CONSEQUENCES OF ELIMINATING AERIAL ACCESS SAMPLES FROM SURVEYS OF FOREST DEFOLIATORS IN COASTAL BRITISH COLUMBIA

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RÉSUMÉ

Les populations larvaires des insectes défoliateurs en Colombie Britannique sont évaluées au moins une fois chaque année par battage des arbres dans un réseau de stations d'échantillonnage permanent. Les donnees ainsi recueillies sont complétées au moyen d'autres échantillons selectionnés au hasard. La plupart des lieux d'échantillonnage sont atteints par voie terrestre, mais l'avion est employé pour atteindre quelques aires non pourvues de routes.

Recemment, pour raison d'économie, de grands blocs de stations d'échantillonnage permanent accessibles par avion ont été abandonnés. Pour vérifier comment cela affectait les estimations des chiffres de population globale, les releves antérieurs déterminés avec ou sans échantillons aériens et avec et sans échantillons aléatoires ont été comparés. La côte septentrionale de la terre ferme et la côte occidentale de l'Ile de Vancouver ont été choisies comme sites d'expérience. Dans la plupart des cas, les populations d'insectes défoliateurs mesurées dans les stations d'échantillonnage permanent accessibles par air et par terre et au moyen d'échantillons aléatoires montaient et baissaient ensemble, ce qui montre que l'estimation des tendances des populations ne serait pas sérieusement affectée par l'abandon d'échantillons aériens et aléatoires.

ABSTRACT

Larval populations of forest defoliators in British Columbia are assessed at least once each year by beating trees at scattered permanent sampling stations. These data are supplemented by additional, randomly selected samples. Most stations are reached by road, but aircraft are used to reach some roadless areas.

Recently, to economize, large blocks of aircraft access permanent sampling stations were dropped. To learn how this affected the estimates of overall population numbers, we compared past records determined with and without aerial samples and with and without random samples. The northern mainland coast and the west coast of Vancouver Island were selected as test sites. In most instances, defoliator populations as measured at aerial and ground access permanent sampling stations and by random samples rose and declined together, indicating that estimates of population trend would not be seriously affected by dropping aerial and random samples.

Surveillance of forest defoliators in British Columbia is carried out annually by the Forest Insect and Disease Survey (FIDS), Canadian Forestry Service. Samples are taken each spring by the three-tree beating method (Harris *et al.* 1972) at sites called "sampling stations", which are representative of large areas of similar forest types. At each station, a 2- x 3-metre sheet is spread beneath each of three trees and the branches are beaten with a 3.7-metre pole to dislodge insects. The numbers of defoliating larvae found are used to determine population trends and to predict future tree damage.

Many samples are repeated annually by FIDS field staff at locations called permanent sampling stations (P.S.S.), and additional random samples are taken during travel between P.S.S. This system began in 1949, and the numbers of samples remained fairly constant from the early 1950s until about 1975, when fiscal restraints forced a reduction. A condition for these restraints, however, was that the effectiveness of the sampling program to provide information on forest pest populations should not be impaired.

The intensity of pest surveys in B.C. is largely controlled by costs, principally relating to access, by road or air. P.S.S. reached by air are principally in areas inaccessible by road; i.e., along the seacoast or at large rivers or lakes. Random samples are usually reached

by road.

Rapidly rising costs have resulted in intensive efforts to economize, such as by reducing the numbers of samples. Those reached using aircraft, cost about $60 per sample in contrast to road access samples at about $20. Air sampling was the first considered for elimination. But would road access samples alone provide an adequate assessment of overall pest numbers in the areas currently reached by aircraft, or would the large geographic gaps in coverage created by eliminating aircraft sampling result in radically different population estimates for these unsampled areas? Also, is the contribution of the additional, less formal random samples, sufficient to warrant their inclusion in the sampling system together with P.S.S. samples?

This study was done to determine the effect of aerial access permanent sampling station samples and additional random samples on region-wide survey estimates of pest numbers and trends. Data from 1949 to 1980 from two coastal areas, once sampled annually but since 1975 only every second year, were examined to see how insect population numbers or trends based on all samples were affected by deleting large blocks of aerial and random sample data.

