

## **Applied Bio-nomics Ltd.**

### **2008 Crop Recommendations Hydroponic Lettuce**

#### **Overview:**

Biological control of pests in hydroponic Lettuce requires a change in thinking for the grower as well as the supplier of the products. The old concept of maintaining a balance of pests and predators/parasitoids does not work in a crop where any insect or mite found on the plants is a negative.

At Applied Bio-nomics we have found that fresh beneficial insects and mites perform better and faster. We have, as a result, minimized or eliminated the storage of the products where there is a degradation in quality and performance over time. These “fresh” products fly farther, live longer, lay more eggs, and are actually smarter than the stored product available elsewhere. The result is that “fresh” beneficials are capable of prevention of pests at low, regular introductions.

The house must be clean and free of all extra plant materials. Office plants should be fake.

#### **Strategy:**

Preventative releases of healthy, fresh beneficials will prevent most pests from establishment. For pests that can enter from outside, trapping plants and physical devices will attract the pests away from the crop to where they can be eliminated.

#### **Cold Season:**

The influx of pests has been eliminated because of the cold weather outside. The only pests remaining are now cycling in the production area.

Aphids are prevented by neutrally releasing 2,000 to 4,000 *Aphidoletes aphidimyza* per hectare, on a weekly basis. It is important to release them away from the crop and especially any known aphid hot spots. This will force the *Aphidoletes* to disperse and use their highly developed sense of smell to locate any aphids. Known hot spots should be directly treated with *Aphidoletes* by releasing the adults directly at the hot spot. A ratio of 1 to 100 (*Aphidoletes* to aphids) will achieve control in 10 days. Circulation fans can physically damage the *Aphidoletes* adults, who are most active in the early evening. If possible, turn off the fans overnight on the day of release, or, at least, release the *Aphidoletes* downstream of the fans.

Whitefly should be removed by introducing Eggplants to the production area. Whitefly prefer Eggplant over lettuce and will move to the Eggplant. Introduce 100 to 1000 *Delphastus catalinae* per hectare, every two weeks until whitefly disappear. For higher infestations, introduce *Encarsia Max* at 2 per square meter per week, in addition to the *Delphastus*. *Delphastus* feed on the eggs, preventing the scale from forming on the Lettuce.

Any thrips over wintering should be pulled out of the crop by applying vanilla extract to blue sticky cards and a “Bug Zapper” electrocution device, hung over the crop. The vanilla is a very strong attractant. A major infestation of thrips should be treated with *A.cucumeris* also. Empty a container of bulk *cucumeris* into the bowl of a rose duster and “puff” the mites onto the lettuce. This will avoid the bran carrier from getting into the lettuce heads. If WFT is cycling in the house it means that you still have some weeding to do, because WFT pupate off the plant.

Any outbreaks of spider mites must be dealt with as soon as possible, because the damage is permanent. Apply *P. persimilis* directly to the infested plants at a ratio of 1 to 10 for immediate control or 1 to 100 for control within 10 days. The rate will depend on how fast you notice the pest and how much of a priority it is to prevent damage.

#### **Hot Season:**

Unlike the cold season, control is only temporary, as new pests will continuously move onto the crop. A continuous prevention program must be employed.

Aphids will be controlled at a weekly preventative rate of 2,000 to 5,000 *Aphidoletes* per hectare. When low aphid numbers are seen, go to 2,000 per hectare. Never skip a week. When aphids begin to be seen on the traps or in the crop move the rate up to 3,000 to 5,000 until the numbers begin dropping off. Always treat known hot spots separately. If the aphid is the Green Peach, you can take your time getting back in control, using less *Aphidoletes*. If the aphid is Melon or a damaging aphid like Foxglove, you must control it faster, so direct releases of 1 to 50 or less will be needed.

Whitefly is a big problem because of the number of eggs they can lay and the disfiguring scale that develops on the plant surface. If whitefly only appear infrequently, release 100 *Delphastus* per hectare every two weeks. The *Delphastus* will feed on the eggs, preventing the scale from developing. If whitefly is a constant problem, place Eggplants around the production area. 8 Eggplants per hectare will be needed. Place *Encarsia* on the Eggplant at 1 tag per 2 weeks. The Eggplant will attract some *Delphastus* and act as a banker plant. Once *Delphastus* pupae are seen on the Eggplant, you can stop releasing them in the house for the rest of the season.

Thrips cannot be prevented, so it is best to react rapidly to them. Strategically placed blue sticky cards will help tell you when they arrive. Develop a good relationship with nearby farmers who have fields of Hay and Alfalfa, especially the ones upwind. Have them notify you when they plan to cut or disturb their fields so you can close the vents during the major disruption. The Eggplants used for the whitefly control will help attract and hold volunteer *Orius*. Once thrips invade, add vanilla extract to the blue sticky cards and turn on the “bug Zapper” every night except the night that you release the *Aphidoletes* or *Delphastus* or *Orius* if you are adding them also.

If spider mites show up, follow the same procedure as described for the cold season. Employees who handle spider mite infested plants should do so only at the end of the day and then directly leave the facility. Gloves and coveralls should be frozen overnight. Continuous infestations should be handled by releasing 500 *Stethorus punctillum* per hectare, every 2 weeks until eliminated. The *Stethorus* are small flying beetles that eat only spider mites and will find very low numbers because of their advanced sense of smell.