Bio**Anagyrus**

Anagyrus vladimiri

Parasitic wasp for biological control of mealybugs

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FUTURE

BioAnagyrus

Anagyrus vladimiri is a solitary endoparasitoid of mealybugs in both greenhouses and open fields.

TARGET PESTS

Anagyrus vladimiri specializes in the control of citrus mealybug (*Planococcus citri*), the vine mealybug (*Planococcus ficus*) and the cypress mealybug (*Planococcus vovae*).


Mealybug direct and indirect damage to citrus and grapes

CROPS

Table grapes, vineyards, citrus, blueberries, vegetables, fruit tree orchards and ornamentals.

DESCRIPTION

The female is brown with distinctive black & white banded antennae and is about 1.2 -2 mm in length. The male is black bearing an arch-like pair of antennae and is much smaller 0.8-0.9 mm in length.

Female

Male

Adults show marked sexual dimorphism.

The adult female wasp prefers to lay its eggs singly, inside the third instar larvae and young adult female mealybugs. The parasitoid larva hatches and feeds on the internal organs of its host.

Anagyrus parasitizing mealybug. The dark spot on the mealybug is the mark left after the parasitizaton.

Anagyrus develops through 5 larval stages which occur inside the host. The pupal stage appears within a "mummy" which is the hardened skin of the dead mealybug.

Courtesy of Dr. Alex Protasov & Prof. Zvi Mendel

The adult then emerges from its host through an irregular exit hole gnawed at the posterior end of the "mummy".

TEMPERATURE & DEVELOPMENT

Temperature (C)	Development time (days)
17.5	40.5
20	29
24	16.8
26	14
30	11.6
35	10.5
40	lethal

Tingle, 1985

Lower Threshold= 13℃
Upper Threshold = 38℃

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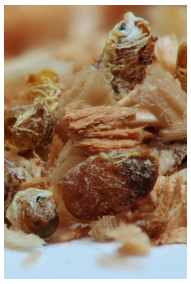
BioAnagyrus

THE PRODUCT

BioAnagyrus is an innovative, patented product which comes in "mummy" form, containing the parasitoid's pupa, rather than adult wasps. Thus reaching its destination "fresh" and ready to emerge.

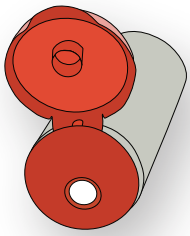
- A bottle contains a minimum of 500 ready-to -emerge "mummies" mixed in sawdust. At least 50% of the "mummies" will yield adult *Anagyrus* females.
- A honey-soaked paper inside the lid nourishes the emerging wasps before leaving the bottle.



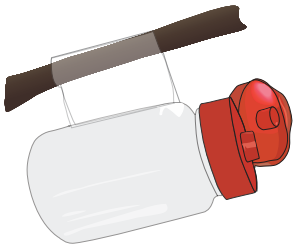
PRODUCT POSITIONING

- The patented label is used to hang the bottle from a branch or twig near the infested area and prevents the entry of harmful ants which interfere with the parasitoids. There are 3 separate stickers that form the label, all numbered for your convenience. Follow the printed directions on the label to remove the stickers and free the two-sided innovative tape.

- The bottle cap is equipped with a hole to allow the newly emerged *Anagyrus* to fly out of the bottle. Make sure you open the cap, once the bottle is securely positioned.



- When hanging the bottle make sure:
  - The bottle is slightly tilted upwards so the mummies can't fall out and the sawdust doesn't block the exit hole.
  - The bottle is far enough from the twig so ants can't get into it and attack the newly hatched *Anagyrus*.



- Make sure the glue ring is complete once the bottle is hanged
- Consult the explanation page or visit www.biobee.com

MONITORING

Scouting and monitoring is crucial.
Application should begin when:

- The first mealybug males are spotted in sticky traps.
- The first virgin female mealybugs are observed.
- Third instars appear.
- Consult the BioBee Field Services for suggested quantities to be applied

APPLICATION & HANDLING

Hang the opened container in a shaded area, near the mealybug infested site. The wasps will fly out of the bottle in search of mealybugs.

- Avoid exposure to dew and rain.
- Apply wasps during early morning or late afternoon, while temperatures are cooler.
- Leave wasps inside insulated shipping boxes until placement in the field.
- The individual packages of *Anagyrus* should be taken from the insulated box, one at a time and placed as quickly as possible.
- **Do not expose the bottles to direct sunlight.**

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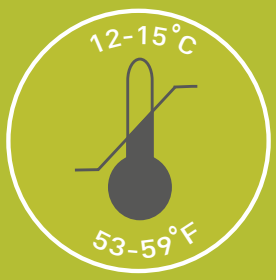

BIOLOGICAL PEST CONTROL

The presence of new *Anagyrus* "mummies", two to three weeks after release (depending upon weather conditions) demonstrates the level of success of the *Anagyrus* application.

Biological pest control continues throughout the growing season, as successive generations of *Anagyrus* continue to control the mealybugs, providing a long-term solution.

The *Anagyrus* wasp can be combined with the *Cryptolaemus montrouzieri* predatory beetle (BioCryptolaemus). These two natural enemies are synergistic in controlling mealybug and can coexist in the same habitat.

GENERAL COMMENTS

Before combining BioAnagyrus with any chemical pesticide in the crop, please consult your BioBee's technical advisory representative.

PATENT DETAILS

The patent encompasses the production process and product of mummified mealybugs by parasitoids like *Anagyrus* and other members of the Encyrtidae family. The patent also applies to the delivery system of the mummified mealybug product: containers with the double-sided adhesive tape that once hung on the plants serve as a barrier against ants, preventing them from invading the product's container.

Europe Patent # 2706856
Israel Patent # 229390
Chile Patent # 54.657
Morocco Patent # 36553
Peru Patent #9009
USA Patent Publ.#US 2014-0178490-A1
South Africa Patent # 2013/04345
PCT Patent # WO 2012/153327

WE HAVE SOLUTIONS

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