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Page: 750.50
Date: 2-1983

onion maggot

Hy/emya ***antiqua*** (Meigen)

INTRODUCTION

The onion maggot is a serious pest of onions in the northern United States and Canada. It attacks only crops in the onion family although it is not capable of maintaining high populations on wild relatives of onions. There are three broods (generations) per year of onion maggot in the northeastern United States and Canada.

ADULTS

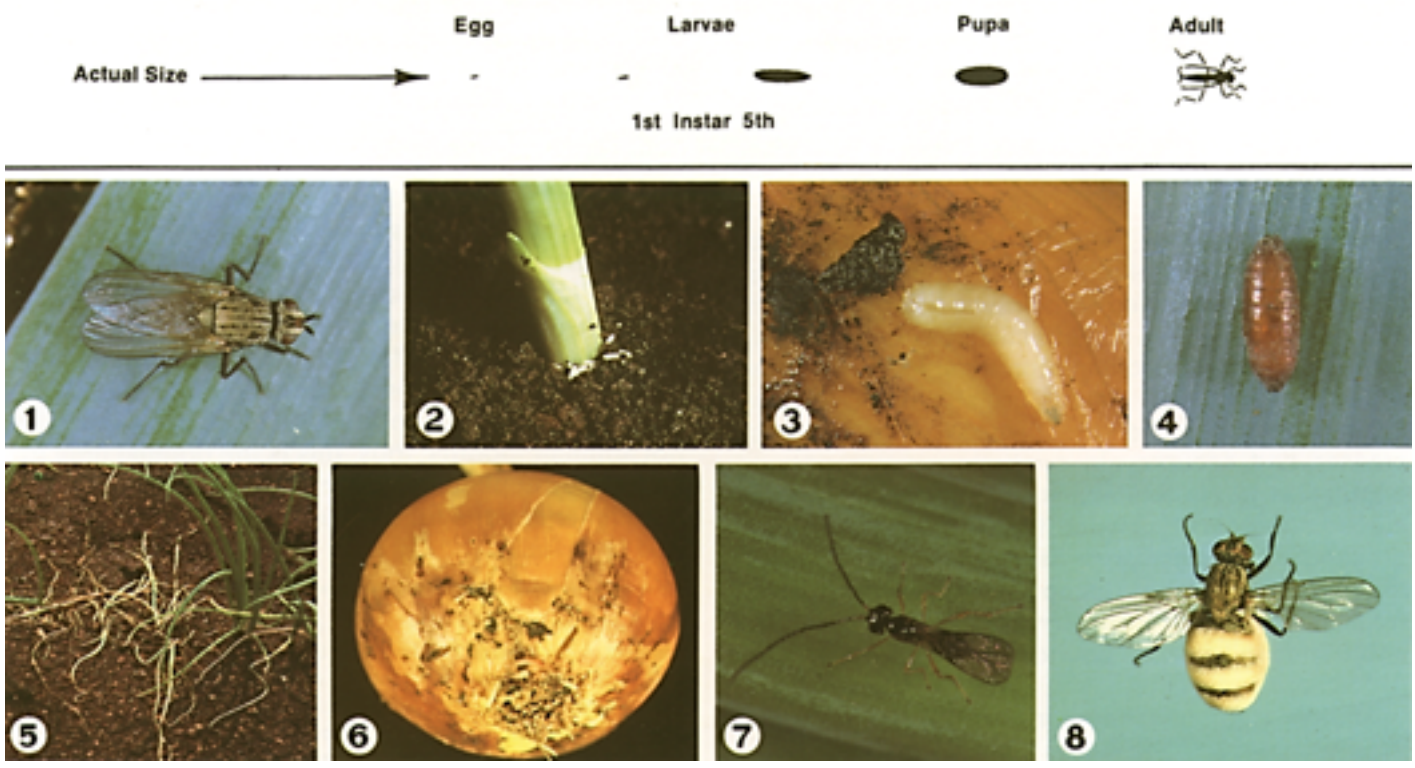
Onion flies (Fig. 1) are slightly smaller than houseflies They have longer legs, are more slender, and overlap their wings when at rest.

The genus ***Hylemya*** contains other similarly appearing root or seed maggot flies. One is the seed corn maggot fly, ***Hy/emya platura,*** which appears on the muck soils prior to the emergence of onion flies. The greyish-brown seed corn fly appears almost identical to the onion fly except that it is approximately 1/2 the size of the latter .13 inch-3 mm). The seed corn maggot is not a serious pest of healthy onions but can feed on previously damaged bulbs. Another similar root maggot fly is the cabbage maggot, ***Hy/emya brassicae.*** The adults are not found near onion fields unless cruciferous hosts are growing nearby. Cabbage maggot flies have smokey-grey wings, black legs, and dark grey bodies with three black stripes on their back. **They** are slightly smaller than onion maggot flies.

Thespring broodofonionfliesemergesfrom pupae (resting stage), which overwinter in the soil until mid-May. Peak flights occur about 2 weeks later in the northeast. Females begin laying eggs approximately 7-10 days after emergence. Onion flies can survive for 2-4 weeks and may lay several hundred eggs. The number of eggs laid is correlated to the amount of food (such as wild flowers) available to the adults. The second or summer brood begins emerging in early July with peaks in mid to late July. Emergence of the final or fall flight begins in late August, peaks in early to mid-September, and may continue into October.

