
In Our Contemporaries

Judy Griffith

WHAT'S NEW IN FOREST RESEARCH

- No. 228 Aerial spraying by computer
No. 229 Managing stands of radiata pine using PC-STANDPAK
No. 230 Stability of radiata pine for remanufacturing uses

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NEW ZEALAND JOURNAL OF FORESTRY SCIENCE Volume 21 No 2/3 (1991)

Climate change – Implications for *Pinus radiata* improvement
Grace, J.C.; Carson, M.J.; Carson S.D.: 123-134

A change in New Zealand's climate, caused by "greenhouse gases" in the atmosphere, may affect the productivity of *Pinus radiata* through increased wind damage, more severe infection by fungal pathogens, and areas becoming too dry or too wet for satisfactory growth. The current breeding strategy is well suited to maintain genetic improvement in a changing environment. Future research should consider planting identical field trials at particular sites several years apart, and planting trials at and beyond the current extremes of climate.

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Geoff Chavasse

(Continued)

64 years since he became a chorister in Wells Cathedral.

His wife Shirley has now retired from school teaching, and they regularly visit their eldest daughter and her family who live in Augsburg, Germany. They have two other daughters: one lives in the Hohepa Community, Hawkes Bay; the other is a general practitioner and lives in Auckland with her husband and three-months-old daughter.

Geoff and Shirley are keen gardeners, although Geoff claims that their large garden gets bigger every year. They have taken on a new challenge – a 7.3 hectare agroforestry, multi-species forest in the Bay of Plenty.

Propagation system for the production of rooted cuttings from physiologically mature *Pinus radiata* within two years of field collection
Van Dorsser, J.C.; Faulds, T.: 135-143
Scions from selected *Pinus radiata* trees were grafted on to open-bed-grown seedlings. The resultant first-year grafts produced the material to be used as cuttings. The technique for rooting such material is based on a system developed since the 1960s at the NZFRI nursery. All but one of the 24 clones tested produced rooted cuttings. The method offers opportunities for establishing and updating archives and seed orchards with rooted cuttings within two years of field ortet selection.

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Increased nutrient availability in topsoils under conifers in the South Island high country

Davis, M.R.; Lang, M.H.: 165-179

Phosphorus levels were higher under conifers than under adjacent grasslands at most sites, with the largest absolute increases occurring under older stands on dry soils of the Mackenzie Basin. Increases were smaller under stands on hygroscopic, high-country, yellow-brown earths of the Canterbury region, but these soils were characterised by large increases in mineralisable nitrogen and sulphate-sulphur. Mineralisation of organic matter by the pines appears to be the major mechanism for nutrient enrichment of topsoils under pines in the hygroscopic soils of Canterbury, but transfer of nutrients from deeper horizons to the soil surface via nutrient uptake and litterfall may be more important in the dry-hygroscopic soils of the Mackenzie Basin.

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Estimating stand weight – The importance of sample selection

Madgwick, H.A.I.: 180-184

Simulated sampling showed that, in determining estimated stand component weights, sampling method and estimating techniques were less important than the sample of trees selected. There is a need for more work on the variables used to predict tree weight. Some problems arise with sequential sampling but it has the advantage that aberrant estimates based on small sample sizes are revealed.

Spiral grain patterns in plantation-grown *Pinus radiata*

Cown, D.J.; Young, G.D.; Kimberley, M.O.: 206-216

Strong radial and vertical patterns were established on wood disc samples from 50 25-year-old trees grown in Kaingaroa Forest, but there was also a major individual tree effect. The most pronounced deviations from vertical grain were in the inner 10 growth rings, where the left-hand angles averaged 4.7°. This amount of deviation is sufficient to cause significant problems through drying degrade, strength loss, and movement in service. Outside this zone, angles were generally less and showed a higher proportion of right-hand spirals.

