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ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 8 (2005) , No. 1 27-31



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Analysis of Leaflet Shape and Area for Improvement of Leaf Area Estimation Method for Sago Palm (*Metroxylon sagu* Rottb.)

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(Received: March 18, 2004)

Abstract: Leaf area of sago palm (*Metroxylon sagu* Rottb.) can not be estimated accurately from the whole leaf shape, and individual leaflet area must be measured for accurate estimation of leaf area. In this study we examined leaflet characteristics in detail and developed a method of estimating individual leaflet area. Shapes of all leaflets were similar regardless of their sizes. The leaflet width was maximal at the distal position around 30–40% from the leaflet base. Products of leaflet lengths and maximum widths (as the X-axis) showed almost a linear relationship with the leaflet areas measured with a leaf area meter (as the Y-axis). Moreover, the Y-intercept of the primary regression equation was very small compared to leaflet area values, and we can regard it as 0. We compared the measured leaflet area with the area of the ellipse with the leaflet length as the major axis and the maximum width as the minor axis. The difference between them was within $\pm 5\%$ except for some leaflets at the base or tip of the leaf. These results suggested that the method of estimating leaflet area from the ellipse area calculated from the leaflet length and the maximum leaflet width as major and minor axes, respectively was simple and accurate. The estimation equation for the leaflet area is $S(e) = 0.785 L_{\text{Leaflet}} \times W_{\text{Leaflet}}$, where $S(e)$ is the estimated leaflet area, L_{Leaflet} is the leaflet length, and W_{Leaflet} is the maximum leaflet width.

Keywords: [Leaf area](#), [Leaflet](#), [Leaflet area](#), [Leaflet shape](#), [Metroxylon sagu](#) Rottb., [Sago palm](#)

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To cite this article:

Satoshi Nakamura, Youji Nitta, Manabu Watanabe and Yusuke Goto: "Analysis of Leaflet Shape and Area for Improvement of Leaf Area Estimation Method for Sago Palm (*Metroxylon sagu* Rottb.)". Plant Production Science, Vol. **8**, pp.27-31 (2005) .

doi:10.1626/pps.8.27

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