EGGS

The onion fly deposits white elongated eggs (Fig. 2) about 1/25 inch (I .25mm) in length on the soil near the stem and occasionallyon **the** young leaves and neck of the onion plant. Eggs hatch into maggots 2-3 days after being laid.



LARVAE

The legless maggots are tapered, creamy-white in color, and reach a length of about 1/3 inch (8mm) (Fig. 3). Maggots develop through three larval stages in 2 to 4 weeks depending on the temperature. Most newly hatched larvae crawl below the soil surface and feed upon the roots or burrow into the basal plate of the bulbs. Some maggot larvae may enter into the sides of bulbs rather than through the basal plate, after undercutting has occurred. Any injury site on the bulb facilitates the maggot's entry.

PUPAE

When full-sized, the maggot leaves the bulb and enters the soil to pupate at a depth of 1-4 inches (5-10 cm). The pupa is chestnut brown and 1/3 inch (7mm) long (Fig. 4). First and second generation pupae remain in the soil for 2-4 weeks before adult emergence. Larvae of the third (fall) generation develop into pupae and pass the winter in that stage. Flies emerging the following spring constitute the spring flight.

DAMAGE

Only the larva causes damage by using its hooked mouth parts to enter the base of the plant. Damaged seedlings first wilt, eventually become flaccid, and die (Fig. 5). Frequently, attacked seedlings die before the maggots are fully grown, forcing them to move to adjacent plants. Second generation maggot feeding on developing bulbs usually results in distorted growth accompanied by rotting tissue. Feeding by third generation maggots on late season onion bulbs results in an unmarketable product (Fig. 6). Egg laying may occur after onions are undercut, windrowed, and left to dry in the field. Hatching maggots can then bore into the onion at any point. Feeding and burrowing by the maggot fnay also introduce and spread fungal and bacterial pathogens. Since the majority of commercial onions are stored, infected and rotting onions present a potential for reducing quality of adjacent onions in storage.

MONITORING

There are various methods that can be used to assess onion fly populations. An inverted screen cone trap on wire legs baited with onions has been a commonly used fly trap. It's effectiveness is greatest in early season for detecting population levels of spring brood flies when the onions are still small. As crop growth continues, the attractiveness of the traps decreases and accuracy in predicting summer brood population levels is diminished. Yellow sticky traps placed strategically around the fields just above the growing foliage can also be used to monitor fly populations. Maintenance of the cone or sticky traps, twice weekly, should aid in determining relative densities and trends in seasonal abundance of the onion maggot.

Another method for monitoring onion maggot adults involves observing the flies in the field. In the summer, the flies are usually present on onions in early morning and late afternoon and are difficult to find throughout the heat of the day. Flies are more active during the mid-day in spring and fall and on cloudy cool summer days. Onions damaged by sprayer wheels, cultivation, onion maggot larvae, or smut are more attractive to onion maggot adults and should be preferentially observed for fly activity.

Data collected from field observations may be erratic, depending on the time of day the field is sampled. Thus, it is suggested that trapping and visual observations be combined for most accurate assessment of onion fly presence and abundance.

CONTROL

Onion growers can reduce onion fly populations by cultural and chemical control measures, and by using procedures that enhance natural biological controls. There are a variety of natural enemies in onion fields that collectively help reduce populations of onion maggot larvae and adults. Certain predatory beetles eat both onion maggot eggs and larvae. Predatory flies and birds consume the onion fly. Parasitic wasps (Fig. 7) can be found early in the season attacking first generation maggots. When environmental conditions are cool and moist in the spring and fall, a parasitic fungus ***Entomopthora muscae*** can infect large numbers of adults (Fig. 8). The potential of these naturally-occurring control organisms may be optimized by minimizing and properly timing insecticide and fungicide applications which suppress onion fly and foliar diseases.

There is strong evidence that rotating onions with unrelated crops can reduce fly populations. Removing cull onions from the field at postharvest and fall plowing, will aid in reducing the number of overwintering flies. Removing volunteer onions in the spring, minimizing herbicide and cultivation damage to onion plants, and destroying weeds on ditch banks that run through the field may also aid in suppressing onion fly populations within specific areas.

Insecticides applied in-furrow at the time of planting protect onion seedlings from first brood maggots and may also protect **onions** from second generation onion flies. A few well timed foliar insecticide applications applied later in the season during peak second and third brood emergence, when the in-furrow insecticides are no longer effective, may be helpful in suppressing the populations of onion flies. Fly activity is greatest in early morning and late afternoon during the hot months, thus, this is the optimal time for insecticide applications. Consult your local extension recommendations for the most effective insecticides and rates.

Published by the New York State Agricultural Experiment Station, Geneva, A Division of the New York State College of Agriculture and Life Sciences, A Statutory College of the State University, Cornell University, Ithaca. Authored by J. T. Andaloro, Integrated Pest Management, Geneva, and C. J. Eckenrode, Department of Entomology, Geneva. Funded in part by an Extension Service—USDA, IPM Grant.