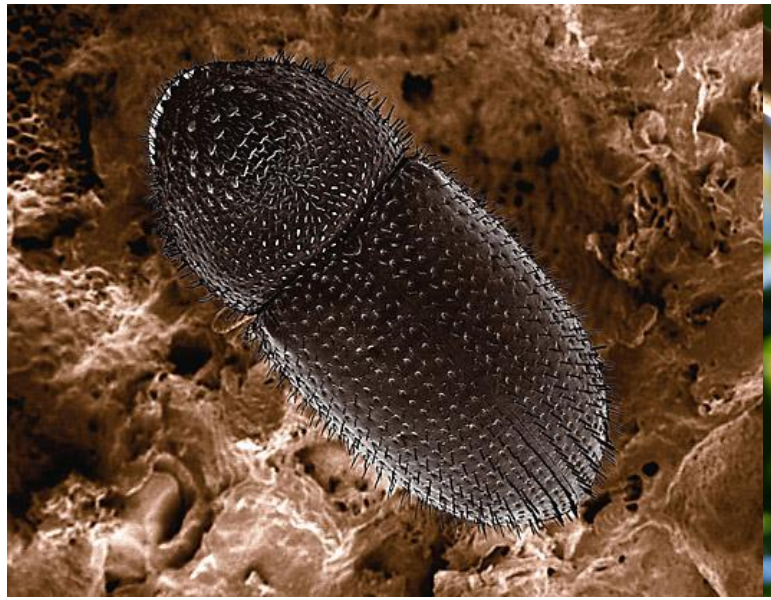
Understanding the Biology and Life Cycle of CBB for Better Management Practices

