

FERTILISER PRESCRIPTIONS FOR FOREST PLANTATIONS
IN THE AUCKLAND REGION

COMPILED
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INTRODUCTION

Since forest fertilisation began in New Zealand in the mid 1950s, the scene in the Auckland region has been dominated by phosphorus (P) deficiency and the application of superphosphate. However, over recent years two aspects have been changing:

1. The availability of more effective P fertilisers, and
2. The recognition of other nutrient deficiencies particularly in stands where growth has been boosted by the application of P.

While the forest fertilisation scene is continually changing and can be expected to stay this way, these notes have been prepared as a guide for forest managers in 1987 and should be read in conjunction with FRI Bulletin No. 97. Together they summarise our present state of knowledge.

Specific recommendations for particular forest blocks made after field inspections, soil analyses or foliage analysis by FRI will usually but not necessarily always fall within these general guideline prescriptions.

At the present time the following nutrient deficiencies are known to have occurred in forest plantations in the Auckland District:

Radiata pine	Nitrogen (N), Phosphorus (P), Potassium (K), Copper (Cu), Zinc (Zn)
Lupins	Molybdenum (Mo), Sulphur (S)
Eucalypts	Nitrogen (N), Phosphorus (P)

It must be recognised that, particularly in young stands, the application of fertiliser alone may not guarantee adequate nutrient uptake by the tree crop for optimum growth. Two other factors outside the notes must always be taken into consideration. They are cultivation and weed control; if these aspects are not considered the application of fertilisers may be ineffective or even have negative effects.

AUCKLAND AND NORTHLAND SOILS

The soils of the Auckland-Northland region are derived from a variety of rocks of sedimentary and volcanic origin. Generally the soils are of low fertility, particularly for phosphorus. The exceptions are the sands of recent origin, and soils where extensive use has been made of superphosphate and grass/legume mixtures.

FORESTS AND SOIL TYPES

For ease of discussion, the forests of the Auckland/Northland region are described according to soil types as shown below, and on the accompanying map.

Forest	Soil type	Likely deficiency
Type A	Recent sands e.g. Woodhill, Aupouri	N (Cu)
Type B	Severely podzolised soils - sands and clays e.g. Waipoua, Omahuta	N, P, K (Cu, Zn)
Type C	Yellow brown earths e.g. Riverhead, Maramarua	P (N)
Type D	Granular clays and loams e.g. Whangapoua	P (N deficiency possible but less likely than for Type C)
Type E	Red-brown loams e.g. parts of Waitangi near Te Puke	Deficiencies unlikely

