NOTE

Phenology and Parasitism of *Phytomyza ilicicola* (Diptera: Agromyzidae) in Georgia[1]

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Phytomyza iliciola Loew, the native holly leafminer, a specialist agromyzid, is a serious pest of American holly, *Ilex opaca* Aiton (Aquifoliaceae). Native holly leafminers are distributed from Massachusetts and New York south to Florida (Johnson and Lyon 1988, Insects that Feed on Trees and Shrubs, second edition, Cornell University Press). Injury to the host tree occurs by the mining activity of the larvae and from the feeding and oviposition scars left by the adult female. One generation occurs each year.

Potter (1985, Oecologia 66: 499-505) determined that both parasitism and intraspecific competition were important sources of mortality for this highly aggregated pest on cultivated American holly. Number and relative abundance of parasitoid species varied within the reported range of the native holly leafminer (Kulp 1962, MS Thesis University of Maryland, 1968, University Md. Agric. Exp. Stn. Bull. A-155; Stegmaier 1971, Fla. Entomol. 54: 187-188; Kahn and Cornell 1983, Amer. Natural. 122: 428-432, Kahn and Cornell 1989, Ecology 70: 1219-1226; Potter 1985, Oecologia 66: 499-505; Potter and Gordon 1985, J. Kansas Entomol. Soc. 58: 727-730). As many as five parasitoid species (Kahn and Cornell 1989, Delaware) and as few as two (Potter and Gordon 1985, Kentucky) have been reared from *P. ilicicola* pupae. Here we extend the range of existing information by reporting the timing of emergence of native holly leafminer in the Southern region, degree of parasitism, and occurrence of seven species of parasitoids in Georgia.

One hundred infested leaves were collected in Spalding County, GA, from each of four American holly trees on 29 March, 4 April, 14 April, and 24 April, 1989. Mines were characterized at the time of collection as either emerged or unemerged. When leafminer adults emerge from a mine a characteristic D-shaped emergence hole is visible, often with the flap of leaf tissue remaining (Potter and Gordon 1985). Parasitoid emergence is indicated by a round emergence hole through the leaf tissue and the presence of distinctive meconia. Unemerged pupae within leaves were placed in plastic cups in an environmental chamber (24 ± 1°C) and

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held for emergence. Proportion emerged on the date of collection relative to the total number of insects in the sample was calculated for both leafminers and parasitoids.

During 1990, 100 mined leaves were tagged to permit weekly observation of leafminer development and parasitoid emergence from 4 February - 25 April without removal of leaves. Presence of pupae could be distinguished within the mine through the undisturbed mine wall. The same procedure was followed during 1991 except that mined leaves were observed weekly from 29 January - 17 June.

Native holly leafminer adult emergence occurred primarily during the last week of March and first week of April during all three years of study (Figs. 1-3). Greater than 50% of the leafminers pupated between 4 and 13 February 1990. Greater than 70% had pupated by 27 February 1991.

Seven species of hymenopterous parasitoids representing three families were reared from native holly leafminers collected in this study. *Opius striativentris* Gahan (Braconidae); *Pediobius albipes* (Provancher) (Eulophidae), *Clostocerus tricinctus* (Ashmead) (Eulophidae), *Horismenus* sp. (Eulophidae), *Chrysocharis* sp. (Eulophidae); and two unidentified genera of Pteromalidae were observed. *Horismenus* sp. has not to our knowledge been reported from *P. ilicicola*.

The pteromalid *Sphegigaster* sp. and *O. striativentris* (Braconidae) were the only parasitoid species found attacking *P. ilicicola* in Kentucky (Potter and Gordon 1985). The eulophids *P. albipes, C. tricinctus, Chrysocharis paradoxa* (Hansson), and *Pnigalio proximus* (Ashmead), and the braconid *O. striativentris* emerged from native holly leafminer pupae in Delaware (Kahn and Cornell 1989). *Pediobius albipes* and *C. tricinctus* were facultative hyperparasitoids. Kulp (1968) reported *O. striativentris,* the eulophids, *C. tricinctus, Pnigalio gutliventris* (Gir.), and *Pediobius amyntas*, and a pteromalid, *Halticoptera* sp., in Maryland.

Leafminers were heavily parasitized. Total parasitized leafminers during 1989, 1990, and 1991 were 74, 85, and 82% respectively expressed as the proportion of total mines from which parasitoids emerged. *Opius striativentris* emerged from 75% of the parasitized mines during 1989. This species, which parasitizes first instar leafminers, has been reported as the predominant parasitoid in Virginia (Underhill 1943, Va. Agric. Exp. Stn. Bull. 349: 27-38), Maryland (Kulp 1968), Kentucky (Potter and Gordon 1985) and Delaware (Kahn and Cornell 1989) and is known only from this host.

Opius striativentris emerged in close temporal synchrony with its host during 1989 (Fig. 1). *Opius striativentris* attacks newly hatched *P. ilicicola* larvae. The remaining generalist parasitoids that attack pupal leafminers or behave as facultative hyperparasitoids reach peak emergence approximately one month later. Although parasitism does not reduce the area mined and resultant aesthetic damage caused by *P. ilicicola* (Potter and Gordon 1985), the high levels of parasitism by *O. striativentris* and additional species suggest their importance in reducing pest population levels.

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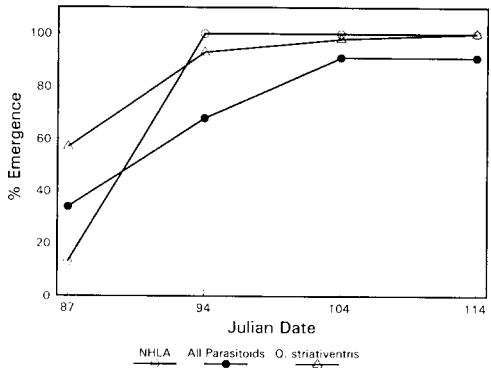

Fig. 1. Emergence of native holly leafminer adults (NHLA) and parasitoids during 1989.

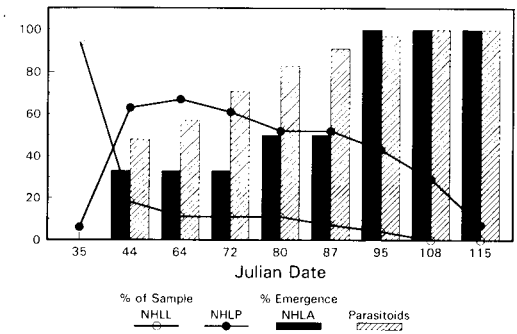

Fig. 2. Occurrence of native holly leafminer larvae and pupae (NHLL and NHLP) and cumulative emergence of leafminer adults (NHLA) and parasitoids during 1990.

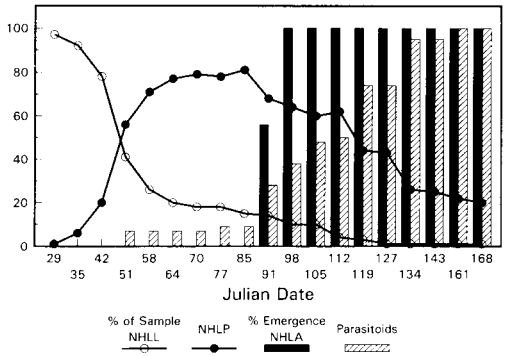

Fig. 3. Occurrence of native holly leafminer larvae and pupae (NHLL and NHLP) and cumulative emergence of leafminer adults (NHLA) and parasitoids during 1991.