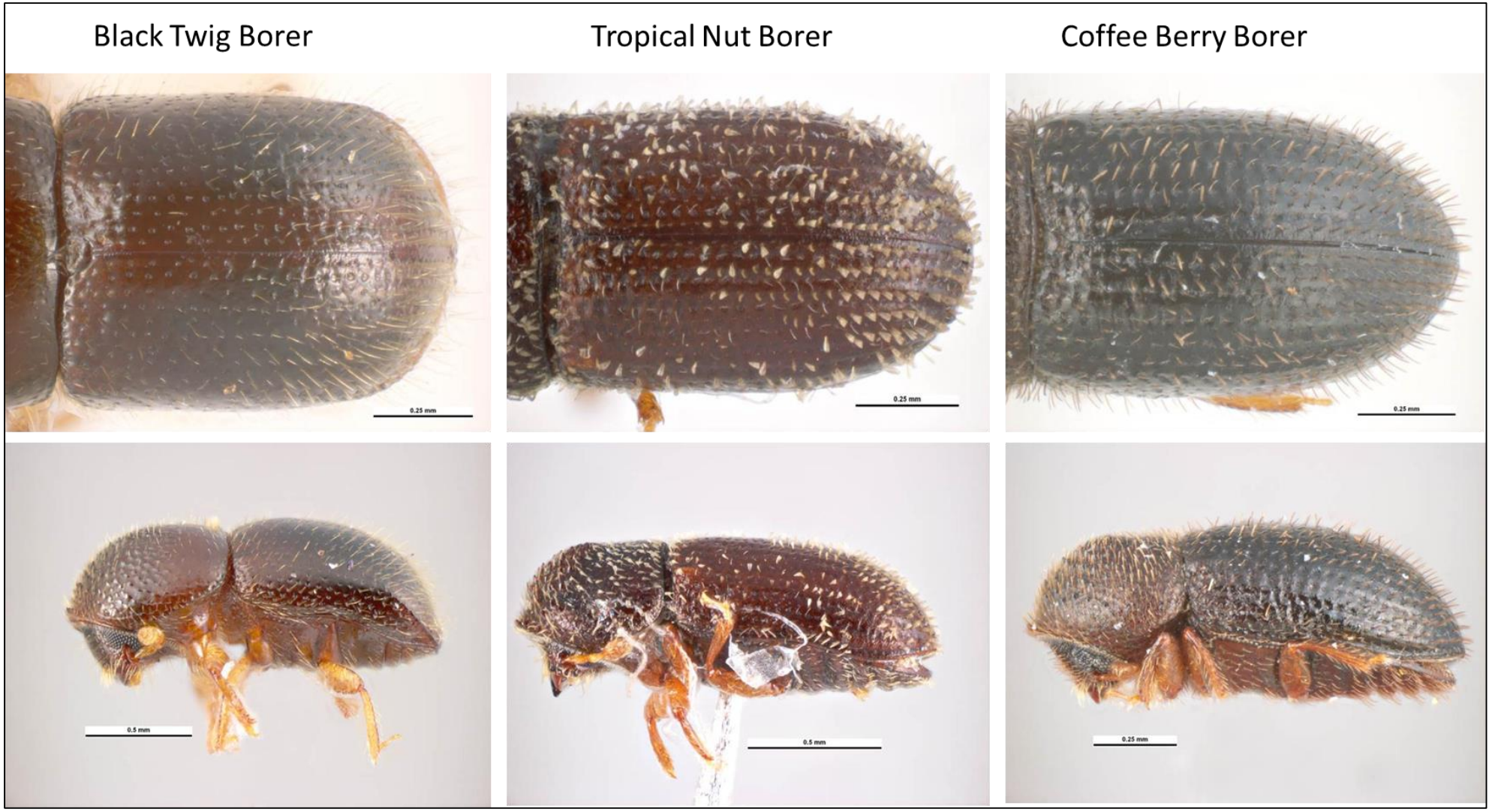
By

Ishakh Pulakkatu-Thodi and Mark Wright

CTAHR-PEPS, University of Hawaii Manoa



General Description



Coffee Berry Borer in Action

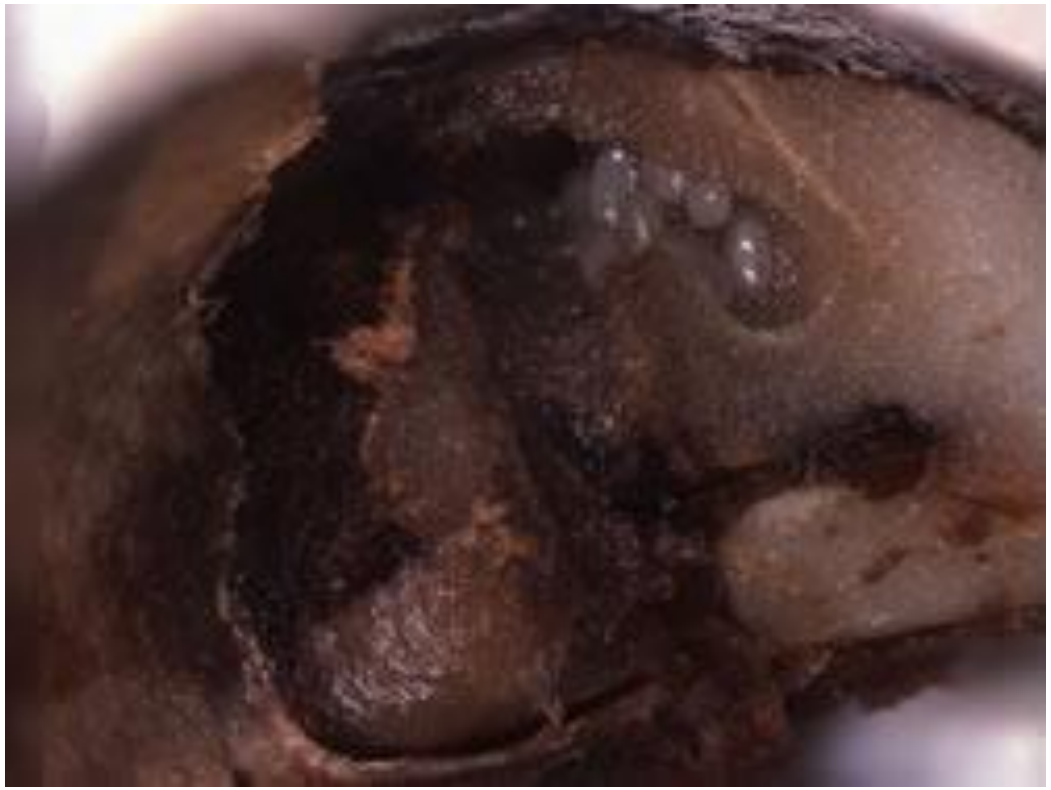
- Video is 40 seconds long
- The process took about 2 hours and 46 minutes
- 4-8 hours to completely disappear into the berry

