Section III: Root-feeding maggots, soil arthropods & other problems

FORECASTING REGIONAL ACTIVITY OF SUGARBEET ROOT MAGGOT

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Introduction

We reported at last year's PNW Insect Management Conference that our phenological model (J. Econ. Entomol. 83: 2078-2085) had merit for predicting the seasonal occurrence of adult sugarbeet root maggot (SBRM) but that further regional validation would be required before the model could be used with confidence. Here we report on studies conducted during 1991 at 120 commercial sugarbeet fields within an 11-county area of Idaho and adjoining Oregon.

Methods

Dates of peak seasonal capture of sugarbeet root maggot flies on Blickenstaff-Peckenpaugh sticky-stake traps were compared with peak capture dates predicted by the model

$$\text{date of peak capture} = 200\ DD_{8.6\,^{\circ}C} + d_{>26.7\,^{\circ}C}$$

Here the predicted date of peak SBRM fly capture is the first day that air temperature exceeds 26.7 °C (80 °F) following 200 degree-days above 8.6 °C since 1 March. The 200 degree-day accumulation accounts for post-diapause development of overwintering larvae; the 26.7 °C temperature is a "flight threshold" that accounts for suppressed fly captures at cooler temperatures.

The date of peak fly capture is important because it identifies a 20-day management window from 10 days before peak through 10 days after peak during which granular, soil-applied insecticides can be used as rescue treatments to prevent subsequent larval feeding on the taproot. Predicted dates of peak capture were made by tracking daily maximum and minimum air temperatures at the regional weather station nearest each field.

Results & Discussion

Mean absolute prediction error during 1991 was 7.7 days (± 0.5 days); the range in prediction errors was 1 to 28 days. Given the 20-day management window around peak fly capture, sugarbeet growers can tolerate prediction errors of ± 10 days. Errors at 79% of the fields fell within this acceptable limit of ≤ 10 days. However, the model seems to be systematically biased toward early predictions; 81% of predicted peak capture dates were earlier than the actual peak capture dates. Unacceptably early or late forecasts (i.e., > 10 days early or > 10 days late) were 17 and 4% of prediction errors, respectively.

Possible reasons for systematic negative biases in model predictions might involve our assumptions about the date of diapause termination in overwintering larvae, temperature

thresholds for adult flight activity, the appropriateness of using minimum:maximum air temperatures to track post-diapause larval development within the soil, and physiographic factors (particularly field-to-station elevational differences).

None-the-less, the model did provide acceptable accuracy at 4 of 5 fields tested and so can be a useful tool for the sugarbeet industry. We plan to deliver regional forecasts of SBRM flight activity during the 1992 growing season via IDEX, the Idaho Extension public-access electronic bulletin board system. Anyone equipped with a PC, modem and communications software can access IDEX 24-hours a day for the cost of a telephone call at 208/885-5911 with modem settings of 300/1200/2400 baud, even parity, 7 data bits, 1 stop bit and full duplex. "Real time" daily maximum-minimum air temperatures from Idaho's statewide network of weather recording stations are delivered to IDEX via satellite download from the NOAA Weather Wire.

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