WARNING SERVICES ON APHID FLIGHTS

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Summary

The criteria used for insect warning services overseas are outlined, and the basis of an aphid warning service for New Zealand wheatgrowers is described.

INTRODUCTION

THERE HAVE BEEN many attempts to offer warning services in connection with the incidence of pests and diseases in crops. Outstanding among these has been the work done in Great Britain in forecasting the likely onset of potato blight. This service relies on a short-range warning that in the presence of blight, a combination of certain defined weather conditions for a given time will cause an epidemic sufficiently severe to threaten crops. By this means, unnecessary spraying may be avoided, and money saved.

Insect warning services have both similarities to and differences from this well-known service. They rely on an established correlation between some factor which precedes infestation and the subsequent infestation itself, and hence may be either long- or short-term. Probably the most successful such service is that associated with the growing of sugar beet in Europe, where two species of aphids spread virus in the crop with a consequent drop in yield unless spraying is carried out. The economics of this service in Britain were recently surveyed by Ribbands (1962), who stated that in the years 1957-60, beet yellows virus reduced yield by $\frac{1}{2}$ to 1 million tons each year, of an average value of £2½ million annually and 75% of the crop was sprayed once or more in all years at an average cost of £1 million per annum. In years of low aphid incidence chemical control is of doubtful economic value. A reliable warning service can confine spraying to years when an economic return from spray application is likely, and can thus be of considerable monetary value to growers.

Before such a service can operate in any region certain criteria must be met.

A basic population pattern must have been established by previous research. The comparison used in these services is one between insect numbers in different years, a warning being given each year if the population reaches danger level. Sufficient research must therefore have been carried out to establish this point. Normally, this must include the testing of the sampling method used. Without such research there is no reference point, and warnings are little more than guesses.

The sampling system used for warning purposes must be one established and tested in previous research. The sampling of insects is everywhere recognized as a highly variable procedure. For this fundamental reason, the collection of data for a warning system must follow some tested system, which in turn must be such as not to permit large operator differences.

Insects collected must be identified with certainty. When disease vectors are involved this must be to species level.

Adequate knowledge on control measures must be available for the warning system to be of practical use.

Warning information must usually be of very recent date, and adequate measures must be taken for its rapid distribution to growers.

The success of such warning services as have stood the test of time and become established overseas is a reflection of how far they have been able to meet these standards.

In New Zealand, no adequate warning service on insect incidence has so far operated for any species. The establishment of a unit at Lincoln to investigate the biology of aphids has given hope of some activity in this direction. After five years of trapping flying aphids, it is now certain that seven aphid species are of prime importance in the spread of viruses among farm crops of peas, potatoes, brassicas, and cereals. Some other species are of regular occurrence, but their role is not yet fully investigated.

The simplified situation in cereals in New Zealand, where only one species of aphid (*Rhopalosiphum padi* (L)) appears to be present, and the importance of wheat as a crop in diversified farming under today's conditions, has offered the opportunity to assist growers with an aphid warning service associated with this crop. We are able to meet the standards outlined above in broad principle, and are collecting additional information on a regional basis by trapping and net sampling in all major wheat-growing areas. The economic importance of this insect is primarily as a vector of barley yellow dwarf virus in wheat, and work initiated at Plant Diseases Division, Lincoln (Smith, *et al.*, 1963) has established the return in yield likely to be obtained from spraying to control virus spread. This information has been linked to the knowledge of aphid flights, and this year is accompanied by trapping in many districts by Dept. of Agriculture officers. Adequate information now exists on control measures, and the final results of this service should enable the grower to demonstrate that the spectacular low-cost, yield increases already shown in field trials are possible on the farm, without recourse to spraying as a regular routine whether aphids are present or not.

Table 1 indicates the basis of the warning service for wheat-growers, and shows that for the years available, heavy spring incidence of barley yellow dwarf virus has been preceded by strong flights of aphids during the month of May.

No immediate extension of this service to other crops is anticipated, since most other crops are subject to a complex of virus diseases, spread by more than one aphid species, making correlations much more complex.

TABLE 1: CEREAL APHIDS TRAPPED AT LINCOLN IN MAY
(Total on 3 Traps 1959-63)

Week	1959	1960*	1961	1962*	1963
1st	1	4	2	17	17
2nd	1	23	0	33	41
3rd	0	10	0	17	28
4th	1	3	2	17	14
5th	—	10	0	8	—

* Year of high virus incidence in spring.

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