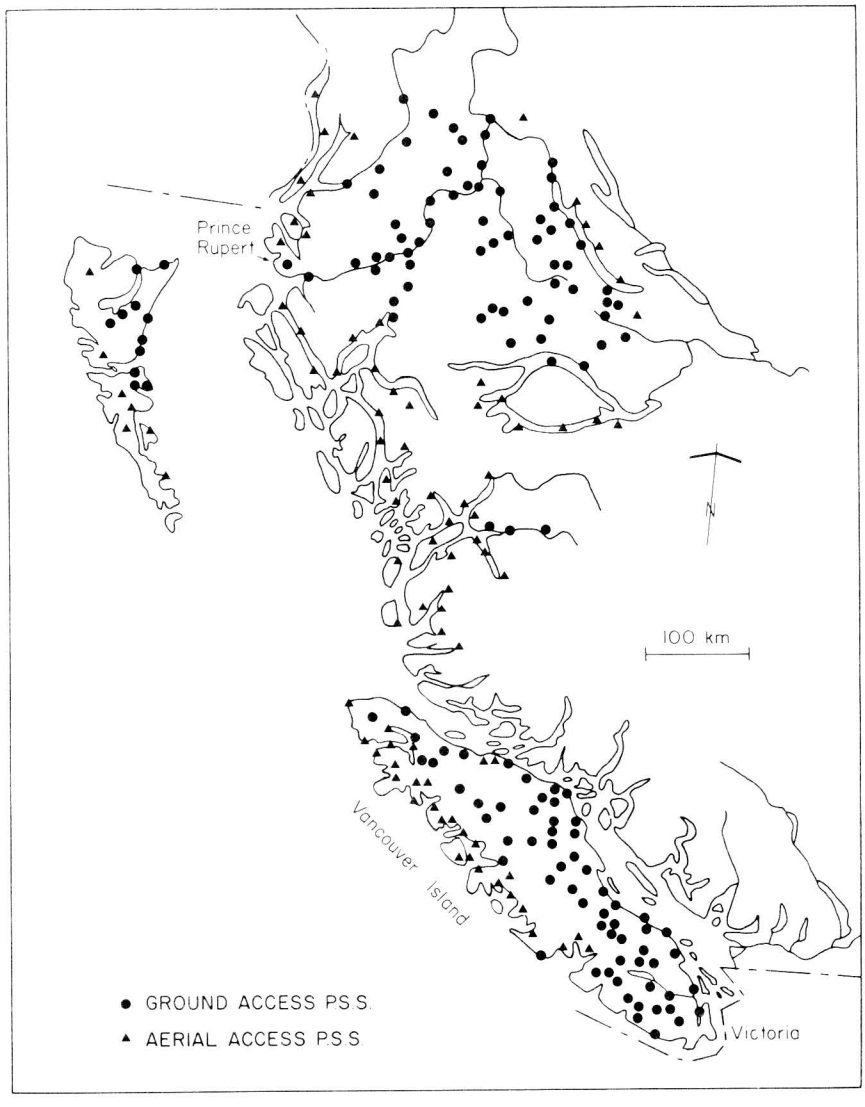

Fig. 1. Forest Insect and Disease Survey Permanent Sampling Stations (P.S.S.) on Vancouver Island and in the Prince Rupert Forest Region.

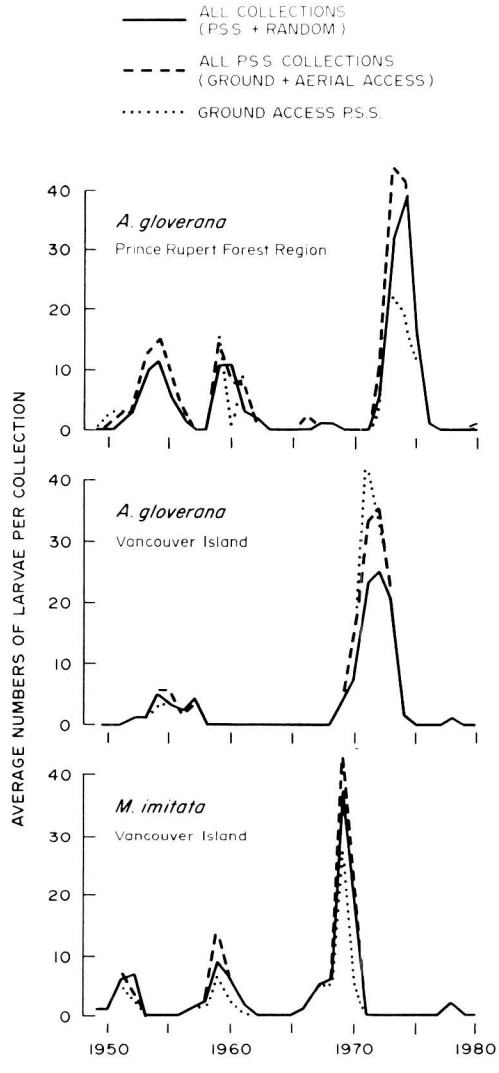

Fig. 2. Comparison of some coastal B.C. insect populations determined by three-tree beating technique.

