

Nutmeg weevil.—Another species of the **Bruchus** family play sad havoc with nutmegs. Shipments have arrived at Vancouver simply riddled and pulverized, and the excavated nuts filled with castings of the insects are not very nice when ground and sold as powdered nutmeg. Such offal has been refused entry into the Province.

Sweet-potato Weevil.—Another so-called weevil, but more resembling an ant, is the sweet-potato weevil (**Cylas formicarius**). Both sweet potatoes and yams from the Orient have been condemned at Vancouver owing to being infested with this insect.

Potato-tuber Moth.—Shipments of the common Irish potato from Australia and New Zealand have been condemned for tuber-moth (**Phthorimæa operculella**).

The commercial world is just beginning to realize the tremendous waste resulting from the many insects that infest stored products, and fumigation and other methods of combating them are becoming very popular. Thousands of tons of the imported store products referred to have been fumigated at Vancouver during the last fifteen years.

MAN'S INFLUENCE ON THE NATIVE FLORA, WITH SPECIAL REFERENCE TO INSECT PESTS.

BY J. DAVIDSON, F.L.S., F.B.S.E.

For many years I have been observing man's influence in changing the local flora from the natural evergreen formation of cedar and Douglas fir to one in which deciduous trees predominate. My attention was first drawn to this about eight years ago during a botanical visit to the district between Crescent and White Rock. About that time an accidental fire had spread through a large area of evergreen forest on the bench land along the Coast where maples formed the fringe of the forest. The conifers and many of the maples succumbed to the effects, and the whole area was left a bleak waste of charred logs and burnt soil. The fire occurred when the fruits of the maples were reaching maturity, and though many trees were fatally injured at the crown of the root they were able to ripen and disperse their seeds. Being on the windward side, the seeds were freely distributed over the burnt area, and in the following season millions of maple seedlings gave promise of a change to a deciduous forest.

A similar change was found on logged-over land between Point Roberts and the Indian reserve, where maples, dogwood, and other deciduous trees form a large proportion of the second-growth forest. The change of soil by the additional humus formed by fallen leaves, and the fact that light reaches the forest floor in spring, favoured the increase of flowering plants formerly unable to exist in the darkness of the evergreen forest.

As is well known, there is a distinct relation between the flora and the fauna. Many of the new plants are food-plants of insects, which in turn provide part of the food of birds. Such areas naturally become breeding-

grounds and distributing centres for insects which may become garden or orchard pests.

In studying man's influence on the flora of the Vancouver District, one has to obtain a glimpse of the original forest formation as a basis for comparison. Unfortunately, this cannot be seen in any part of Greater Vancouver, not even in Stanley Park, which bears abundant evidences of the logger's axe. We can tell, however, that the forest was predominantly evergreen, with alder and elder, willows and crab-apple, fringing the forest on boggy lands, and where the soil was too wet for Douglas fir to encroach; and maples, cherry, and dogwood along the slopes near the Coast.

In those days it was absolutely impossible to have a tent-caterpillar plague such as we have experienced during the past few years; there were not sufficient food-plants to support it; the coniferous trees limited the distribution of deciduous species and caused the starvation of millions of seedlings which germinated in the darkness of the evergreen forest.

With the advent of the logger, open spaces in the forest provided the necessary light for the success of deciduous trees whose seeds were distributed by wind or by birds, and some of those early intruders may be found in various parts of Greater Vancouver as fairly large trees.

With the establishment and development of the City of Vancouver, and subsequently of the adjacent municipalities, the wholesale clearing of property opened up large areas for the increase of deciduous trees, notably alders and willows, whose seeds are adapted for distribution by wind. The result is to be seen to-day in most parts of Greater Vancouver—and in other Coast districts—where, on much of the "wild land" and some of the "improved land," we see young forests of food-plants for insect pests, replacing the forests which so long served as a natural protection against their invasion.

Man has thus upset the balance of nature, and if left to herself Nature will gradually restore the former order of things and evergreen trees will again become dominant, because in this locality they constitute what is termed the *climax flora*.

As a step towards the rehabilitation of the normal forest, Nature must control the abnormal growth which followed man's overthrow of natural conditions; the tent-caterpillar is but one of Nature's agents in this work, and, judging by the results of the past few years, it has proved a very effective one.