Biology and Life Cycle

- Female beetles bore into developing coffee berry
- Starts constructing galleries inside the bean and starts laying eggs with in two days
- Can lay 2 to 3 eggs per day for about 20 days

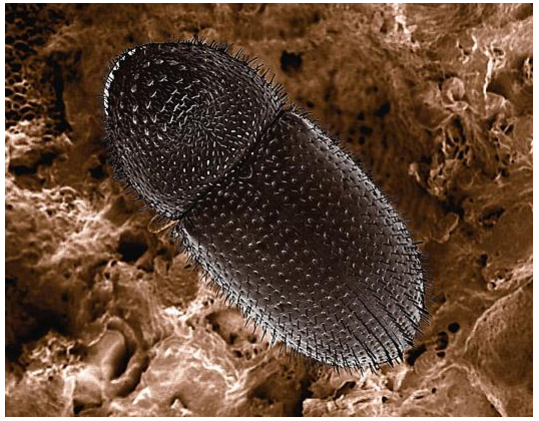
Biology and Life Cycle

- It is common to observe all life stages in one berry
- Sex ratio: For every male CBB there could be up to 10 or more female CBB
- CBB reproduce by sibling mating



Biology and Life Cycle



Developmental Requirements

Average Developmental time (in days) of coffee berry borer life stages at different temperatures (Jaramillo et. al. 2009)

Life stages	Temperature °C (F)							
	15 (59 F)	**20 (68 F)**	**23 (73.4 F)**	**25 (77 F)**	**27 (80.6 F)**	**30 (86 F)**	**33 (91.4 F)**	**35 (95 F)**
Eggs	–	12.0	7.7	5.3	4.3	3.3	4.7	–
Larva I	–	6.3	3.3	2.8	2.0	1.7	9.0	–
Larva II	–	9.0	6.0	5.8	5.0	4.0	–	–
Pre-pupa	–	12.7	7.7	6.0	5.0	5.3	–	–
Pupa	–	16.3	6.5	6.3	5.2	6.0	–	–
Egg to adult	–	53.7	31.2	26.6	21.8	23.3	–	–

Male and Female CBB

- Male CBB is smaller than female in size
- Male has poorly developed wings and cannot fly
- Lifespan of male 20- 87 days
- Lifespan of female is about 157 days

