

WHEN THE DIET GOES BAD...

A case study of the Southwestern Corn Borer

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Abnormal Last instar larvae (38D old)



We received reports from two workshop alumni on developmental issues of SWCB reared on a particular batch of diet from a renowned vendor

Abnormal pharate pupae and pupae



When we obtained SWCB larvae from one of the alumni, they were already in the last instar and ~ 38 days old!

The pupae that developed from the few surviving larvae were mostly deformed and did not transition to normal functional adults!

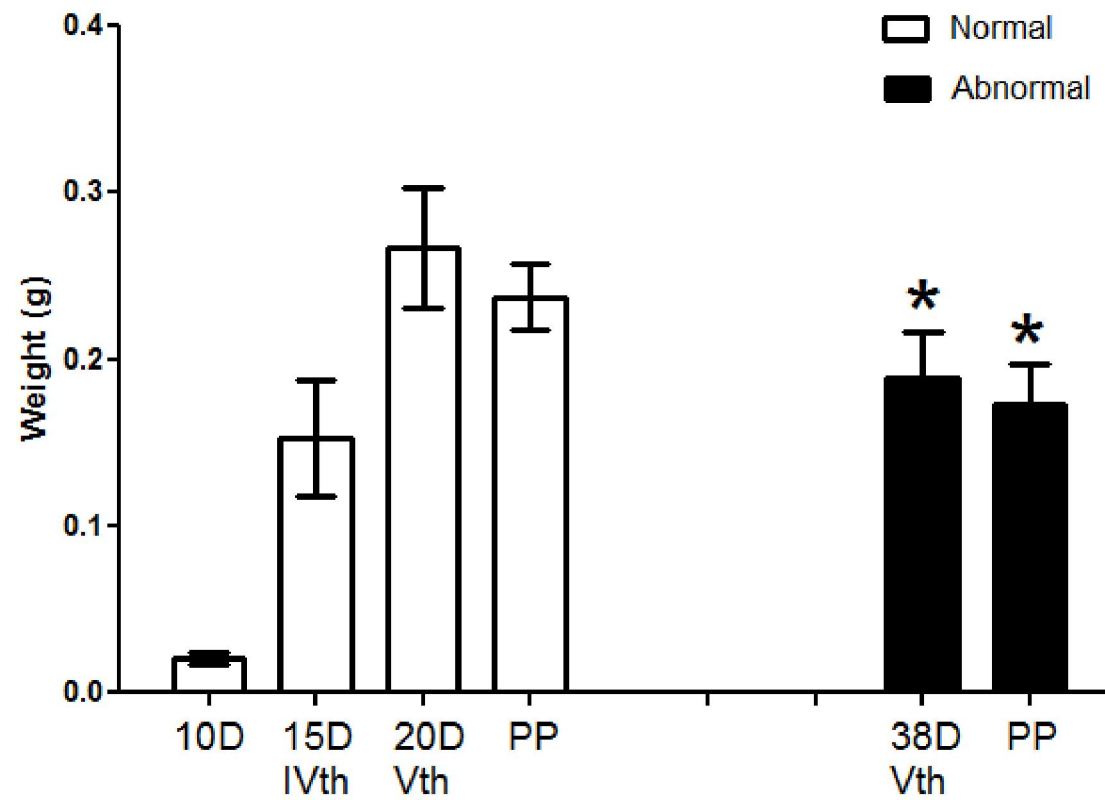
So what was wrong with the insects?

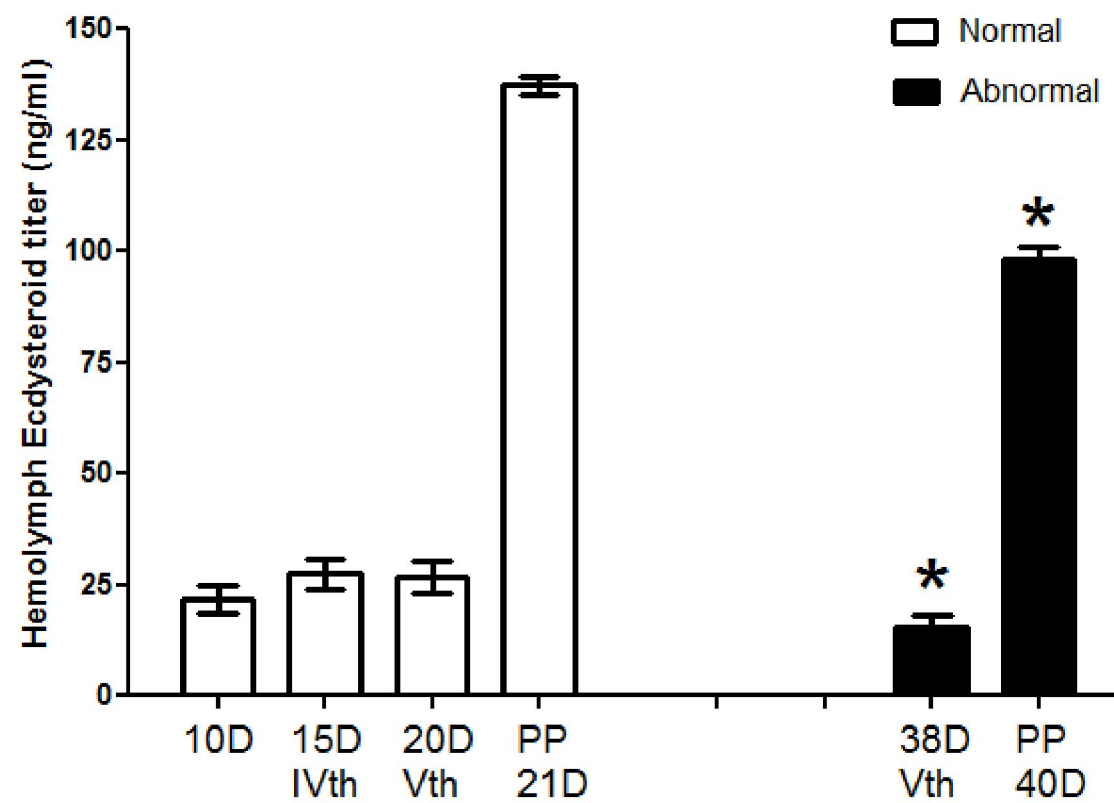
- **Amanda Lawrence checked to see if the insects were infected with any pathogens**

