Temporal partitioning of daily activities has been posited as a means of decreasing interspecific competition or avoiding predation. The ecological significance of temporal partitioning, particularly in mammals, was recently summarized by Kronfeld-Schor and Dayan (2003). Behavioral studies of daily activity times can be critical for understanding migration, feeding, and reproduction. Studies on insect daily temporal differences in activity include dung colonizing beetles (Caveney et al., 1995), territorial defense in male Epitheca dragonflies (Paulson, 1973), calling regimes of cicadas (Gogala and Riede, 1995; Reide and Kroker, 1995), and overlap in daily activity of two aphid predator guilds (Losey and Denno, 1999). The daily changes in light intensity that occur at dawn and dusk can serve as cues that trigger activities ranging from local movements to long-distance migrations. Factors influencing these migrations in some delphacid planthoppers, may include light intensity, temperature, lack of wind, and the lunar cycle (Jeffrey and Dyck, 1983; Kisimoto and Rosenberg, 1994).

The North American flatid planthopper Metcalfa pruinosa (Say) (Hemiptera: Flatidae), which has spread throughout much of southern Europe since its introduction some thirty years ago, has been the focus of a number of morphological, ecological, and behavioral studies (Alma, 2000; Wilson and Lucchi, 2000, 2001; Lucchi and Mazzoni, 2004). In Europe, this insect can reach high densities on a variety of economically important woody plants. These planthoppers feed by sucking phloem sap and produce copious amounts of honeydew because they lack a filter chamber and have a midgut cellular membrane which prevents the efficient uptake of sugars (Lucchi et al., 1999). Honeybees (Apis mellifera L.) (Hymenoptera: Apidae) collect honeydew produced by M. pruinosa and utilize it to manufacture honey (Lucchi, 1997). This honey is harvested by apiarists in Italy and southern France and marketed as “Meile di Melata di Metcalfa” (=Metcalfa honey) (Lucchi, 2000). Field observations indicate that honeybees collect most of the honeydew in the early morning and at sunset (Barbattini et al., 1997). This restriction of honeybee activity to these times is likely due to the relative availability of honeydew and the fact that honeydew dries quickly during the heat of the day.

In the present study we detailed the feeding activity schedules of fifth instar nymphs and adults of M. pruinosa by measuring honeydew production.

Materials and Methods

Experiments were conducted under ambient conditions on Japanese pittosporum shrubs (Pittosporum tobira (Thunb.) W. T. Aiton) (Pittosporaceae) in Marina di Carrara, Italy. Ten Metcalfa pruinosa fifth instar nymphs or ten adults, collected from pittosporum plants in the vicinity, were placed in 10 cylindrical cages each running through a twig of pittosporum (Fig. 1). The experiment was conducted over 5 consecutive days, from 7 to 11 July 2001, for nymphs in their 10 cages and 6 consecutive days, from 13 to 18 August 2001, for adults in their ten cages. Each cage was constructed of a plastic cylinder (80 mm. high, 60 mm. diam.) with a plastic screw cap on the bottom and a 155 mm. cylinder of fine netting glued to the top of the cage. The netting was slipped over a ca. 100 mm. length of pittosporum twig, from which the leaves had been removed, and tied tightly around the twig at ca. 100 mm. from the top of the plastic portion of the cage. A 60 mm. diam. construction paper disc was placed in the bottom of each cage and left for 8 hours. At the end of 8 hours the disc was removed and the number of ca. 1 mm. diam. honeydew droplets was counted (Fig. 2). The aggregate of the honeydew droplet counts was calculated for each filter