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INSECTS INJURIOUS TO YOUNG TREES
ON TREE CLAIMS; PP. 83-149**

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LAWRENCE BRUNER

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VOL. III.

ARTICLE II.—*Insects Injurious to Young Trees on Tree Claims.*

BY LAWRENCE BRUNER, ENTOMOLOGIST.

DISTRIBUTED JUNE 7, 1890.

LINCOLN, NEBRASKA,
U. S. A.

ARTICLE II.—*Insects Injurious to Young Trees on Tree Claims.*
By LAWRENCE BRUNER, Entomologist.

SIR: Herewith is presented for your consideration a short report on some of our most injurious insect enemies of young trees such as are grown upon tree-claims, homesteads, and farms, for wind-breaks and fuel, here in Nebraska, thinking that, perhaps, it might be of use to those who are cultivating these trees.

In the preparation of this report only such of the insect foes have been treated as are especially destructive to the trees while they are still small, and that commit their injuries by destroying the foliage rather than the woody portion and roots of the tree. A great many other insects might have been added to the list; but, as the present paper is only intended to include "defoliators," they have been omitted. Many of these latter have been treated in Bulletin No. 7 of the United States Entomological Commission, entitled "Insects Injurious to Forest and Shade Trees."

Considerable space has been devoted to each of the species treated, while the text is made clearer by the addition of many explanatory illustrations of both the injurious species and their insect enemies that assist us in keeping them in check. In addition to a general introductory chapter on the causes for the increase and spread of these injurious insects, together with modes of prevention, remedies have been suggested in each case after the life-history of one of them has been given.

No claim for originality is made for this paper, because it is a compilation, or a bringing together from many sources, of such facts and notes as relate to the class of insects that are being dealt with. Most of the authors from whom I have quoted or borrowed my ideas are given credit in the text of the work, as are also those from whom the illustrations were obtained.

I am under obligations to Prof. I. H. Orcutt, of the South Dakota Agricultural Experiment Station, and to Mr. C. G. Brackett, Secretary of the Kansas Horticultural Society, for the use of a number of the electrotypes used in illustrating the species treated.

LEWIS E. HICKS,
Director.

LAWRENCE BRUNER,
Entomologist.

INTRODUCTION.

For several years the writer has been greatly interested in such of our injurious insects as occur here in the West, and make themselves especially obnoxious to the settler by attacking and defoliating young trees other than fruit trees. This interest was first aroused by the reports which reached me of insect depredations upon tree-claims located in the semi-arid region lying to the westward of the 97th meridian, and afterwards accelerated by personal experience in that region. A slight investigation has been sufficient to convince me that the ravages of insects upon tree-claims have been great and quite general. It is to aid the settler in preventing, at least to some extent, the further injuries from this source, that time has been spent to prepare the following paper.

A very little investigation into the subject has been necessary to ascertain facts of sufficient importance to warrant a continuation of the study. It was learned how very frequent are the failures for being unable to "prove up" at the proper time directly traceable to the ravages of insects, although in some instances the settlers were themselves ignorant as to the causes of failure in their trees. Not unfrequently has it been the misfortune for those striving to gain titles to government lands by taking advantage of the timber culture act, to have their trees completely defoliated repeatedly for several years in succession. Nor have these injuries been confined to any single kind of tree. Since commencing this study of the subject, the following-named trees have been ascertained to suffer alike from this cause: ash, box-elder, soft maple, elm, walnut, cottonwood, and willows. The honey-locust, too, has been subject to defoliation by insect enemies when growing in hedges or in groves upon the uplands of this semi-arid region; while various other shade and ornamental trees growing along the streets of the cities and towns, and in public parks, have suffered likewise from the same cause. Some of these trees, when thus attacked and stripped of their foliage, are killed outright, while others are set back a year or more by each defoliation.

Several different lines of investigation have been followed in the study of this subject; such, for example, as the comparative freedom from attack by insect foes of the various kinds of trees usually grown; the influence of climatic conditions and topography of the country upon the growth of each kind of tree; as well as the influence of these conditions upon the development and increase of the insect life thriving upon it. The comparative abundance or absence of birds and parasitic insects in the different regions, and what relation these bear to insect depredations, have also received consideration. Of course, when fully carried out in these several lines of investigation, as indicated above, the subject cannot fail to result in some good to the parties most interested. Even if the entire line of work has not been completed, some of it has at least, and will now be given to the public for what it is worth.

