

Dear colleagues

Ganey Am, March 2011

The subject: Biological control

After two and half years (August 2008 - March 2011) of controlling the main gerbera pests by means of biological control - The White Fly, Leafminer Fly, Thrips and Mites, I am gratified to inform you that these pests are almost totally controlled.

It is also important to mention that shortly after we stopped the use of the pesticides; some secondary pests immigrated into the biologically-controlled area. These secondary pests were suppressed in the past, as a result of the harsh non-selective pesticides' management. But at the same time, when we stopped the use of harsh pesticides, some natural beneficial insects emigrated into the greenhouse, and together with the 'Bio-Bee' released predators and parasitoids, these secondary pests are successfully controlled too.

Today, March 2011 we do not use the common pesticides, as our gerbera plants are almost totally clean. We continuously monitor the greenhouse for the presence of pests, and if needed we can use some permitted pesticides without harming the present biological control agents.

I would like to encourage our growers to study this information towards changing their pest control policy, as we did successfully in our gerbera breeding greenhouse.

Best regards
Dr. Yoseph Shoub

Excellent Results of Biologically-Based Integrated Pest Management in Gerbera Breeding Ltd, Israel.

Carried out and advised by 'Bio-Bee' Sde Eliyahu Ltd., Israel

Summary - for more details contact www.BioBee.com

Pesticides and their negative results:

For years we treated the white fly and the leafminer fly with pesticides, and we never succeeded to keep our greenhouse clean. Once we postponed a spray, we paid immediately with more chemicals and with shorter sprays' intervals. Along the years the

pesticides' resistance of the pests increased, and we were forced to increase the chemicals concentrations and continuously search for new pesticides.

In practice, the vigorous pesticides management violates the natural biological balance. And while we partially controlled the white fly and the leafminer we eliminated the activity of the natural enemies present in the surrounding areas.

For example: Thrips, Red spidermites and Cyclamen mites were present in the greenhouse sporadically in hot spots and didn't require special chemical care. Thus when we started the biological control program, the Thrips become temporarily a problem, but shortly after its appearance, the natural local minute pirate bug *Orius laevigatus* invaded the greenhouse from the surrounded area and satisfactorily controlled the Thrips population. Hence, in the subsequent season (2010) the *Orius laevigatus* bugs, received from Bio-Bee, were applied as a prophylactic treatment.

Biological Control of the Major Gerbera Pests -

White Fly (*Bemisia tabaci*) is controlled by the predatory mite - *Amblyseius swirskii*

Leafminer (*Liriomyza trifolii*) is controlled by the parasitic wasp *Diglyphus isaea*

Western flower thrips (*Frankliniella occidentalis*) is controlled by the minute pirate bug *Orius laevigatus*

Red spidermite (*Tetranychus cinnabarinus*), and broad mite (*Polyphagotarsonemus latus*) are controlled by the predacious mites - *Phytoseiulus persimilis*, and *Amblyseius swirskii*, respectively.

The mealybug *Planococcus citri*, a secondary pest known as the "Citrus mealybug", is controlled by the ladybeetle *Cryptolaemus montrouzieri*, and by the parasitic wasp *Anagyrus pseudococci*.

Integrated pest control

On August 2008 we stopped to use the common pesticides and started the biological control program, at that time the residues of the pesticides used before covered the leaf area surface in a way that did not allow *Amblyseius swirskii* predatory mites to establish in the crop for a few weeks. At that time our gerbera plants were heavily infested by whiteflies. Therefore, we applied for a while some **selective** pesticides that can be integrated with the natural enemies.

(For more information regarding side effects of pesticides on natural enemies, please consult www.BioBee.com)

Some practical information from our experience -

Control of Whiteflies by the predatory mite - *Amblyseius swirskii*

On August 2008 (two weeks before introducing the Swirskii mites) we stopped using the common pesticides and performed a "pilot trial" to check the ability of the Swirskii mite to establish in our gerbera greenhouse. Up to that date we were obliged to use in a yearly cycle, at least 70 sprays of 8 different pesticides against the whiteflies, leafminers and western flower thrips.

For a period of about 2 months, the residues of the chemicals sprayed throughout 2008 season prevented the predatory mites from establishing in the crop therefore, we had to repeatedly release more mites.

Only when fresh new foliage has developed, the Swirski mites were able to establish and from that time onwards the presence and activity of the Swirski mites were easily monitored (eggs, young and mature active stages)

On October 2008, the population of the whitefly decreased gradually and towards the winter season (December – February,) the whitefly had practically disappeared. After the cold winter season we renewed the predatory mite population by means of prophylactic introductions.

When the population of the whitefly was scarce, the predatory mites fed on flower's pollen as an alternative food.

Control of Leafminers by the parasitic wasp - *Diglyphus isaea*

The control of the leafminer flies with *Diglyphus* started only on April 2010 as a prophylactic treatment. At that time we stopped the use of the pesticide 'Trigard' (cyromazine) that has been used before as a weekly drench.

The tiny wasps are very active and one can trace their activity on the leafminer larvae all over the plot even though they had been released in a small restricted area.

Control of Thrips by the minute pirate bug - *Orius laevigatus*

On May 2010 we released a relatively small amount of predatory bugs on a restricted area. It took 4 - 5 weeks for the *Orius* to establish and then we could find it every where in the greenhouse.

It seems that under our climate conditions, introducing *Orius* once or twice on early spring is effective enough to control Western flower thrips.

Control of Red spider mites & broad mites by the predatory mites *Phytoseiulus persimilis* and *Amblyseius swirskii* respectively

During spring, summer and autumn seasons, when the swirskii mites are very active, the red spider mites and broad mites are almost totally controlled. Additional help in hot spots is provided by *Phytoseiulus persimilis*.

In winter, when the activity of the predators is relatively limited, it is possible to correct with 1 or 2 applications of permitted miticides advised by BioBee.

Control of *Planococcus citri* (the Citrus mealybug) by the predatory beetle - *Cryptolaemus montrouzieri* and by the parasitic wasp - *Anagyrus pseudococci*

The mealybug *Planococcus citri* exists in the surrounding area but due to the chemical pesticides' regime, it was never found in our greenhouse. This dangerous pest was discovered on some of the gerbera plants.

On June 2010 about 100 *Cryptolaemus* ladybeetles were released at the mealybug hot spots and a week later about 500 *Anagyrus* wasps were added. Today we do not trace any mealybugs what-so-ever.

Control of Ants

Ants are the vector of the Citrus mealybug. Therefore we control the ants' nests and the ants' pathways by granular Dursban.