

Non-destructive estimation of maize leaf area, fresh weight, and dry weight using leaf length and leaf width.

ABSTRACT

Leaf area and leaf weight measurements are required to calculate several growth indices, which are leaf area index (LAI), net assimilation rate (NAR), specific leaf area (SLA), specific leaf weight (SLW), and leaf area duration (LAD). We developed three predictive equations to estimate leaf area, leaf fresh and dry weight in maize from leaf length and leaf width measurements. A total of 1,314 leaves from different parts of plants at different plant growth stages, different planting densities and different sowing dates were collected in 2008 at the Agricultural Research Center near Gorgan, Golestan, Iran. To evaluate the equations, some goodness of fit indicators used included mean absolute error, root mean square error and index of agreement. This study found strong relationships between leaf length and leaf width and LA, LFW and LDW ($R^2 > 0.85$). Based on the results LA, LFW and LDW of individual maize leaves can be estimated non-destructively by leaf length and leaf width. These equations allow the research workers to make non-destructive or repeat measurements on the same leaves. The general equation to estimate LA, LFW, and LDW was: $\text{Ln}(Y) = a + b \text{Ln}(L) + c \text{Ln}(W)$

Keyword: Zea mays ; Maize ; Leaf area ; Leaf fresh weight ; Leaf dry weight ; Non-destructive estimation