F. O. Kla Plant

UGANDA FOREST DEPARTMENT Technical Note No.114/63

Observations on crown-diameter, stocking, silvicultural requirements and possible yield of Maesopsis.

From R.P.s 15, 32, 53 and 389 in Budongo, 225 and 228 B at Opit. June-July 1962. Expanded from article in C.F.R., December, 1962.

Crown-diameter ratio.

1. Crown-diameters (d.k.) of trees of R.P. 15 were plotted agains their bole-diameters (d) at b.h. The relation between the two appeared to be linear, and on that assumption was calculated as:

$$d.k. = .85 + 25.15 \times d$$

(d.k. and d in the same units)

$$\text{or } d.k.' = 2.8 + \begin{pmatrix} 2.1 \times d'' \\ .67 \times c'' \\ 8.0 \times c' \end{pmatrix} \text{ approx.}$$

FOREST ... 24 SEP 1963 KAMPALA
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2. The equation implies the following crown-diameter ratios (d.k./d, listed below against c rather than d):

c":-	36	48	60	72	84	96
d.k.':-	27	35	43	51	59	67
d.k./d:-	28	27	27	27	26	26

3. Although the trees of R.P. 15 varied only from 36" to 80" c, yet when the line was extrapolated up to 120" and down to 20" c, it was found to pass almost exactly through the mean points of the other Budongo R.P.s, including even the senile restricted trees of R.P. 53 and the free-growing juveniles of R.P. 32. In fact d.k. of all the measured Budongo trees lay within ± 15% of the expected value of the R.P. 15 line, and 80% of them lay within 10%.

4. Trees of the Opit samples straddled the Budongo d.k.:d line but showed greater variation below it, i.e. considerably smaller d.k./d ratios existed. However, increment at Opit was found to be highly dependent on d.k./d and varied almost proportionally with the ratio. Thus the smaller-crowned trees were markedly slower growing, other factors being equal, and would doubtless have been shaded out had they been in natural, untended conditions as at Budongo. The d.k./d ratios found for averagely growing trees in Budongo were equally valid for Opit.

Implications on stocking.

5. If healthy mid-rotation Maesopsis requires a d.k./d ratio of 27 then total basal-area at that stage cannot be allowed to exceed $43560 \div 27^2 = 60$ ft.^{2}/ac. and even that implies 100% stocking. If crowns are to be kept reasonably free, for instance at 75% canopy (= circular contacting crowns at square spacing), then 45 ft.^{2}/ac. is the limit. At maturity it would be reasonable to permit say 90% canopy and with d.k./d at 26 this allows just under 60 ft.^{2}/ac. Higher densities could not be allowed unless smaller-crowned genotypes are found or inter-locking or overlapping crowns are permitted. On silvicultural evidence we must conclude that only the more efficient genotype holds out any hope for greater final yields.

Silvicultural requirements (R.P.s 15 and 228 B)

6. Analysis of the effects of basal-area crowding and shading revealed nothing new for Maesopsis: its increment, as expected, was sensitive to both. However, owing to the lack of variation of crown exposure in both plots (S.D.% of k.e. was only 9%) and of

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basal-area density at Opit, precise implications of a given degree of thinning could not be calculated.

7. In neither plot did peripheral contact between crowns seriously affect diameter increment, probably because interlacing did not occur; any element of overlapping however, showed up in k.e. and resulted in loss of increment. The sensitivity, extreme at Opit, of increment to d.k./d ratio suggests that subject to overall basal-area remaining below the 45-60 ft.^{2}/ac. line during the 4'-7' girth stage, thinning should aim to avoid overlapping rather than horizontal contacts.

8. Neither plot showed signs of genotypic or soil-mosaic effects on increment, even at Opit. In the latter the whole site must be considered at fault, (i.e. in comparison with Budongo), and if favourable soil pockets exist the trees on them must still be severely limited by some other over-riding site factor.

Volume increment

9. R.P.s 15 and 228B, if they had been fully stocked to 80% canopy at the time of observation, would have been producing about 210 and 80 ft.^{3}/acre respectively, total above-ground volume of wood based on the form-factor f.b. = 0.5. The first figure wa[illegible] probably near to culmination at m.a.i. on that site, the second certainly past it though equally certainly never so high as the first. The higher figure is approximately the same as that which would be produced, including thinnings, from a crop of 6' c, 30-year old trees 100' high standing at 60 ft.^{2}/acre (i.e. 21 trees). Such a crop seems a practical possibility at least on the better t.h.f. sites in Uganda.

Timber volumes would of course be less negligible from the thinnings and probably only two-thirds of the total volume of the final crop, i.e. 1800 to 2100 ft.^{3}/acre or 60 to 70 ft.^{3}/ acre/yr. as m.a.i. of final crop. Greater or lesser height would provide more or less volume, pro rata; for example the 2,400 ft.^{3}/ acre suggested as a possible final crop for R.P. 16 (in the silvicultural section's eleventh annual report, para. 172) was derived from trees averaging about 120' height such as can now be seen in the comparable R.P. 389.

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