Key

0 - No crop
1 - Light crop
2 - Medium crop
3 - Heavy crop
4 - Very heavy crop

Note

Statistics compiled from seed reports of 60 co-operatives in widely scattered sections of the forest belt.

The table reproduced above is a tentative study for white spruce (Picea canadensis)and Jack pine (Pinus banksiana) in the matter of seed production. It indicates a medium to heavy crop every alternate year since 1942 including the present year 1948. A series of consistent annual seed surveys may indicate a definite two year cycle and perhaps also a longer cycle in which bumper crops are produced.

Such a variation is known to exist from district to district in other parts of Canada and a further detailed and comprehensive study may bring this interesting angle into focus. Even the origin of tree seed in climatic regions affects the survival of the resulting transplants in forest nurseries according to their geographic position. This would indicate that some seeds are not climatically adaptable to strange sites. For this reason in Norway, seed origin and quality is examined very carefully and the highest quality seed-producing regions are early discovered and earmarked as reliable sources of supply for forest nurseries whose ultimate purpose is the growing of trees for timber.

The introduction of phenological calendars should form a part of the program of every natural history society. If you are interested in the subject I will describe what a phenological chart deals with and how it can be put to local use for the study of plants.

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ASH BORER, PODOSESIA FRAXINI LUG

Importance of Pest and Recognition of Damage

The ash borer is known to attack green ash, white ash, and mountain ash, but in the Prairie Provinces has been found only in green ash. During the current season infestations reported to the Indian Head Laboratory were more numerous than in past years. These occurred at Pennant, Swift Current, Moose Jaw, Regina, Radville, Estevan, Strasbourg, and Saskatoon, Sask. Several of them were very severe.

The visible signs of ash borer injury are holes or burrows openings in the bark. These vary from one-eighth to one-quarter inches or more in diameter. Such openings may occur singly if infestations are new, or if small trees are affected, but in older infestations in larger trees they are usually grouped together and are often associated with dead sunken areas on the trunks. In addition to the exposed burrow openings, thickened bands almost encircling the stem may be present on the smaller trees and on some of the branches of the larger trees. These bands usually occur at the base of a branch or twig and are scar tissue which has overgrown horizontal surface burrows made by young borers which have failed to survive. Any part of the bole or limbs of a tree may be attacked by the ash borer, but the base of the trunk and the portion just below the canopy, especially

if the lower branches have been removed by pruning, are most seriously affected. Widely spaced trees are more subject to attack than closely spaced trees. This characteristic has made the ash borer more important in city and town plantings than in closely-spaced farm shelterbelts.

Appearance of Stages

The ash borer is a lepidopterous insect and passes through the usual adult, egg, larval, and pupal stages of development. The adult stage is a narrow-bodied, narrow-winged clearwing moth with a wing expanse of approximately one and one-quarter inches. The body is dark brown or almost black with narrow yellowish bands around the abdominal segments. The legs are long, and when resting the adult is wasp-like in appearance.

The eggs are ellypsoid in shape and viewed under magnification are deeply sculptured in a reticulate pattern with the longitudinal ridges much heavier and more continuous than the cross ridges. The ridges are grey in colour and the areas between them black. One end of the egg is indented and the upper surface somewhat depressed. The long axis of measured eggs varied from .79 to .86 mm. and the short axis from .45 to .63 mm.

When newly hatched, the larvae or borers are extremely small and have a reddish-brown head. The presence of three pairs of thoracic legs and five of abdominal legs distinguish these borers from the legless beetle borers.

The ash borer pupa is dark brown and capable of considerable movement.

History and Habits

Adults of the ash borer are present during most of June and July. Wounds on the trunk and branches, and roughened areas on the bark such as occur around the base of the branches are favoured oviposition sites. In consequence, bruises to lower parts of the trunk resulting during cultivation, wounds caused by pruning, or damge from hail and snow encourage infestation. Old burrow openings also encourage re-infestation. The eggs are not inserted into the bark or wood, but are attached to the surface.

The young borers are first present during July. Upon emerging from the eggs they bore directly into the bark or wood in most instances. Where oviposition has taken place in old ash borer burrows, however, the newly-hatched larvae often crawl along the old burrows for short distances before starting their own burrows. Usually in the course of feeding each burrow is widened just inside its entry to form a "feeding chamber" in the outer sapwood of the tree. From this "feeding chamber" the burrow is extended upward into the sapwood at an angle of approximately 45 degrees. In large trees this burrow penetrates the sapwood only an inch or two and then turns sharply outward to the outer sapwood, terminating just under the bark an inch or more above the original entry and from one to two inches to right or left of it. In small trees, or where a branch is entered, the burrow penetrates to its centre, then may rise several inchesalong it before turning again to the outside to terminate in the outer sapwood just under the bark. In small trees also, burrows often pass through the stems so that they terminate near the bark on the side opposite the entry. When the outer sapwood is reached the terminal end of the burrow is enlarged somewhat to form a second chamber within which

the larva overwinters. By October the larvae have completed this stage of activity. The following spring larval development and feeding are resumed and before pupation occurs a hole is cut through the thin layer of sapwood and the bark to provide an exit opening for the adult.

The pupal stage is short. Just prior to the emergence of the adult, the pupa manoeuvers itself into the exit opening cut by the larva, in such a way that the emerging adult escapes directly to the outside leaving the pupal cast projecting two-thirds of its length out of the opening. Emergence of the adults begins in early June and continues until mid-July or later.

CONTROL

Ridding infested trees of the ash borer is difficult. As far as possible, therefore, infestation should be prevented. To help achieve this, wounding of the trees should be avoided. Whenever wounds occur either by accident or by pruning the branches, the injuries should be painted over so as to make them unattractive as egg deposition sites.

Once infestation has occurred, direct control measures are necessary. Trees with many borers in them and in consequence severely damaged should be cut out and the infested portions burned. This should be done before the middle of May to prevent emergence of the adult moths and danger of infestation to other trees. (Avoid cutting out and destroying trees showing only old injury and from which infestation has been eliminated by natural means). Less severely infested trees should be treated to destroy the borers in them. In many instances this can be done by digging the borers out and then coating the exposed wood with a paint. Injection of carbon tetrachloride, carbon disulphide, or cyanide paste into the open burrows during late fall and early spring, is also effective.

For carbon tetrachloride or carbon disulphide, a machinist oil can will serve to introduce the poison into the burrows. A spoonful of the liquid injected into each opening should be adequate. Following the treatment the burrow opening should be closed with putty or wet clay to confine the gases formed. This treatment, if undertaken in the spring is most effective if the infested trees are revisited at intervals or two or three days during late May and June to treat and close all new untreated openings. (Carbon tetrachloride and carbon disulphide should be handled with care. Both are poisonous to humans a and carbon disulphide is very inflammable.)

Cyanide paste, prepared by stirring powdered calcium cyanide into linseed oil to form a paste, can be pressed into the burrow openings with a putty knife, or injected into them with a grease gun. (Calcium cyanide is very poisonous and extreme care must be taken in preparing the paste and also in applying the treatment to the trees. Avoid breathing any of the fumes and getting the material on the hands or face. Trees visited by children should not be treated with this material.

D.D.T. and benzene hexachloride have not been tested against this pest, but there is reason to believe that these materials would be effective. If used as dusts these materials should be blown forcibly into the burrows with a plunger-type dust gun, having a reduced nozzle which can be inserted into the burrow openings. Sprays should be applied similarily using a small hand sprayer. As D. D. T. and benzene hexachloride are contact poisons, it is important that the dusts and sprays be injected as far into the burrows as possible.

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