MAP LEGEND

Type A



Type B



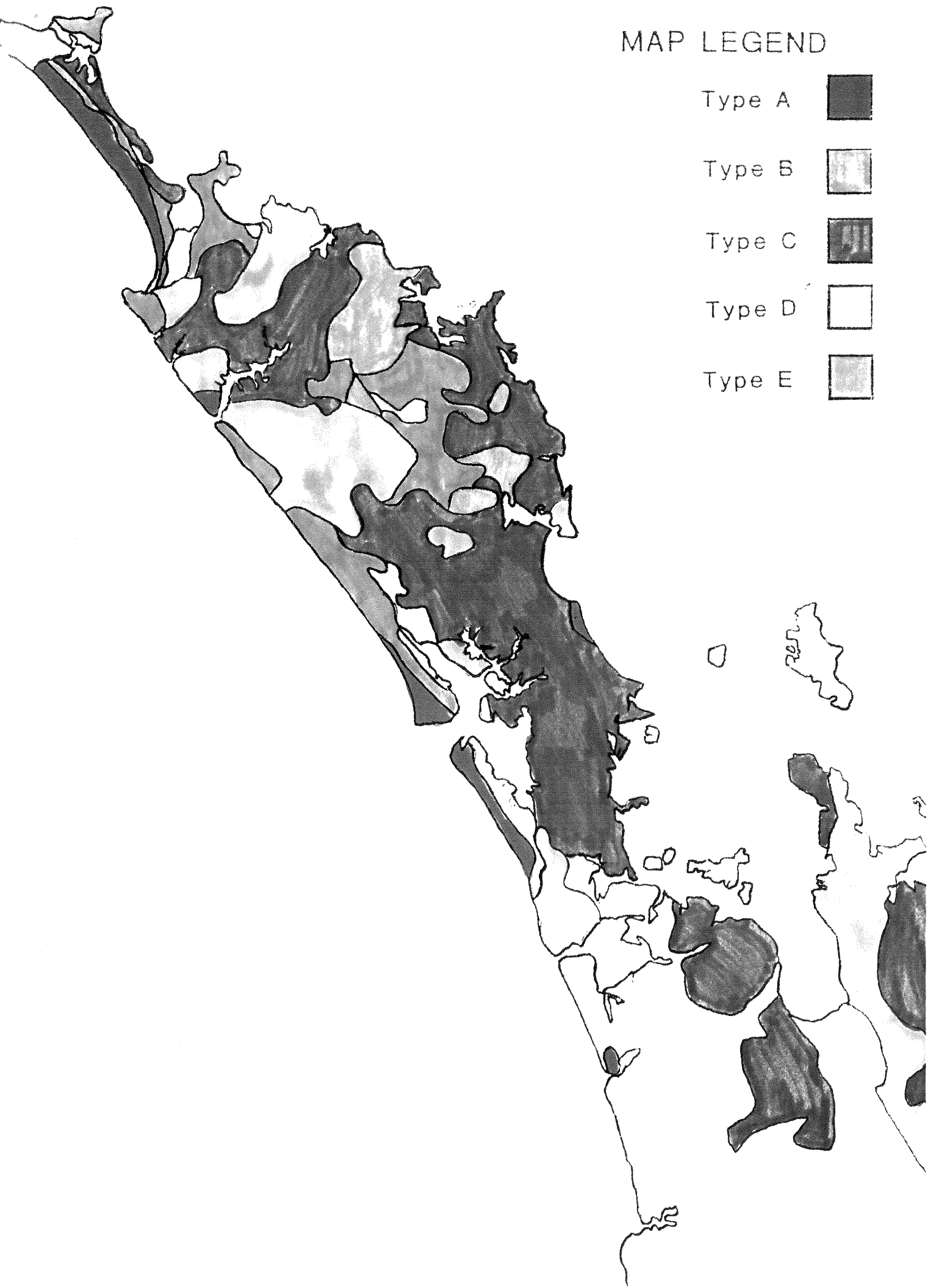
Type C



Type D



Type E



PRESCRIPTIONS FOR RADIATA PINE - PHOSPHORUS

Historically superphosphate has been applied to forests. More recently triple super has been used but there are now a wider range of fertilisers on the market.

PARR (partially acidulated reactive rock) is one of a number of PAPR products (partially acidulated phosphate rocks) currently being introduced. Others are DURAPHOS and HYPHOS. All PAPR products are considered superior for forestry to ordinary and triple superphosphate.

At establishment

- Type A Forests: Phosphorus deficiency is most unlikely.
- Type B Forests: Broadcast a PAPR fertiliser to provide 100 kg P/ha. At planting, apply 40 g DAP as a slit application by the seedling.
- Type C and D Forests: Broadcast a PAPR fertiliser to provide 100 kg P/ha. At planting, apply 40 g triple superphosphate as a slit application by the seedling.

Notes

- * Application of K at planting is unlikely to be of any benefit even if K deficiency is anticipated by age 3 years.
- * The application of soluble fertiliser will ensure early rapid growth and establishment.
- * On tractorable land, where cultivated, the PAPR fertiliser can be banded where initial stocking rates are low.

Established stands

- Type A Forests: P deficiency is most unlikely.
- Type B, C, D Forests: Apply PAPR fertiliser to yield 80 kg P/ha as and when indicated by foliage analysis (currently considered less than 0.11% P). For third and subsequent P applications a lower rate of P may be adequate. Consult FRI for up-to-date information.

Notes

A full response to P will only be achieved in the presence of adequate N and K. Before applying P alone check that foliar N and K levels are above marginal; i.e. N is above 1.4% and K above 0.5%.

PRESCRIPTIONS FOR RADIATA PINE - NITROGEN

Nitrogen deficiency can be counteracted by either biologically fixed N or by the application of fertilisers.

At establishment

- Type A Forests: N deficiency is unlikely where lupins are well established; where lupins have established poorly, re-establish lupins rather than fertilise trees.
- Type B Forest: Apply DAP (see P deficiency above).
- Type C, D Forests: N deficiency unlikely until age 6 years.

Established stands

- Type A Forests: Where lupin growth is inadequate to maintain foliar N, apply 400 kg urea/ha.
- Type B, C, D Forests: Apply 400 kg urea/ha along with P application if required (see earlier). As in Type A legumes may be a viable substitute for chemical fertiliser.

PRESCRIPTIONS FOR RADIATA PINE - POTASSIUM

At establishment

- A response to K fertiliser at time of planting is most unlikely. An application of K at time of planting will not counteract deficiencies which are expected to develop 2-3 years later.

Established stands

- Type A Forests: K deficiency does not exist.
- Type B Forests: From ages 3-5 years a strong likelihood of need for K. Apply 160 kg KCl/ha.
- Type C, D Forests: Possible deficiency; treat as above.

PRESCRIPTIONS FOR RADIATA PINE - TRACE ELEMENTS

Copper

Be aware that Cu deficiency can occur in restricted areas (e.g. Mangawhai) or after the application of N to Type B soils. Consult FRI for advice.

Zinc

Not expected in other than isolated areas. If Zn deficiency is suspected consult FRI.

PRESCRIPTIONS FOR LUPINS

In Pouto forest deficiencies of Mo and S have seriously effected the growth of lupins and their ability to fix N.

Vigorous lupin growth can be ensured by the following treatments:

- Mo: coat 9 kg of lupin seed with 120 g of MoO₂.
- S: apply 100 kg/ha of elemental S in drills.

PRESCRIPTIONS FOR EUCALYPTS

Successful eucalypt establishment can only be achieved by:

1. soil cultivation; plus
2. strict weed control for at least 6-12 months; and plus
3. the application of fertiliser at time of planting.

There are very few soils where any of these measures can be omitted.

Based on limited experience to date, the application of 80 g of DAP per tree at time of planting is a suitable fertiliser prescription to ensure good growth on most soils.

Experience to date in applying fertilisers to established stands is limited and no general prescriptions can be made. FRI should be consulted for recommendations for particular stands.