

practically defined as the point at which the accumulation curve shows an adequate decrease in species accrual. The principal problems with this “sufficient-sampling” definition are the lack of a single asymptote for diverse taxa and the difficulty in quantifying “an adequate decrease in species accrual.” One practical solution to the latter problem is to sample until a certain percentage—say 80%—of the estimated species are obtained, based on ICE and jackknife estimates of the total number of species that occur in the plot or transect. An alternative approach is to continue to sample until additional sampling effort is predicted to achieve a negligible increase in the number of species sampled. In this approach, the increase in species obtained with additional sampling must be weighed against both the cost of sorting and identifying additional specimens and the relative importance of identifying the full complement of the species at the site. Under either approach, species-accumulation curves can be calculated by randomizing sample accumulation order and using asymptotic or nonasymptotic functions (Colwell and Coddington 1994), and the predicted species richness values can be extrapolated using the ICE, jackknife, and M-M estimation techniques.

Sampling Methods Experiment

The 17 sampling methods yielded a total of 134 ant species. In the total of 918 samples (17 methods \times 54 samples per method), most of these ground-dwelling ant species are extremely rare, with 43 species collected only once, 18 species collected twice, and 34 species collected in up to 10 samples; only 39 species occurred in 11 or more samples.

The number of species sampled by the 17 different methods is shown in Table 10.1. Winkler extraction sampled the greatest number of species (63), followed by Berlese funnels (48), inspection of dead wood (45), small soil samples (42), and pitfall traps. Pitfall traps run for 7

Table 10.1 Actual Number of Ant Species Sampled by the 17 Methods Described in the Text

Sampling Method	Number of Species	Rank ^a
Winkler extraction samples	63	1
Berlese funnel samples	48	2
Dead wood inspection	45	3
Small soil samples	42	4
Pitfall traps (7-day)	40	5
Pitfall traps (24-hour)	27	6
Large soil samples	26	7
Sardine bait (24-hour)	20	8.5
Orange peel bait (24-hour)	20	8.5
Sardine bait (4-hour)	19	10.5
Orange peel bait (4-hour)	19	10.5
Sugar bait (4-hour)	18	12
Dried cocoa pod inspection	17	13
Cassava flour bait (4-hour)	16	14
Meat bait (24-hour)	15	15
Cassava flour bait (24-hour)	14	16
Sugar bait (24-hour)	11	17

^aMethods are ranked from 1 (most species sampled) through 17 (fewest species sampled).

days yielded more ant species than those run for 24 hours (40 versus 27 species). Large soil samples yielded only 26 species and dead cocoa pods only 17 species, while the species counts from the baiting methods never exceeded 20. Baiting for longer periods of time did not necessarily yield more species; indeed, with the cassava and the sugar baits, a lower number of species was obtained after the longest baiting period.

The species-accumulation curve plots are shown for the individual methods in Figs. 10.1a–q, and for all methods combined in Fig. 10.1r. These graphs also show jackknife and ICE estimators of species richness based on successively larger numbers of samples. The agreement between the predicted M-M asymptotic values and the actual maximum value encountered in the 54 samples is shown in Table 10.2. This table