Birch Aphids

Betulaphis brevipilosa Börner
Callipterinella calliptera (Hartig)
Euceraphis betulae (Koch)
Hemiptera: Drepanosiphidae

Hajek, A. E.; Dahlsten, D. L. 1988. Distribution and dynamics of aphid (Homoptera: Drepanosiphidae) populations on *Betula pendula* in northern California. Hilgardia 56: 1-33.

Objective: To develop a collective aesthetic injury level for the aphids *B. brevipilosa, C. calliptera*, and *E. betulae* on European white birch, *Betula pendula*, in northern California.

Abstract: The aphids *Betulaphis brevipilosa* Börner, *Callipterinella calliptera* (Hartig), and *Euceraphis betulae* (Koch) feed on European white birch, *Betula pendula* Roth., which is often planted as an ornamental tree in North America. Large populations of these aphids produce copious amounts of honeydew that supports the growth of sooty mold, and attacked leaves may senesce prematurely. Homeowners who find the honeydew and mold unsightly may use chemical applications as preventive treatments to avoid this problem.

A collective aesthetic injury level was calculated for these aphids on *B. pendula* within the urban landscape in northern California. The authors estimated that 40 aphids per 100 cm of branch terminal or 88 aphids per 100 leaves warranted control measures if homeowners considered feeding damage by the aphids to be unsightly. Sample sizes necessary to estimate population density were determined using the coefficients of Taylor's Power Law. Sampling effort depends on aphid density and the desired level of reliability in estimating aphid density. Overall, the aggregated distribution of these aphids requires large numbers of samples from each tree even if only a low level of reliability is desired. Higher aphid densities require smaller sample sizes and less time is spent sampling each tree, thus sampling cost is also lower than if aphid densities were low. Sampling in the spring, when aphid populations were high, took <2 minutes per branch while sampling in the summer, after populations fell, required <1.5 minutes per branch. Few aphids were found in the upper third of the canopy, therefore sampling effort should concentrate on the lower two-thirds of the tree.

Sampling Procedure: The sampling unit consists of all the leaves found on a new long terminal shoot, plus the leaves on any short shoots occurring along the previous year's twig growth of a length equal to the terminal shoot. Examine leaves and shoots closely for immature and adult aphids. Record the number of aphids found on leaves and on the branch separately. Average the number of aphids per 100 cm branch terminal or per 100 leaves. If feeding damage, honeydew production, or sooty mold accumulation is undesirable, consider insecticide treatment when aphid populations reach 40 aphids per 100 cm of branch terminal or 88 aphids per 100 leaves.

To estimate aphid densities on groups of trees, randomly sample 5 branches per tree throughout the lower two-thirds of the canopy when aphid populations are low (approximately 5 aphids per 100 leaves) and 3 branches per tree when aphid populations are high (approximately 40 aphids per 100 leaves). Refer to Fig. 1 for the number of trees to sample to estimate aphid populations at either low or high aphid densities using a 70% confidence limit. Sampling costs in person-hours are illustrated in Fig. 2 for both low and high aphid densities with a 70% confidence limit.

Use Table 5 to determine the total number of branch samples necessary to estimate aphid densities on individual trees. For example, 174 branch terminals should be taken from each tree to estimate aphid density when aphids are estimated to be 10 per 100 cm branch length and 30% reliability is desired (Table 5).

Note: These recommendations are based on data collected in northern California and may not apply to other aphid species on different host birch species in other regions. Use these recommendations with caution until validated in other locations.

