

which are known to have been infested for several years. This ability of the tree to survive repeated attacks of the saw-fly is offset somewhat by the fact that the insect is exceedingly prolific, since its progeny consists almost exclusively of females, and mating is unnecessary for fertilization of the eggs. The saw-fly, moreover, is able to survive the most rigorous climatic conditions and, being of European origin, is almost completely free from attack by native insect parasites. The main natural control factors operating against it at present are small mammals, principally mice and shrews. These feed upon the cocoons in which the larvæ overwinter under the debris on the forest floor. Although perhaps between 40 and 50 p.c. of the cocoons may be destroyed yearly in this way, the ultimate measure of control effected by mammals, birds, native predacious and parasitic insects, is not sufficient to prevent a marked yearly increase in the intensity and spread of the infestation. From the beginning it was assumed that an insect which is favoured in so many ways by nature may constitute a very real menace to our spruce forests and the actual situation which has developed in recent years amply confirms this view.

Recent estimates of the damage show that, in the heavily-infested areas on the upper Cascapedia river, 24.8 p.c. of the volume of white spruce and 27.4 p.c. of the black spruce have been killed by the saw-fly. These figures do not include the mortality due to an apparently independent outbreak of the eastern spruce bark-beetle between 1931 and 1934. During this period 44.4 p.c. of the white and 5.6 p.c. of the black spruce were destroyed by the beetle, giving a total mortality for the region of about 69 p.c. of white and 33 p.c. of black spruce. In other parts, the mortality rates vary considerably from locality to locality. However, the number of trees actually killed by the saw-fly does not give a true appraisal of the situation; the probabilities of survival of the remaining trees constitute an equally, if not more, important factor. In many extensive areas in Gaspé and elsewhere the probability of recovery is gradually decreasing year by year and in the older centres of infestation it is virtually nil. Irrespective of local or seasonal fluctuations, it may be said that over the entire area in which the saw-fly occurs there has been a fairly steady yearly increase in extent and intensity of infestation since 1930. At the present time no one can safely predict what the future course of the outbreak will be. The known facts in the case are ample evidence of the seriousness of the situation and call for immediate, energetic action in an attempt to deal effectively with this dangerous pest.

While the European spruce saw-fly is gradually making inroads into the forests of Eastern Canada, the jack pine bud-worm, a native species, is appearing in outbreak form in northwestern Ontario and Manitoba. Although there can be no parity between the two infestations from the standpoint of actual or potential national and economic importance, the jack pine bud-worm presents a problem of the first rank for the lumber and paper industries in the affected territory. The centres of heaviest infestation are the extensive jack pine stands in the Quetico and Rainy River sections of the Great Lakes-St. Lawrence Forest Region. Lighter infestations have been found immediately north of these sections and westward as far as the eastern boundary of Saskatchewan. The trend of spread seems to be eastward. (See chart on p. 257.) Practically all the jack pine stands over an area of approximately sixty thousand square miles are involved to a greater or lesser extent.

The bud-worm is a biological race or strain of the notorious spruce bud-worm from which it differs in habits rather than in form. It exhibits such a marked preference for pine instead of spruce or balsam that from an economic standpoint it may be considered as a distinct species. The principal injury caused by the bud-