

Thesis Title Ecological Study of the Asian Corn Borer, [*Ostrinia furnacalis* (Guenee)] in Yunnan, People's Republic of China

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ABSTRACT

The ecology of *Ostrinia furnacalis* (Guenee) was studied. Developmental time declined substantially with each increase temperature between 12 to 30°C. Constant temperatures between 10 and 14°C or above 30°C were detrimental to *O. furnacalis*. The lower developmental threshold temperatures for egg, larva, pupa, and overall immature stages were extrapolated from the linear relationship between temperature and rate of development. The lower theoretical threshold of development for this insect was determined to be $10.35 \pm 0.02^\circ\text{C}$. The temperature of developmental upper limit threshold was 32.0°C . It was calculated by using the sigmoid model, $R_t = \frac{C}{1 + e^{k_1 + k_2 T}}$. The thermal constant required for the completion from egg to adult was 539.51 ± 8.62 degree-days.

Field investigations were in an unsprayed corn field at Yongde, Yunnan of People's Republic of China. The moths responded well to both synthetic Asian corn borer sex pheromone and the light trap.

Average weekly catches of moths taken from blacklight and pheromone traps were plotted as a function of cumulative degree-days. Average degree-days between peak flight periods of generations were similar to the thermal constant required for the completion from egg to adult estimated in the laboratory.

Both generation egg masses, medium (third and fourth instars) larvae and large (fifth instar) larvae, and pupae were randomly distributed between corn plants in the field where small (first and second instars) larvae were aggregated.

The investigation of arthropod species diversity on seedling, tasseling, and physiological mature stages of corn revealed that the abundance of arthropod species closely correlated to corn plant architecture. The number of arthropod species (S), abundance, and Shannon-Wiener's index increased as the corn plants development and decreased as corn plants senesce. The evenness index had a different performance which was determined by the rare species in the arthropod community.

ทุกระยะการเจริญเติบโตของหนอนเจาะลำต้นสามารถพบได้ในช่วงการทดลอง แบบแผนการกระจายตัวของมวลงไข ตัวหนอนระยะปลาย และคักแค้ อธิบายโดยใช้ Poisson distribution อย่างไรก็ตาม แบบแผนการกระจายตัวทางปริมาณของตัวหนอนระยะแรกนั้น การใช้ Negative binomial distribution อธิบาย จะใกล้เคียงมากกว่า

จากจำนวน arthropod ทั้งหมดที่จับได้ 1599 ตัว ในระยะออกดอก จำแนกได้เป็น 19 สปีชีส์ และในจำนวนนี้ 7 สปีชีส์ คือ *Oxyopes salticus* Henth, *Rhopalosiphum maidis* (Fitch), *Coccinella septempunctata* Linn., *Mythimma separata* (Walker), *Ostrinia furnacalis* (Guenee) และ *Lasius alienus* (Christ) คิดเป็น 89 เปอร์เซ็นต์ของ arthropod ทั้งหมดที่จับได้