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ABSTRACTS

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O MF I-5

Improving the Degree-day model for forecasting Locusta migratoria manilensis (Meyen) (Orthoptera: Acridoidea)

Z. Zhang, X. Tu
Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China
zhangzehua@caas.cn

The degree-day (DD) model is an important tool for forecasting pest phenology and voltinism. Unfortunately, the DD model is inaccurate, as is the case for the Oriental migratory locust. To improve the existing DD model for this pest, we first studied locust development in seven growth chambers, each of which simulated the complete growing-season climate of a specific region in China (Baiquan, Chengde, Tumotezuoqi, Wenan, Rongan, Qiongzhong, or Qiongshan). In these seven treatments, locusts completed 0.95, 1, 1.1, 2.2, 2.95, 3.95, and 4.95 generations, respectively. Hence, in the Baiquan (700), Rongan (2400), Qiongzhong (3200), and Qiongshan (2400) treatments, the final generation were unable to lay eggs. In a second experiment, we reared locusts for a full generation in growth chambers, at different constant temperatures. This experiment provided two important findings. First, temperatures between 32 and 42°C did not influence locust development rate. Hence, the additional heat provided by temperatures above 32°C did not add to the total heat units acquired by the insects, according to the traditional DD model. Instead, temperatures above 32°C represent overflow heat, and can not be included when calculating total heat acquired during development. We also noted that females raised at constant 21°C failed to oviposit. Hence, temperatures lower than 21°C should be deducted when calculating total heat acquired during adult development. Using our experimental findings, we next micmiked 24-h temperature curve and constructed a new DD model based on a 24-h temperature integral calculation. We then compared our new model with the traditional DD model, results showed the DD deviation was 166 heat units in Langfang during 2011. At last we recalculated the heat by our new DD model, which better predicted the results from our first growth chamber experiment.

O MF I-6

Modeling academic knowledge using semantic networks in integrated pest management of cereal stem borers

P. Martin[1,2], P. Silvie[1]
[1]*CIRAD, UPR AIDA, Montpellier, France*
[2]*LIRMM, Computer science, Montpellier, France*
pierre.martin@cirad.fr

Question: In conservative biological control, the local landscape is managed in a way that ensures the survival of natural enemies. Our hypothesis is that some components of the landscape, especially secondary host plants of pests, can be identified using trophic chains and food webs published in the literature. This hypothesis was evaluated considering cereal stem borers in a lowland region of Benin characterized by a complex agro-ecological context. A mosaic of crops (maize, sorghum, rice, cotton, gardening...) occupies 49% of the area in the rainy season, the rest being comprised of fallow and natural areas.
Methods: The first step was to construct a semantic network using data from 70 scientific papers published between 1957 and 2014, among them 11 review articles, concerning lepidopteran cereal borers in Africa. The data introduced in the semantic network are trophic chains, their geographical location and the bibliographic references. The second step was to extract, from this semantic network, the part related to food webs including the cereal borers studied (*Busseola fusca*, *Sesamia calamistis* [Noctuidae] and *Coniesta ignefusalis* [Crambidae]) and their wild host plants (9 species of Cyperaceae and 23 species of Poaceae) observed in the landscape. This subnet included location and bibliographic reference. The last step was to check the consistency of the combination of geographic locations juxtaposed in the subnet, as well as the bibliographical references.
Results: The resulting semantic network describes 3004 trophic chains distributed in 40 territories and 13 regions. The extraction of the food web related to the three species of borers helped identify 15 species of plants able to host borers. Among them, *Rottboellia cochinchinensis* is able to host, indirectly via the host borer, two Hymenoptera that are larval parasitoids of the borers, i.e. *Goniozus indicus* (Bethylidae) and *Xanthopimpla stemmator* (Ichneumonidae).
Conclusion: The pertinence of our analysis is determined by the accuracy of the data provided by the authors. Some studies lacked information on the precise location of the observation or gave an incomplete description of the local ecology. In addition, some reviews did not cite previously published work, raising questions about the value of these reviews or of the uncited studies.