Data on two defoliators which reached outbreak proportions in the Vancouver and Prince Rupert Forest Regions (Fig. 1) were selected: the green-striped forest looper, *Melanolophia imitata* Walker, and the western blackheaded budworm, *Acleris gloverana* (Walsingham). The average numbers of larvae per sample (Harris 1976) were graphed (Fig. 2) for the period 1949-1980 for the following categories: ground access P.S.S.; ground + aerial access P.S.S.; and all P.S.S. + random samples. The latter figure is the one normally calculated. It uses samples which completely cover the sampled area.

As shown in Fig. 2, the numbers of larvae in the three populations rose, peaked and declined in a similar manner. Apparent population trends seen from the existing pattern of ground and aerial samples were not changed when the data from aerial P.S.S. were omitted. An exception occurred in 1960 in the Prince Rupert Forest Region, where *Acleris* in ground samples dropped sharply, then rose again in 1961, whereas those in aerial access samples remained high in 1960. Two years later, all the samples showed declining populations. The reason for the drop in ground sampled populations in 1960 is not known but it may be because samples were taken later in the season than normal.

This study also confirmed that quantitative data on population trends were not greatly improved by taking the additional random samples included in the normal sampling program.

In any case, serious problems will still be detected by means of annual aerial observation surveys. In these, aerial observers locate and map tree damage from the air, but do not land. These missions, which are in addition to the previously discussed sampling surveys, provide an opportunity to observe and record problems and to schedule detailed ground surveys where needed.

REFERENCES

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BRACHYCOLUS ASPARAGI MORDVILKO, A NEW APHID PEST DAMAGING ASPARAGUS IN BRITISH COLUMBIA

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ABSTRACT

The aphid *Brachycolus asparagi* Mordvilko was identified from asparagus at Summerland, B.C. in 1979. In 1980 and 1981, this aphid damaged asparagus throughout the asparagus-growing areas of the Okanagan as far north as Armstrong. Feeding by the aphid causes a severe rosetting of the ferns and weakens the plant.

In September 1979, Dr. R. D. McMullen of the Summerland Research Station sent me a vial of aphids collected from asparagus at Summerland, B.C. He stated that a witches'-broom type of growth was very common on asparagus and was closely associated with the occurrence of the aphid. I identified the aphids as *Brachycolus asparagi* Mordvilko. This was the first time this aphid had been identified from asparagus in Canada. Subsequent examination of alate aphids caught in Moericke yellow pan water traps maintained at Penticton and Summerland in 1975 and 1976 revealed that *B. asparagi* had been trapped as follows: 1 from Penticton in 1975, 2 from Penticton in 1976 and 5 from Summerland in 1976. The aphid was therefore present at both Penticton and Summerland for several years before its presence on asparagus became apparent. In 1980 and 1981 *B. asparagi* was present in damaging numbers throughout the asparagus-growing areas of the Okanagan as far north as Armstrong.

B. asparagi is native to Europe and the Mediterranean region (Plant Pest Control Division, U.S.D.A., 1970) and was first found in North America in New York in 1969 (Leonard, 1971. It was later found in New Jersey, Pennsylvania, Virginia, Delaware, Maryland, Massachusetts and North Carolina (Angalet and Stevens, 1977). The asparagus aphid was first observed throughout most of the asparagus-growing areas of the state of Washington on the west coast during the fall of 1979 (W. W. Cone, personal communication).

B. asparagi (Fig. 1) is a long, narrow, green aphid, covered with a grey mealy wax. Its antennae are very short and its cauda is moderately long and almost parallel-sided. Its cornicles are small and mammiform. This aphid can be easily separated from other aphids occurring on asparagus by its color, waxy covering, body shape and small cornicles.

B. asparagi is reported to be specific to asparagus. We reared it on common garden asparagus *(Asparagus officinalis)* and on ornamental Sprenger asparagus *(A. densiflorus* 'Sprengeri'). It would not colonize such hosts as celery, Chinese cabbage, potato, or broad-bean which we placed in cages with our laboratory colonies.