FPL 32 – Rhabdocline Needle Cast

The information accessed from this screen is based on the publication: Collis, D.G. 1973. Rhabdocline needle cast of Douglas-fir in British Columbia. Forestry Canada, Forest Insect and Disease Survey, Forest Pest Leaflet No. 32 4p.

Introduction

Rhabdocline needle cast is caused by members of the genus Rhabdocline, of which the most common is *Rhabdocline pseudotsugae* Syd. (Ascomycetes) (4). The disease can be a problem throughout the natural range of Douglas-fir (Pseudotsugae menziesii (Mirb.) Franco) and in other areas of the world where Douglas-fir has been introduced, such as Western europe, Great Britain and Eastern North America, where persistent serious needle losses producing corresponding loss of increment or tree mortality have occurred. In Western North America, trees, grown or managed for the Christmas tree industry, that have suffered heavy needle casts create serious problems. Even if no repetition of infection occurs, several years are required before infected trees become marketable. In other developing stands, heavy infection causes growth loss.

Hosts and Distribution

The disease is known to occur on two species of the genus Pseudotsuga (menziesii and macrocarpa). Introduction of the disease into Europe and Eastern North America was likely accomplished on nursery stock. In the west, Rhabdocline needle cast has been a problem in Idaho, Montana, Oregon, Washington and British Columbia. In B.C., damage of any consequence is confined to the drier southern portions of the province. Pure stands are more likely to suffer severe infection than mixed stands, and coastal Douglas-fir appears to suffer less severely than the interior variety. Individual trees show considerable variation in susceptibility to infection, and some may even remain free while adjacent ones are seriously attacked. Vigor does not appear to play a part in tree resistance.

Life History of the Causal Organisms

Rhabdocline infection is a needle disease which usually completes its development on most trees in one year; but, on some, two to three years are required. Spread of infection is accomplished by ascospores released in May or June, depending on humidity. In release from the apothecia, the fruiting bodies of the organism (Fig), spores are carried by air currents usually for short distances of 100 to 250 feet, but may be carried greater distances under some circumstances (1). These spores can only infect tender young needles of opening buds. Under suitable conditions of temperature and humidity, spores germinate and penetrate the young needles in a few days. From these infections, fruiting bodies of the organism develop and mature, usually releasing spores the following year to begin a new life cycle.

Parker (3) has shown that high humidity and cool temperatures are necessary before

infection can take place, a temperature below 10 degrees C and relative humidity of 100% being optimal for spore dissemination. Temperatures from 1 to 15 degrees C are necessary for spore germination and growth and 10 degrees C was found to be optimal in laboratory experiments (5).

Recognition

In B.C., the first symptom of infection, called the yellow blotch stage, appears on the needles as pale-yellow lesions 1-2 mm in diameter from early fall to early winter. This is followed by the characteristic red-brown needle spots some time in the late fall or winter months. These dates are variable, depending on weather conditions. The mottled red-brown (Fig) or, in cases of severe infection, scorched brown appearance of needles and trees persists until after spore dissemination the next year, in late May and June, after which these infected needles are cast. When defoliated trees are encountered between needle drop and the appearance of the yellow blotch stage, it may be difficult to determine the cause of defoliation, although, to an experienced examiner, the pattern of defoliation is characteristic of the disease.

Depending on the sub-species of the organism, the fruiting bodies may develop on either the upper or lower surface of the needles (4). At first they appear as elongated swellings, up to 1.5 mm in length, on either side of the needle mid-rib, but with maturity, the needle epidermis splits, exposing the pale orange spore bearing areas.

Damage

Persistent severe infestation almost completely defoliates trees, leaving only the current year's needles, which may also be diseased, to maintain food production. Vigor and increment of such trees are severely affected and are useless for the Christmas tree trade. Considerable mortality has resulted from Rhabdocline infection in some parts of the world where Douglas-fir has been introduced, as well as the needle cast. In the natural range of the host, the disease is a problem of small trees; large trees usually undergo only light defoliation and sustain little damage.

In an experiment designed to aid Christmas tree cutters, Parker and Truscott (5) found that when trees with moderate infection were cut for marketing, premature needle cast was no greater than on healthy trees subjected to similar handling conditions.

Control

Chemical control of the disease in the forest is not practical at present. In nurseries, parks or other areas where trees have high individual value, they could be protected by chemicals. Brandt (1) achieved up to 100% control using lime-sulphur, provided that the first application was made at the proper time in relation to bud burst and repeated at 7- to 10-day

intervals throughout the bud opening period. Weir (6) experimented with systemic antibiotics; however, the results did not indicate a practical control.

If possible, trees showing a high degree of susceptibility to Rhabdocline during years of low infection should be removed during thinning programs, and seed should never be gathered from such individuals. It is evident that some trees show resistance to infection, suggesting that a resistant strain might be developed for problem areas.

References

1. Brandt, R.W. 1960. The Rhabdocline needle cast of Douglas-fir. State Univ. Coll. of Forest., Syracuse, Tech. Publ. 84.

2. Parker, A.K. 1962. The germination and growth of *Rhabdocline pseudotsugae* Syd. on artificial media. Can. Dept. Forest., Bi-monthly Prog. Rep. 18(5): 3-4.

3. Parker, A.K. 1970. Effect of relative humidity and temperature on needle cast disease of Douglas-fir. Phytopathology, 60: 1270-1273.

Figures

Figure 237-0084. Rhabdocline needle blight, fruit body.

Figure 237-0085. Discoloration of older needles by Rhabdocline needle blight.