most of the year. Studies on the invasion of stumps by the fungus, and its spread to living trees are in progress.—G. Reynolds and G. W. Wallis, Forest Research Laboratory, Victoria, B.C.

Grey Mould of Douglas-Fir Seedlings.—Grey mould of Douglas-fir seedlings caused by *Botrytis cinerea* Pers. appears to occur sporadically in forest nurseries of coastal British Columbia. Etiological factors are believed to include the prevalence of humid weather, abundance of inoculum, and susceptibility of the host species (T. R. Peace, Pathology of Trees and Shrubs, Oxford University Press 1962). In the coastal nurseries of B.C. the fungus attacks newly flushed needles; the climatic events most likely to promote the disease are a warm period in early spring causing the needles to flush, followed by a cool, humid period which delays their maturation. The sporadicity of the disease is attributed to the infrequency of this combination. Tests under controlled conditions have demonstrated the importance of temperature on disease incidence; 16 shoots were attacked on five seedlings grown at 55° compared to five shoots on the same number of seedlings at 65° F.

Abundance of inoculum is probably a factor of secondary importance. The fungus is always present on dead or moribund plants; however, a build-up of inoculum on cull seedling and weed piles can intensify infection in nurseries. In densely stocked beds the lowermost needles are often colonized and constitute a source of infection of the new foliage. Losses from grey mould may be greater in beds where frost or winter-killed seedlings are abundant, or where killing by other diseases has been extensive. A random sample of 150 seedlings killed by *Fusarium oxysporum* Schlecht showed that 47% were invaded by *Botrytis*.

Douglas-fir is more susceptible to the disease than spruce, hemlock, or balsam fir.

The sporadic occurrences of the disease makes the application of routine control practices difficult. Assessment of late winter inoculum levels, observation of seedlings which flush early, and the removal of small intact plots to a controlled environment are useful in forecasting the potential severity of the disease, When a severe disease potential combined with suitable weather conditions indicates an outbreak of grey mould, preventive sprays should be applied. Tests of various chemicals for their effectiveness against grey mould, using the small intact plot technique (Table 1), showed Ferham and Thiram to be highly effective, Zineb to be partially effective, and that Bordeaux mixture stimulated the disease. Although effectiveness of Captan cannot be evaluated from this test, additional testing showed that it did not give complete protection. Paradoxically, stunted seedlings were more resistant than thrifty ones. Relative succulence of foliage of the two types of seedlings may be a factor in their differential susceptibility.—W. J. Bloomberg, Forest Research Laboratory, Victoria, B.C.

TABLE 1

Infection of Douglas-fir seedlings by *Botrytis cinerea* in intact plots sprayed with various chemicals.

Spray	Seedling condition	Percentage infection
Ferbam	Thrifty	0
Thiram	"	0
Zineb	"	56
Control (water)	"	73
Captan	Stunted	0
Bordeaux	"	100
Control (water)	"	0

SILVICULTURE

Stand Conversion in the Maritime Provinces.—Much of the tolerant hardwood forest in the northern and northeastern part of its commercial range is decadent and difficult to rehabilitate. Field trials suggest that converting such stands to softwoods may be better land use. These trials consisted of planting and seeding of white spruce to evaluate the difficulties of such stand conversion and of maintaining the desired species. In northern New Brunswick 1-acre blocks of cut-over tolerant hardwood land were planted in three successive years after scarifying with a bulldozer. In a pole-sized tolerant hardwood stand in northern Nova Scotia twelve ½-acre plots were planted and seeded, six without site preparation and six after clear cutting and partial burning.

In 1962 the average growth on each of the New Brunswick plantations, including some trees severely suppressed by raspberry, was about 1 ft. This was the fourth, fifth, and sixth growing season since planting and the five tallest trees in each of the plantations averaged 6.0, 7.0, and 9.5 ft in height respectively. In 1963 a growth of 3 ft in 2 years was common.

In Nova Scotia, also in 1962 and 12 growing seasons since planting, the growth rate of the trees planted on the cut-over plots was 1.2 ft, the overall average height was 9.0 ft, and the four tallest trees averaged 15.8 ft. Broadcast and spot seeding on the cut-over plots gave poor results in spite of protection of the seeds against rodents by covers of hardware cloth. The growth rates in 1962 of these seedlings was 0.8 ft and total height averaged 3.5 ft. Seedling and planting on the uncut plots failed.

The results (Tables 1 and 2) indicate that:

1) Bulldozing and clear cutting can be effective in preparing tolerant hardwood sites for white spruce transplants.
2) Attempts to establish white spruce under dense hardwood cover were fruitless. Eleven years after white spruce was sown and planted on six uncut plots, only a few suppressed trees remained.
3) Planting is superior to seeding. The number of seedlings was small compared with the amount of seed used and survival and initial growth of seedlings were inferior to those of transplants; further mortality of seedlings is likely owing to competition from hardwoods.
4) Hardwood and most shrub regrowth after clear cutting and bulldozing did not inhibit the vigorous growth of white spruce transplants. In 1962 the height growth of transplants at both locations was keeping pace with the sometimes dense hardwood growth. Few softwoods, however, have outgrown the hardwoods.
5) Dense raspberry can be a serious threat to the survival of spruce transplants where snow and raspberry canes combine to flatten the spruce.—L. J. Post, Forest Research Laboratory, Fredericton, N.B.

TABLE 1.

Survival and Growth of Planted Spruce in Northern Nova Scotia

Treatment	1951		1954		1962	
	Number planted	Average height (ft)	Survival (%)	Average height (ft)	Survival (%)	Average height (ft)
Cut-over plots..	300	0.5	81	1.8	73	9.0
Uncut plots.....	300	—	—	—	2	1.3

TABLE 2.

Survival and Growth of Planted Spruce in Northern New Brunswick

Establishment	Number planted	Average height at planting (ft)	1960		1962	
			Survival (%)	Average height (ft)	Survival (%)	Average height (ft)
1956.....	400	0.8	94	3.2	88	4.8
1957.....	400	1.2	94	2.8	91	4.7
1958.....	400	1.2	99	1.9	96	3.7