Figures and Table

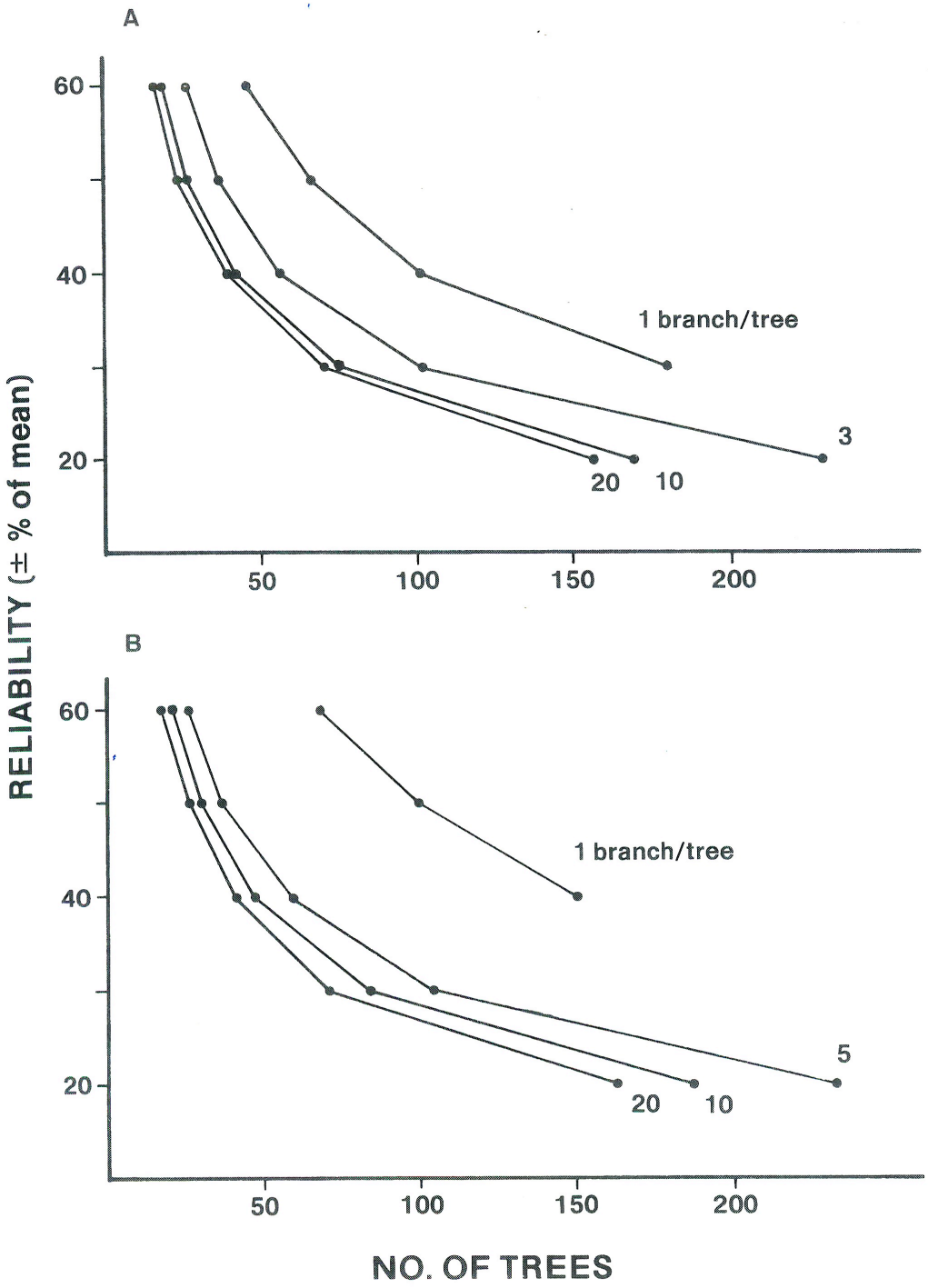

Fig. 1. Numbers of trees to sample for estimation of aphid populations on *Betula pendula* with varying levels of reliability and numbers of branches per tree (70 percent confidence limits). (*A*) 40 aphids/100 leaves; (*B*) 5 aphids/100 leaves.