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Utilisation of 25-year-old *Pinus radiata*. Part 1: Wood properties
Young, G.D.; McConchie, D.L.; McKinley, R.B.: 217-227

The stand was selected as "typical" of current silvicultural regimes and as being at the lower end of the age range for expected rotations of this species. Average whole-tree wood property values were determined from discs cut at the butt and at the top of each log. Assessments were also made of compression wood, and within-tree variation in tracheid length and spiral grain. Generally, wood property values were similar to previous studies and to predictions for trees this age grown in the region.

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Utilisation of 25-year-old *Pinus radiata*. Part 2: Warp of structural timber in drying

Haslett, A.N.; Simpson, I.G.; Kimberley, M.O.: 228-234

From the same stand, 183 4.8 m-long logs were sawn to 100 x 50 mm framing timber. After high-temperature drying, warp measurements were related to the individual log characteristics. Twist was the major form of degrade; before planing, 36% of the lengths had excessive twist, and rejection from Framing 1 grade was 28%. Twist was most strongly related to log diameter, with corewood portion and spiral grain being the contributory factors. Twist also increased with log height class. Gauging halved the incidence of twist rejection.

Penetration of methyl bromide into *Pinus radiata* wood and its significance for export quarantine

Cross, D.J.: 235-245

Data obtained from studies of penetration of methyl bromide gas into "green" and dry sapwood were used to calculate the likely minimum "concentration: time" products at various depths into the wood. It was demonstrated that there is a curvilinear gradient into green timber and a linear one into dry wood. In the former, this gradient is such that it is not practical to achieve useful insecticidal doses much beyond a depth of 100 mm in green material using conventional tent fumigation techniques.

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Fibre-based composites in New Zealand: Past developments and future opportunities

Plackett, D.V.; McLaughlan, J.M.; Burton, R.J.: 246-255

Composite wood products have been made in New Zealand since the 1940s when a wet-process fibreboard plant was established. Medium-density fibreboard production began in 1976 and the total capacity of the New Zealand MDF industry is now 465,000 m³ per annum or about 6% of worldwide capacity. In 1987 production began of a type of board in which MDF surface layers are combined with a strandboard core in a stem-pressing operation. Areas of research currently in progress at NZFRI include research on dimensional stabilisation of MDF focusing on in-line chemical treatments of fibre, and vapour boron treatment to improve fungal, insect, and fire-resistance properties.

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NEW ZEALAND JOURNAL OF FORESTRY SCIENCE

Volume 22 No. 1 (1992)

Pinus radiata seedling water potential and root and shoot growth as affected by type and duration of storage.

Balneaves, J.M.; Menzies, M.I.; Hong, S.O.: 24-31

Seedlings were lifted and packed into waxed cardboard planting boxes which were stored in transporting/storage crates, or under tarpaulin tents, or in a coolstore for up to 12 days. The crates and tarpaulin-covered boxes were stored either on an exposed site or under heavy shade in an adjacent sheltered position. The results highlighted the importance of ensuring that seedlings are firstly packed into a crate system and then stored (where coolstores are not available) under sheltered

heavy shade to minimise temperature rises above 2°C within the boxes of seedlings.

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Forestry quarantine risk of cargo imported into New Zealand

Bulman, L.S.: 32-38

Quarantine interception data from 2547 randomly selected consignments of part-container-load cargo were analysed. Insect damage was found in 4.1% of the consignments, bark in 3.7%, insects in 2.7%, and fungi in 0.7%. Stone and slate, and goods in the "unknown" category had the highest rate of interception, as did other cargo packed in pallets, cases, and crates. Chemicals, food, textiles, cartons, and rolls of cloth or carpet backing had a low interception rate. Goods originating in Asia and Europe were more frequently infested than American or Australian cargo.

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How will New Zealand's forests respond to climate change? Potential changes in response to increasing temperature

Whitehead, D.; Leathwick, J.R.; Hobbs, J.F.F.: 39-53

Current relationships between temperature and occurrence of natural forest species suggest major changes in forest pattern with an increase in temperature. Initial changes should favour species with wide tolerance to climatic factors, good dispersal capacity, and short generation times. The plantation estate can be classified in relation to present-day temperature and rainfall. If the worst-case climate change scenario is realised, then 96% of the plantation area will experience mean annual temperatures above 13°C, and 21% will experience mean annual temperatures above 17°C which is near the top of the optimal range for growth of *Pinus radiata*. The effect of this on timber yield and log quality is still uncertain.

