

## *A Calendar of Incubation for Alfalfa Leafcutting Bees*

Cocoons (*Megachile rotundata*) are placed in incubation trays and are allowed to warm up slowly over several days at room temperature. The incubator temperature is then increased to 30°C. Count "day 1" of incubation as the first day at which they are at 30°C. This calendar of incubation assumes continual cool storage at 5°C prior to incubation, and continual incubation at 30°C. Degree-Days are the number of degrees above the base temperature for development (15.7°C) for a day. At 30°, 14.3 degree days (D.D.) are accumulated each day.

**Day 1** - Cocoons are at 30°C. All are in the prepupal stage (Fig. 1). Black lights and water traps are in place.

**Day 3** – *Pteromalus* (“parasites”) undergo their final molt into the pupal stage.

**Day 7** – Place Vapona into the incubator at suggested rate of 3/4 strip per 1000 cu ft. If the incubator is only partially full use a lower rate.

**Day 8** - Leafcutting bees begin to undergo their final molt into the pupal stage. At this stage they are very sensitive to temperature fluctuations so maintain an even temperature - no cooling and holding at this time.

**Day 8-9** - First *Pteromalus* begin to emerge. If Vapona is working/effective they should die in the trays rather than making it to the water trap. 150 D.D.

**Day 9-12** - *Pteromalus* continue to emerge. (Fig. 2)

**Day 10** - Leafcutting bee larvae pupate - white pupa stage. 148 D.D.

**Day 12** - Pink eye stage. 165 D.D.

**Day 13** - Dark eye stage. 190 D.D. Remove Vapona strips. Actively air the incubator thoroughly and completely, using an exhaust fan and circulating fans, for 24-48 hours. Maintain the 30° temperature if possible and desirable. (Fig. 3)

**Day 14-15** - Leafcutting bee pupae continue to darken in color. If cooling occurred during airing after Vapona removal bring the incubator temperature back to 30°C for continuation of development. (Fig. 4)

**Day 14-15** - Native leafcutting bees *Megachile relativa* emerge. This may cause concern to the new beekeeper that the timing is off and the bees are beginning to emerge several days early. These bees are larger, and the female has orange hairs on the abdomen (Fig. 5).

**Day 15-22** - *At any time during this period, if incubation must be slowed due to weather or bloom, the cocoon temperature can be lowered to 10-15°C for up to 10-14 days. This virtually stops development.* Once the temperature is increased, development resumes until the hatch is complete. Remember that the bee temperature must be at 10-15°C, not just the air temperature.

**Day 16** - Early hatching pupae (mainly males) are completely dark in color; later hatchers (mainly females) are darkening. (Fig. 6)

**Day 18-19** - Males begin to emerge. Remember that the bees are very susceptible to high temperatures! 265 D.D. Good time to hold the bees if needed.

**Day 21-22** - Females begin to emerge. Male emergence peaks. Second generation *Pteromalus* begin to emerge. 307 D.D. (Fig. 7)

**Day 22-24** - Female emergence has started and will peak by **Day 24**; therefore, the trays should be taken to the field to release the adult bees **before then**. 336 D.D.

**Day 28** – Hatch is virtually complete at 30°C.



Fig. 1

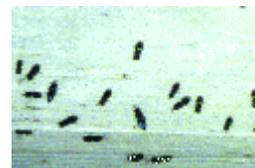


Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7