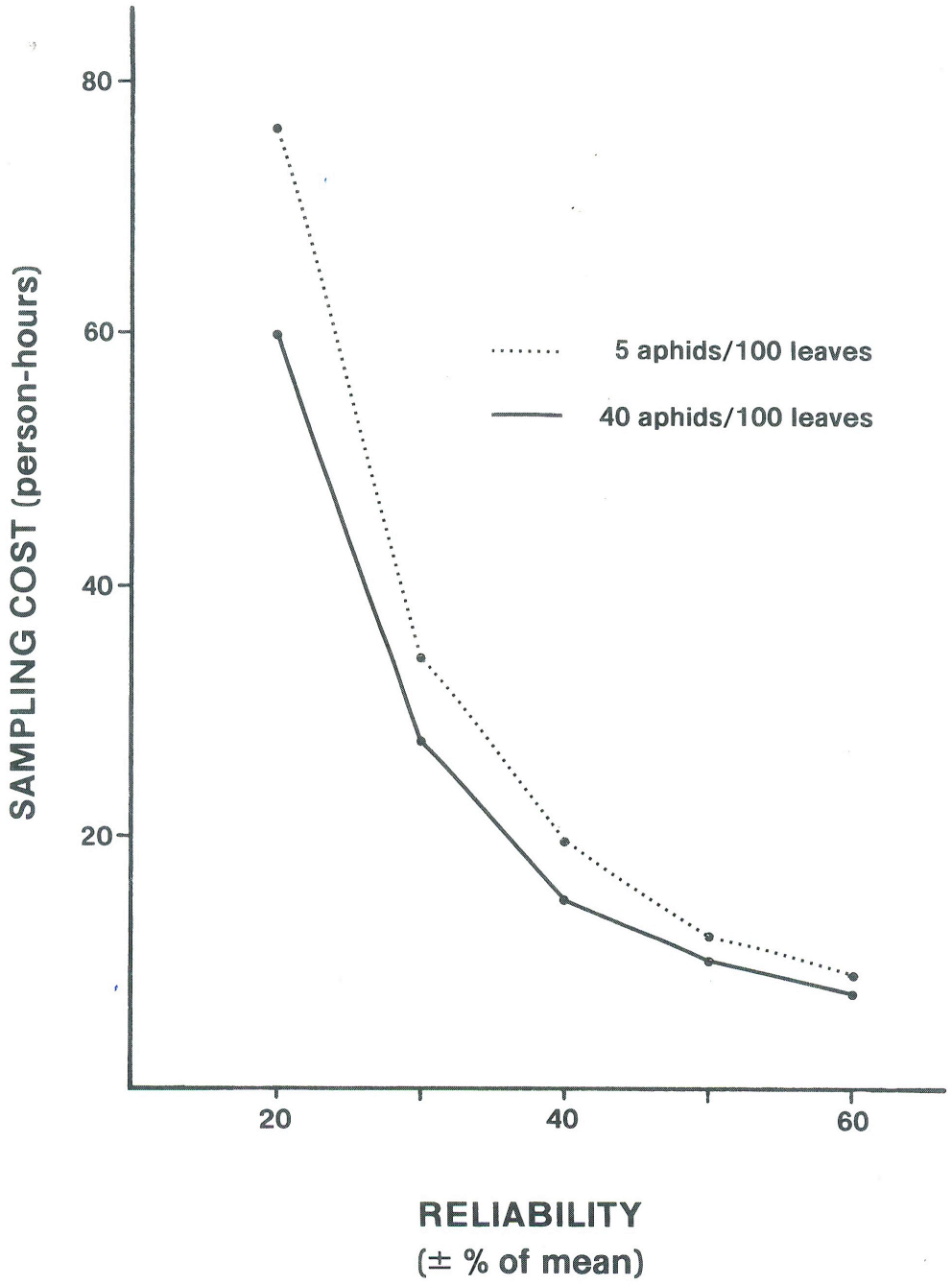

Fig. 2. Sampling costs (in person-hours) to optimally estimate aphid population densities on Betula pendula for varying levels of reliability (70 percent confidence limits).

Table 5. Sample size in number of branches for estimation of aphid populations on individual *Betula pendula* trees at varying levels of reliability and aphid population densities.

Mean aphid density	Reliability with 70% confidence intervals (± % of the mean)				
	20%	30%	40%	50%	60%
(/100 *cm*)	(*numbers of branches)*				
10	391	174	98	63	43
20	320	142	80	51	36
30	285	126	71	46	32
40	262	116	65	42	29
50	245	109	61	40	27