

NOTES

NEW ZEALAND PINUS RADIATA IS SUSCEPTIBLE TO WESTERN GALL RUST DISEASE

J. R. PARMETER JR. and F. J. NEWHOOK*

SYNOPSIS

Overseas tests have shown that Pinus radiata growing in New Zealand is genetically susceptible to western gall rust, one of the major factors limiting its value as a timber tree in California. The disease is so far absent from New Zealand. Strict quarantine control of imported pine propagating material is essential.

INTRODUCTION

The risk of epidemic disease development in New Zealand's large area (over 1,000,000 acres) of exotic pine plantations, predominantly *Pinus radiata*, has frequently received comment from overseas foresters and pathologists.

Within New Zealand the risks have always been recognized, but the rapidity of growth of *P. radiata* is such that it would provide two or three rotations before any suitable replacement species could be ready to take over.

While the risk is accepted, the remarkable freedom from serious disease over the century or more that *P. radiata* has been grown in the country has led to speculations about the reasons for this good fortune. These have included suggestions that New Zealand climatic factors might not favour exotic diseases such as pine rusts and some needle blights, or that the original introductions were as seed from selected trees of good appearance which might have been disease resistant. There can be no room in the forest industry for complacency regarding disease hazards especially if these should lead to a relaxed attitude towards quarantine restrictions, although such an attitude is less likely now that *Dothistroma* blight has become established in many parts of the country.

One of the serious exotic diseases of pines which has not yet been observed in New Zealand or Australia is western gall rust (*Peridermium harknessii*) which attacks several species of pines and is widespread and severe on *P. radiata* in its native habitat in California. Unlike most Californian rusts, the intermediate host does not play an obligate role in the life-cycle of the disease and aeciospores produced on pines can directly infect new pines. Once introduced, there is every likelihood of its spreading throughout the country in one to two seasons as has been the case recently with other exotic rusts such as those of antirrhinum and mint.

As a result of visits to New Zealand by Professors J. S. Boyce and A. J. Riker and by Dr G. H. Hepting, and following a recommendation by the Council of the International Union of Forest Research Organisations that susceptibility to potentially dangerous diseases be tested on a co-operative basis in countries where those diseases are already present, New Zealand seed lines of *P. radiata* were tested against western gall rust in California.

* Respectively, Associate Professor, University of California, Berkeley, and Associate Professor, University of Auckland.

INOCULATION TESTS

Seedlings were grown in flats of steam-sterilized U.C. mix (sand plus peat) in the greenhouse in Berkeley, California. Four flats were sown with New Zealand pine seed and two control flats were sown with California pine seed. Seeds were placed in rows in the flats to facilitate counting. All flats were sown in November. By April, the seedlings were 5 to 10 in. tall and growing vigorously.

Inoculum was prepared from freshly-collected rust galls on Monterey pines growing in the Berkeley Hills. Mature rust pustules on galls from several trees were opened with a pen-knife and the spores were dusted into a one-litre beaker of sterilized water. A few drops of Tween 80 (a surface-tension reducer) were added to increase wetting of spores and produce a dense, cloudy suspension. This suspension was then poured into a hand-sprayer and all seedlings were thoroughly drenched with spray. A continuous mist was then applied to the seedlings for 72 hours, after which the mist was turned off and the seedlings were allowed to grow under normal greenhouse conditions for three months. Each seedling was then examined for rust infections. The results are shown in Table 1.

TABLE 1: RESULTS OF WESTERN GALL RUST INOCULATION TEST, USING SEEDLINGS FROM NEW ZEALAND AND UNITED STATES SOURCES

	<i>New Zealand</i>	<i>Local U.S.</i>
Total trees	529	142
Number infected	270 (51%)	65 (46%)
Number with 1 infection	166	47
Number with 2 infections	78	10
Number with 3 infections	17	5
Number with 4 or more infections	9	3

These data are conservative, since only those swellings that represented unquestionable rust infections were counted. Many lesions and slight swellings were not recorded, although most of these probably represented early stages of gall development. No significant differences in susceptibility between New Zealand and California seedlings were found. About half of the seedlings in each group became infected. These results indicate that the several generations of selection in Monterey pines grown in New Zealand have not altered their basic susceptibility to gall rust. New Zealand Monterey pines are just as liable to this disease as are the native California pines.

WARNING

Gall rust is very damaging to Monterey pine in its native range and is one of the major factors limiting the value of this species in California. The accidental introduction of the rust into New Zealand could have disastrous consequences. Every effort should be made to avoid its introduction, and continuous surveillance of New Zealand pine stands should be maintained to ensure that any introduction would be discovered promptly.