CBB and Coffee Berry Development

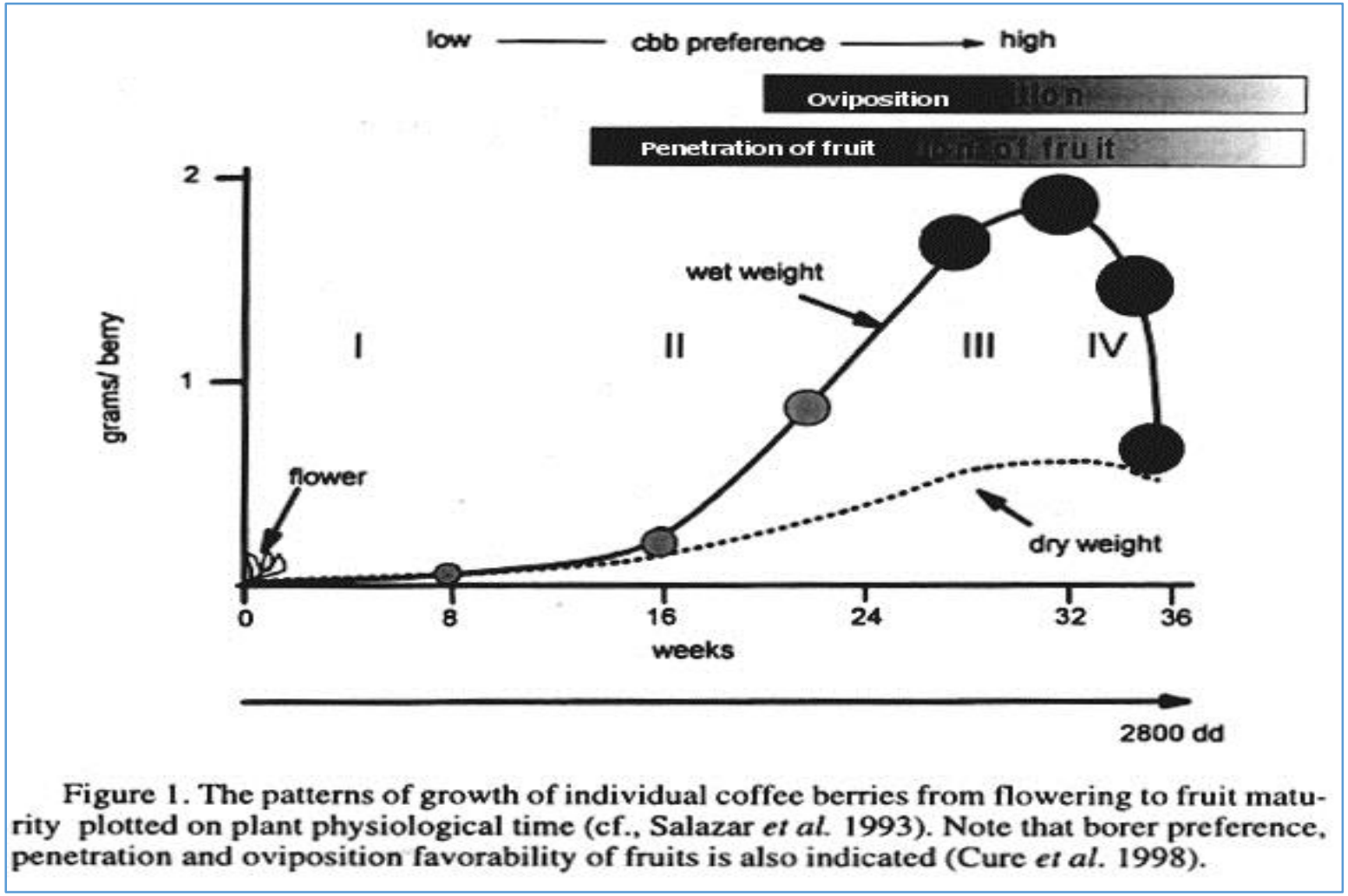


Figure 1. The patterns of growth of individual coffee berries from flowering to fruit maturity plotted on plant physiological time (cf., Salazar *et al.* 1993). Note that borer preference, penetration and oviposition favorability of fruits is also indicated (Cure *et al.* 1998).

- Starts penetration around 12 weeks
- Starts egg laying when the berry has enough dry matter (20%)

Emergence of CBB from Coffee berry

- CBB is sensitive to changes in humidity and temperature
  - Humidity below 60% and above 90 to 100% in lab conditions induce emergence
  - Not much emergence around 20 ^{o} C
  - Rains after a dry period during inter-harvest season found to initiate emergence

Factors affecting CBB management

- Cryptic life cycle
  - Spends most of the time inside the berry- Protection from insecticide treatments
- High reproductive ability and female-biased sex ratio
- Short life cycle and favorable environmental conditions
- Continuous availability of resources- Frequent flowering of coffee
- Absence of natural enemies
- Limited management options and high cost of managements

Questions..?!