As before stated, a large list of these injurious tree pests has been made. For the present, however, only a few of the most important of these will be considered. Of these there are about thirty species that belong to the following orders, as insects are separated by the naturalists: Coleoptera, Hymenoptera, Lepidoptera, Orthoptera, and Hemiptera. Most of these insects to which I wish to call attention, are quite general in their distribution, and are therefore quite as well known to those living beyond the confines of the "tree-claim" region as they are to those living in it. My report will, then, consist simply of a statement as to their abundance, distribution, and the amount of injury done by each species. All of these insects herein mentioned have been either observed by myself or have been reported to me by others as occurring in injurious numbers during different seasons upon tree-claims located in the States of Nebraska, Kansas, and Dakota. Most all of them, too, are sufficiently numerous at times, when working alone, to kill, or at least to greatly injure, and thereby retard the growth of the tree or trees upon which they feed. Of course they do not all occur at once in any given locality in such overwhelming numbers, nor are their injuries the same every year; but quite frequently two or more of the species are found feeding in company upon the same tree in numbers sufficiently great to do harm. In addition to the species about to be described, there are a great many others, as has already been stated, that are also known to attack and injure the young trees growing upon tree-claims. These latter have not yet made their

presence so strongly felt as to compel us to place them on the list of insect pests in connection with tree-claim culture. For a description and life-history of many of these, the reader is referred to Bulletin No. 7 of the United States Entomological Commission, entitled "Insects Injurious to Forest and Shade Trees."*

CAUSES FOR THESE INSECT INJURIES.

"There is a cause for everything;" so in the present instance we must look for a cause, or a combination of causes, that work together in producing the undue increase of insect life far out upon the prairies when new plants are introduced. Notwithstanding the fact that one would hardly suppose them capable of reaching these out-of-the-way places, they nevertheless do; and how it is done a very superficial survey of the ground will quickly and plainly reveal. After the insects have found the new food-plants, it will be easily seen how they are permitted, in fact aided, to increase rapidly. In the first place, there are always a few dwarfed native trees of most of the kinds that are usually planted upon claims, close at hand. These trees, as most of us who have traversed prairie countries know, are scattered along the water courses, in ravines and gulches, and a few other such localities as are protected from the fires that have annually swept over the broad prairies for generations. These few trees furnish food and refuge for small colonies of the various species of insects that we have named or referred to above. There are always enough of them to very quickly stock a claim close by upon which small trees have been planted that are to their taste. Then, too, all of these injurious insects are of a hardy nature, used to a precarious existence, and are strong fliers, capable of making comparatively long journeys in search of food for themselves and their progeny. They are in fact the nomads of the insect world, capable of withstanding the vicissitudes belonging to a life upon the vast prairies where the more delicate parasitic forms could not live or even find the necessary shelter which they require. Then, too, their requirements for quarters in which to pass the long, cold winter months are less complex than are those of the species that are introduced later on in the settlement of the country.

Nature has favored some kinds of insects much more than others, so that they are better prepared to hold their own in their struggle for

* By A. S. Packard, Washington, 1881, pp. 275, 100 illustrations.

existence. They have been provided with natural means for protecting themselves against the ordinary vertebrate and insect enemies that attack other forms not so protected. These natural means of protection are usually in the form of glands for secreting offensive odors, repulsive fluids, etc., or in the presence of bristles, thorns, and other surface coverings. Other forms are protected in their larval stage by the utilization of their excreta for constructing a covering or case within which they live with comparative safety. Most of the species of insects mentioned in the present bulletin belong to this class. They are all more or less perfectly protected against enemies. In the second place, the country being destitute of groves of timber among the branches of which and around the roots of which *birds* can find shelter and suitable places in which to build their nests and rear their young, most of these insect destroyers are absent. Of course, the absence alone of so great a factor as are these birds in the keeping down and ridding a country of its insect pests soon becomes apparent in the increase of and accompanying damages done by them. The absence of groves not only keeps away the feathered tribe, but also prevents many of the more delicate parasitic as well as a large number of the predaceous insects from becoming established in the region. The majority of these latter forms of insects, as before stated, are such as require sheltered retreats in which to lurk or to get away from the hot dry summers and the long cold winters. Besides bird and insect friends that are absent from the region at the opening up of these new homes, there are also fewer of the small insectivorous mammals than later on after more shelter has been provided for them. This, too, has a decided effect upon the increase of insect enemies.

In the third place, the comparative aridity of the region where these claims are located renders tree growth somewhat slower than where the precipitation of moisture is more bountiful. This slowness of growth, while it is an advantage in one respect, aids the insect foes to a considerable extent in their work of destruction. A rank and rapid growth places a tree out of danger from external enemies much more quickly than will a slow growth. At the same time, in a rank growth, a much greater amount of food is furnished for the same number of insects, and as a consequence, less injury results than if the growth were slower.

A fourth cause for the rapid increase among the different insects in