

Japanese Beetle Flight Activity

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Objectives

We marked Japanese beetles with a fluorescent dust, released them, then recaptured marked beetles in Japanese beetle traps to determine: (1) the daily flight distance and dispersal of the beetles and (2) trap efficiency in collecting beetles from a given area.

Rationale

Japanese beetles are severe pests of crops, ornamentals, and turfgrass. Traps baited with pheromone and floral lure are often used to monitor beetle emergence and population abundance. However, relatively little is known about daily beetle dispersal, flight distance, and trap efficiency in collecting beetles from a given area. During summer 2002, a mark-release-recapture study was conducted to address these questions.

How It Was Done

Adult Japanese beetles were collected (using Japanese beetle traps) and held overnight in a cold room. The following morning, the beetles were marked with fluorescent dust and released at distances ranging from 75 to 800m from Japanese beetle traps baited with floral lure. Approximately 8,500 beetles were released at each release site. Traps were emptied every half-hour or hour following release. The collected beetles were immediately frozen. Later, in the lab, the trap catches were screened for marked beetles. The experiment was conducted on nine dates and in four distinct landscapes (patchwork corn/soybean, soybean only, turfgrass, and parking lot). Correlation analysis was performed to relate the rate of marked beetle capture to the distance to release sites, elapsed time since release, wind speed, and angular deviation of the wind from blowing the floral lure directly to the release sites.

Results

The distance to the release site was negatively correlated with rate of marked beetle capture (Table 1). However, elapsed time since release, wind speed, and angular wind deviation were not (Table 1). Released beetles dispersed in all directions and were found in traps both up-wind and down-wind of the release sites (it was expected that more beetles would be caught from release sites downwind of the trap) (Figure 1). The beetles were very mobile, traveling up to 700m within five hours. Most of the marked beetles, however, were collected from release sites within 120m of the trap. Although, a few beetles were consistently recaptured from release sites 300 – 500m away from the trap. Beetles released within 120m of the traps were consistently found in the traps in less than one hour after release. In all cases, less than 1% of the marked beetles were recaptured.

Conclusions

- Japanese beetles are highly mobile, traveling up to 700m within a few hours
- Beetles could potentially migrate long distances (>0.5km) from feeding and egg laying sites to areas of interest
- Trapping only removes a small proportion of the beetles in an area.
- The beetles dispersed in all directions, regardless of the wind direction

Table 1. Correlation coefficients (r) for the relationship between rate of marked beetle capture (beetles/hr) and other factors for all sites and days. Characteristic recapture data showing the number of beetles recaptured from release sites located at varying distances away from the trap. The landscape for this particular dataset was a corn / soybean mosaic. Beetles were released on July 15, 2002.

| | Release Distance | Elapsed time since Release | Wind Speed | Wind Angle Deviation |
|------------|-------------------|----------------------------|------------|----------------------|
| r | -0.41 | -0.11 | -0.06 | 0.05 |
| P -value | <0.0001 | 0.052 | 0.304 | 0.374 |