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Corewood (juvenile wood) in *Pinus radiata* – Should we be concerned?

Cown, D.J.: 87-95

Traditional definitions of corewood are based on qualitative assessments of the number of rings from the pith at which an important property (usually wood density) becomes "mature". Since this is an interpretation of a biological pattern, subject to fluctuation in the absolute level under the influence of site and genetic factors, species differences can be large and there is often little relation to wood product performance criteria. An alternative defini-

tion based on wood density goes some way towards a technical description of the absolute wood quality.

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NEW ZEALAND JOURNAL OF FORESTRY SCIENCE

Volume 22 No. 2/3 (1992)

Special Issue: Genetic survey of *Pinus radiata* in New Zealand

A provenance-progeny trial was planted in three stages on two sites in Kaingaroa Forest to study the quantitative genetic architecture of the species and establish a gene resource. The trial contained 50 open-pollinated families (progenies) of each natural population (Ano Nuevo, Monterey, Cambria, Guadalupe Island, and Cedros Island), representing the species' full natural range, plus two New Zealand populations (Kaingaroa and Nelson), with 20 seedlings per progeny per site. Authors include: R.D. Burdon, M.H. Bannister, H.A.I. Madgwick, C.B. Low, R.E. Gaskin, J.A. Zabkiewicz, and I.A. Andrew.

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NEW ZEALAND JOURNAL OF FORESTRY SCIENCE

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Forward selection plots in breeding programmes with insect-pollinated tree species

Cannon, P.G.; Shelbourne, C.J.A.: 3-9

For trees which are naturally insect-pollinated and have effective pollination ranges of less than 40 m, the Forward Selection Plot design provides an open-pollinated breeding population layout that is effective for ranking families, for within-family selection, and, subsequently, for collection of seed for the breeding population of the next generation. It therefore provides a basic field resource for breeding which will give near-optimal genetic gain at low cost.

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Prediction of internode length in *Pinus radiata* stands

Grace, J.C.; Carson, M.J.: 10-26

Internode length is an important variable in determining the amount of clearwood which can be obtained from unpruned logs. An empirical model has been developed for predicting stand mean internode length for variable log lengths for forest sites in New Zealand. The model predicts internode length from mean annual rainfall, altitude, and "level of genetic improvement".

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Vector analysis of foliage data to study competition for nutrients and moisture: An agroforestry example
Mead, D.J.; Mansur, I.: 27-39

Vector analysis, previously used to study nutrient status in trees, has been modified for use in competition experiments. The interpretation of changes in leaf weight, nutrient concentration, and nutrient content per leaf indicates whether moisture and/or nutrients are causing changes in growth. In an agroforestry trial with *Pinus radiata* and six ground-cover treatments the main competition factors reducing tree growth were moisture, nitrogen, and boron. Lucerne proved to be the most competitive of the ground covers used in this trial.

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Soil pH and nutrient levels at Tikitere Agroforestry Research Area
Hawke, M.F.; O'Connor, M.B.: 40-48

Soils under various stockings of *Pinus radiata* at the Tikitere Agroforestry Research Area have shown a significant decline in soil pH with increasing tree age and at higher tree stockings. Higher phosphorus and sulphate-sulphur levels under trees and an increase in magnesium in open pasture were also evident.

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Pohutukawa (*Metrosideros excelsa*) health and phenology in relation to possums (*Trichosurus vulpecula*) and other damaging agents
Hosking, G.; Hutcheson, J.: 49-61

At Homunga Bay on the Coromandel Peninsula, possums were the only threat to established trees through damage to foliage and vegetative buds. The study also showed that regeneration occurred rarely because of the presence of feral goats and domestic sheep and cattle. It is recommended that possum control be carried out in late winter so as to protect new vegetative buds, and that fencing out of domestic stock to allow regeneration be done where possible.

