Delphastus *(Delphastus catalinae*)*
Whitefly Lady beetle

Target Pests
Greenhouse whitefly (*Trialeurodes vaporariorum*)
Banded-winged whitefly (*Trialeurodes* spp.)
Sweetpotato whitefly, silverleaf whitefly (*Bemisia* spp.)
Woolly whitefly (*Aleurothrixus floccosus*)
Azalea and hibiscus whitefly (*Pealius* spp.)
Cloudywinged, citrus and rhododendron whitefly (*Dialeurodes* spp.)
Citrus blackfly (*Aleurocanthus woglumi*)

Description
'Delphastus' is a specialized whitefly predator in the lady beetle family.
- Adults are tiny, 1.4 mm (1/15 inch) long, dark brown to black, hemispherical beetles; females have reddish yellow heads, lighter coloured than males.
- Larvae are elongated, cream coloured, covered with short fine hairs and have conspicuous legs.

The adult beetles fly, while larvae are slow moving and travel from plant to plant on leaves.

Use in Biological Control
- Delphastus is used to control whiteflies in tropical and semi-tropical plantings as well as commercial vegetable greenhouses.
- Delphastus avoids feeding on parasitized whiteflies, therefore is compatible with the use of *Encarsia* spp. and *Eretmocerus* spp. whitefly parasites. Delphastus also tends to feed in high density whitefly populations, while parasites do best at lower densities of whiteflies. Delphastus adults prefer feeding on whitefly eggs.
- Optimum conditions are moderate to high temperatures of 16-35 ºC (61-90ºF); Delphastus do not fly at temperatures below 13 ºC (55 ºF).
- Delphastus do not enter diapause under short-day conditions, therefore remain active all season.

Monitoring Tips
Inspect the undersides of leaves in whitefly "hot spots" for all stages of beetles.
- Three weeks after the first introduction, expect to see larvae and pupae on the underside of leaves.
- After 4-5 weeks, the first beetles should be found feeding on whitefly eggs among the adult whiteflies.
- Two months after the first introductions, all stages of Delphastus should be present in the oldest whitefly infested areas.

Life Cycle
The complete life cycle takes 25-21 days at 25-30^{o}C (78-86^{o}C).
- Eggs are yellowish ovals, laid on end, in clusters on the underside of leaves. Females lay 2-6 eggs per day, and can lay over 300 eggs in their 65-day life time. Females must eat 100-150 whitefly eggs per day to initiate and sustain egg laying.

- Larvae feed for 7-10 days. Older larvae migrate down the plant to pupate. Pupae are often found clustered along leaf veins on the undersides of leaves.
- Adults emerge from pupae in 6 days. Adults can eat 150-640 whitefly eggs or 11 large larvae per day. A single beetle can consume as many as 10,000 whitefly eggs or 700 larvae during its lifetime.

Both adults and larvae feed on whitefly eggs and immature stages. If food is scarce, they will also feed on other small arthropods, such as spider mite and aphids, and will cannibalise their own species.

Product Information
Delphastus are sold in small containers of 100-500 adults. They are shipped in shredded paper or other packing material to protect them during transport. Mortality in these containers should be less than 10%.
Once the beetles warm up they become active immediately, therefore should be released as soon as possible.
If necessary, beetles can be stored for 1-2 days at 10-16 ºC (50-61 ºF), but longer storage will reduce egg laying.

Introduction Rates
Introduce Delphastus in whitefly infested areas of the greenhouse as soon as whiteflies are detected.

<u>General introduction rate:</u>
- Release at least 100 adults/whitefly "hot spot", or 10 adults/infested plant, weekly, for 3-4 weeks.

<u>Greenhouse cucumber, pepper and tomato:</u>
- Low Rate: use general rate (above), or 0.5 beetles/m^2 (10 ft^2), bi-weekly, for 3 weeks
- Moderate Rate: 500 Delphastus/whitefly hot spot; or 1-2 beetles/ m^2, weekly, for 4 weeks.
- High Rate: 500 Delphastus/whitefly hot spot; or 3-4 beetles/ m^2, weekly, until established in all infested areas.

<u>Tropical Plantscapes</u>
- Low Rate: use general rate (above) or 0.5 beetles/m^2 (10 ft^2), bi-weekly, for 3 weeks
- Moderate Rate: 500 Delphastus/whitefly hot spot, weekly, for 4 weeks.
- High Rate: 500 Delphastus/whitefly hot spot, weekly, until established in all infested areas.

For Best Results
- Best results are achieved when Delphastus is used together with whitefly parasites (for information on Encarsia, see Sheet 210; for Eretomocerus, see Sheet 280).
- Delphastus do not survive in the absence of prey, therefore should be released only after whiteflies are detected.
- Check for Delphastus when de-leafing or pruning leaves from infested plants. Keep any leaves with Delphastus pupae in the greenhouse until adult beetles have emerged.