It will therefore be seen that anything done to encourage the growth of certain species of deciduous trees will also encourage the increase of tent-caterpillars; and conversely, by encouraging evergreen trees and such species of deciduous trees as are not food-plants of the tent-caterpillar, we lessen the risk of future plagues.

To directly attack the tent-caterpillar by spraying vegetation on vacant lots is contrary to nature and tends to prolong the duration of the plague; by adopting this method we protect unnatural vegetation to increase the menace every succeeding year. It is better to assist in restoring the balance

of nature by demolishing the abnormal conditions which we have created, and by destroying *only those species which are food-plants of the tent-caterpillar* we remove the cause of the outbreak and prevent its recurrence.

For the past three years I have advocated this method of combating the tent-caterpillar plague, and last year the City of Vancouver took steps to carry this method into effect by having vacant lots cleared. But the clearing has been overdone, and on that account may have to be repeated in a year or two. Instead of destroying only food-plants, every tree and shrub was cut to the ground, piled into heaps and burned, with the result that a greater area is available for the growth of food-plants than existed before the ground was cleared, and much unnecessary expenditure was incurred in cutting down trees which were not only harmless, but were actually beneficial in hindering or limiting the establishment of food-plants.

Man's influence on the flora is therefore well illustrated in Vancouver; instead of vacant lots covered with various evergreen trees, vine-maple, cascara, dogwood, and other beautiful and harmless species, we have waste ground for the reception of wind-borne seeds of alder, willow, fireweed, thistles, dandelions, and other weeds, and the prospect of a continuance of the tent-caterpillar pest until a new growth of immune trees takes possession of such areas.

It should be emphasized that all deciduous trees are not food-plants of the tent-caterpillar, and those entrusted with clearing operations should be able to distinguish the harmful species from the useful. This can be done as easily in winter as in summer, and arrangements should be made to give the men sufficient instruction in the identification of trees as would enable the work to be done more effectively and more economically.

Last summer on a small area comprising almost one-quarter of a block, several men worked for the greater part of a week clearing off the vegetation; it so happened that on this particular area there were comparatively few food-plants of the tent-caterpillar, but there were many deciduous trees, including maples and cascara-trees; of the latter I counted ninety-four specimens of average size, besides a number of saplings; all were cut and burned. One man could have cut all the food-plants in one afternoon; approximately \$80 worth of cascara-bark would have been saved from the flames, and the remaining cedars, Douglas firs, and maples would have provided shelter, protection, and nesting-places for birds, many of which assist in controlling insect pests.

TREES WHICH SHOULD BE CUT,

Amongst the local trees which are food-plants of the tent-caterpillar, and which alone should be destroyed on vacant lots, are alder, various species of willow, two species of poplar known as cottonwood and aspen, wild cherry, crab-apple, and hawthorn; the latter, though not in evidence in Vancouver, is very common in one or two municipalities in this region. The following shrubs are also food-plants: Flowering currant, wild roses,

and June-berry or saskatoon. In some localities these are so abundant as to constitute a menace to adjacent gardens and orchards, but unless the plants are actually attacked by the pest, isolated patches of these shrubs may be spared for the beauty of their flowers.

TREES WHICH SHOULD BE SPARED.

Amongst the trees which are immune to the attacks of tent-caterpillars are the conifers, including giant fir, cedar, hemlock, yew, Douglas fir, and pine. Spruce-trees attacked by the spruce-gall aphid may be destroyed. Maples, cascara, arbutus, Osier dogwood, and Nuttall's dogwood are all useful species and should be spared. Nuttall's dogwood is our famous large-flowered species and is practically immune to all insect and fungus pests. It is rapidly becoming extinct in Vancouver except as a garden plant, but is still found in abundance outside the city boundaries. If vacant areas were replanted with this tree it would add much to the beauty of the city and help to prevent the establishment of undesirable species.

I have endeavoured to show that the tent-caterpillar plague here is due to man's influence on the local flora, and that by using his influence in the right direction and in accordance with natural laws he may not only counteract the present outbreak, but will save future generations from a recurrence of the pestilential conditions we have had to endure for the past three or four years.

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