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Armillaria populations in a *Pinus radiata* plantation on a former indigenous rainforest site
Hood, I.A.; Sandberg, C.J.: 62-77

Incidence of *Armillaria* root disease and populations of the causal fungi were monitored in four plots in a *Pinus radiata* plantation on a site converted from indigenous podocarp-broadleaf forest in the Bay of Plenty. This paper completes a set of three documenting the trial; it describes the increase in incidence of *Armillaria* popu-

lations within the plots and the resultant infection and mortality in the young pine forest.

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Cleopus japonicus, a potential bio-control agent for *Buddleja davidii* in New Zealand
Zhang, X.; Xi, Y.; Zhou, W.; Kay, M.: 78-83

Field surveys and laboratory studies in China have indicated the potential of *Cleopus japonicus* for control of buddleia because of its ubiquity and host specificity. A constant temperature of about 20°C and a photoperiod of up to 14 hours appeared to optimise survival and oviposition and indicated that this weevil should readily acclimatise to conditions in New Zealand.

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Foliage and growth distribution within crowns of *Pinus radiata*: Changes with age in a close-spaced stand
Madgwick, H.A.I.: 84-89

Needle and branch weight were estimated for each 2-m height zone of the crown in trees of five size-classes for each year from ages five to 13. The fraction of needles aged one year decreased down the crown and with increasing tree age. The ratio of branch to needle production did not differ significantly with position in crown, tree size-class, or tree age, and averaged 0.75.

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Biodegradability of wastewaters from a medium-density fibreboard mill
James, T.I.; Walker, J.R.L.: 110-119

Effluent from a MDF mill, using mainly *Pinus radiata*, was analysed for total and suspended solids, particle size distribution, reducing sugars, total carbohydrate, nitrogen, and phosphorus. The waste liquors, which contained many fine cellulose fibres, were moderately biodegradable. Microbial utilisation of the raw wastewater was enhanced by supplements of nitrogen, whereas addition of phosphate had little effect.

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FRI BULLETINS

No. 124 Pt 13 Introduced forest trees in New Zealand: Recognition, role, and seed source. 13. The redwoods (*Sequoia sempervirens* (D. Don) Endl.

– coast redwood; *Sequoiadendron giganteum* (Lindley) J. Buchholz – giant sequoia; and the related ornamental genera *Taxodium* and *Metasequoia*)

Knowles, F.B.; MILLER, J.T. (1993)

\$27.00 (incl. GST & postage)

This Bulletin provides an account of the redwoods in New Zealand, covering their introduction, role as an exotic forest species, recognition in the field, and the location and quality of current local seed sources.

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No. 180 Forest weed control manual – A guide to herbicide use in forests
Davenport, N.A.; Ray, J.W.; Vanner, A.L. (1994)

\$45.00 (incl. GST & postage)

This manual updates and extends information presented in the 1988 edition of FRI Bulletin No. 108 (Guide to use of herbicides in forest establishment). Topics covered include: New Zealand forest weeds, herbicide types and modes of action, toxicity and use of currently available herbicides, weed control prescriptions, and recommended application methods and safety procedures. There is also a small section on non-chemical methods of control. The manual is intended to be updated as either demand or prescription changes make it necessary.

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No. 184 Radiata pine growers' manual
Maclaren, J.P. (1993)

\$60.00 (incl. GST & postage)

Topics covered include site selection and preparation, genetics, planting, weed control, browsing damage, timberbelts, pruning, thinning, risks, harvesting, marketing, and finance.

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No. 185 The New Zealand forestry sector in 1993
Cox, O.; Horgan, G.; Maplesden, F. (1993)

\$19.00 (incl. GST & postage)

This Bulletin provides a brief introduction to and overview of New Zealand forestry. Current and future harvest levels are discussed, the existing processing industry is described, and major markets and future prospects are outlined. Thumbnail sketches of the major companies involved in forest growing and processing are also included.