identifying contaminants

***Eretmocerus* pupae**

***Encarsia* pupae w meconia**

meconia

1.9 Agencies or individuals that will be involved in the release and monitoring.

- John Goolsby, Ph.D., Research Entomologist with the USDA-ARS in Edinburg, TX will conduct the initial release in greenhouses in Alamo, TX. Monitoring will be conducted weekly at the release sites.

Target Pest Information

- 2.1 Taxonomy: scientific name, full classification, synonymy, common names (if any), and sufficient characterization to allow unambiguous recognition.
- 2.2 Economic impact and benefits (if any) of the target pest.
- 2.3 Biology and reproductive potential of the target pest.
- 2.4 Global distribution of the target pest.
- 2.5 Economically and ecologically important species in North America (introduced and native) phylogenetically related or habitat associated to the target pest.
- 2.6 Regulatory or pest status of the target pest in state, provincial or federal law.
- 2.7 Knowledge of status of other biological control agents (indigenous and introduced) that attack the target pest.
- 2.8 Life stage(s) of target pest that are vulnerable to the biological control agent.

2.1 Taxonomy: scientific name, full classification, synonymy, common names (if any), and sufficient characterization to allow unambiguous recognition.

- *Eretmocerus hayati* (Zolnerowich and Rose)
- No synonomies, This species was described in 1995 by Mike Rose and Greg Zolnerowich from Texas A&M University in support of the Silverleaf Whitefly Program, USDA-APHIS, citation
- Zolnerowich, G., and M. Rose. 1998. *Eretmocerus haldeman* (Hymenoptera: Aphelinidae) imported and released in the United States for control of *Bemisia* (*tabaci* complex) (Homoptera: Aleyrodidae). Proc. Entomol. Soc. Wash. 100: 310-323.
- Hymenoptera: Aphelinidae
- Silverleaf whitefly parasitoid
- Eretmocerus species are determined by examination of antennal funicular segments. Dr. Greg Zolnerowich (K-State) identified the species. Vouchers sent to SEL

2.2 Economic impact and benefits (if any) of the target pest.

- B. tabaci is an exotic and invasive insect. More than 15 million dollars is spent on pesticides are spent to control this pest in greenhouses throughout N. America. One of the key insecticides (imidacloprid) may soon lose its registration due to non-target impacts on honey bees. There are no beneficial uses for B. tabaci.

2.3 Biology and reproductive potential of the target pest

- *B. tabaci* attacks more than 500 host plant species. Females can lay more than 200 eggs and at 27C, generation time is 18 days. In the absence of effective natural enemies it can quickly reach damaging levels and cause greenhouse crops to be non-marketable.

2.4 Global distribution of the target pest.

- B. tabaci, Biotype B is distributed worldwide in tropical, subtropical and warm temperate climates. It infests greenhouses worldwide
- Other biotypes including Biotype Q are most common in greenhouses in N. America and Europe. Q is highly resistant to pesticides.

2.5 Economically and ecologically important species in North America (introduced and native) phylogenetically related or habitat associated to the target pest.

B. tabaci is not native to N. America. There are other *Bemisia* spp. including *B. berbericola* that are native to the western USA.

Trialeurodes vaporarium and T. abutilonea are native whitefly that occur in the same habitat (greenhouses and outdoors in the warmer parts of N. America.)

2.6 Regulatory or pest status of the target pest in state, provincial or federal law

- B. tabaci biotypes B & Q are no longer actionable pests due to their widespread distribution. New biotypes not established in N. America may be subject to quarantine.

2.7 Knowledge of status of other biological control agents (indigenous and introduced) that attack the target pest.

- Other species of *Eretmocerus and Encarsia* parasitoids. *Eretmocerus eremicus* is indigenous to N. America, and parasitizes both *Trialeurodes* and *Bemisia* whitefly species. E. eremicus is commonly reared and sold for *B. tabaci* control, but is not as effect as E. hayati. *Eretmocerus mundus* is native to Europe and a *B. tabaci* specialist, but not as effective as *E. hayati*

2.8 Life stage(s) of target pest that are vulnerable to the biological control agent

- *Eretmocerus hayati* the biocontrol agent oviposits into 2nd instar *B. tabaci*. Adult *E. hayati* host feed (predation) on all the nymphal stages.