The results came out negative!

- **Around this time (August 23rd, 2012), we received ten 32-cell trays of SWCB larvae feeding on diet from a new lot of diet from the same vendor.**
- **We reared these neonates in our rearing facility ($80\pm0.5^{\circ}\text{F}$, 50-60% RH and 16L:8D)**

- Since it was a developmental issue we next checked if the larvae were attaining the necessary **critical weight** in a particular stage so they could transition to the next stage...
- Since **ecdysteroids (molting hormone)** are crucial for molting, we also checked their levels at a particular stage (there are several ecdysteroid peaks prior to a molt, however, because of lack of samples we could check only one time point) using a Competitive ELISA technique.





Pupation

- The first pupation of larvae reared on new lot of diet was on September 4th, 2012, 17 days after infestation! (compared to larvae which failed to pupate for 38 days on an earlier lot of diet from the same vendor)
- In the new lot of diet all the larvae pupated within a 7 day period – an outstanding achievement!

Normal pupae

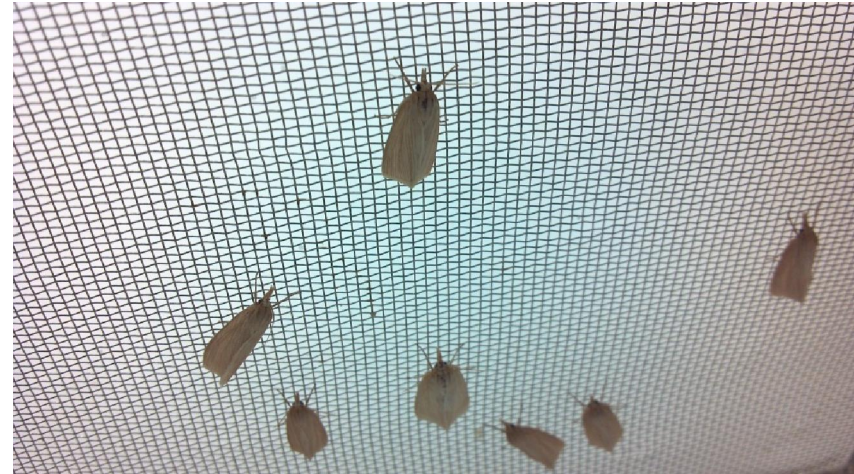


Male

Female

Adult Emergence and Normality

- The pupae were harvested on September 12, 2012 and rated for their normality, and placed in a small adult emergence cage.
- All 22 adults emerged successfully from their pupae in a 5 day period and were 100% normal morphologically!



- SWCB adults derived from larvae fed on the new lot of artificial diet also mated and oviposited lots of eggs which hatched normally.

Take home message...

- It was obvious that SWCB larvae reared on a batch of diet that had gone bad, or was lacking some essential ingredient, which causes serious developmental issues.
- These developmental defects manifested symptoms very similar to disease situations/ syndromes, yet they were caused by nutritional deficiency.
- It is our recommendation that each fresh lot of diet be first tested for efficacy by rearing a small number of insects on a small batch of the diet. If development occurs normally, then the diet can be used for rearing insects en masse.
- It is best to order a small batch of fresh diet well before the existing batch of diet is consumed. This will ensure that you have sufficient time to test the new batch before ordering larger quantities of that lot.
- Also, immediately inform the vendor of developmental issues noted on a particular batch of diet so that appropriate action can be taken promptly by the vendors in replacing the diet to serve your needs as well as the insects being reared...
- Finally, have a good working relationship with your vendor!