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ESTIMATION OF LEAF AREA IN *COSTUS SPECIOSUS* USING LINEAR MEASUREMENTS

Several methods have been suggested from time to time by various workers for determining leaf area of field crops. A usual method is to work out a constant which when multiplied with the dimensions of the leaf will yield an estimate of its area with a reasonable degree of accuracy. The method is simple, non-destructive to the plant and allows rapid, on the spot estimation of area of leaves even by unskilled field staff. This technique has been used by Spencer (1962) in cassava; Yadav and Kumar (1974) in arecanut; Arora and Chanana (1975) in grapes and Madhusoodana Rao (1975) in bajra. But no such studies have been conducted on *Costus speciosus* (Koening) which is an erect, stout, perennial herb with some medicinal uses. Its leaves are oblong to lanceolate, silky beneath and spirally arranged on thick cane like stems. The actual measurement of leaf area on *Costus speciosus* by graphical method is tedious and time consuming and hence a rapid method has been evolved to determine the leaf area of *Costus speciosus* using linear measurements.

A sample of 200 leaves of different sizes was collected randomly from the bulk crop grown at the College of Horticulture, Vellanikkara. Leaf area of each leaf was obtained by tracing the leaf on graph paper and counting the number of squares. The maximum length (L) and maximum breadth (B) of the leaf were measured and correlated with the actual leaf area.

The correlation coefficients between leaf area (Y) and its components are presented in Table 1. As the form of the relationship was unknown logarithm of leaf area was also correlated with size measurements. All the correlation coefficients were statistically significant but the strength of relationship was poor in all cases. The independent variables explained only about 50% variations in leaf area.

In order to get a more precise relationship between leaf area and leaf measurements the breadth of the leaf was measured at three points by dividing the leaf length roughly into four equal portions by erecting ordinates at equal intervals. The first point was located at the first quartile Q, of the maximum length of the leaf which was also a point of inflexion of the curve of leaf lamina. The second point Q_2 was at the foot of the maximum ordinate and the third point Q_3 was at the third quartile which was also a point of inflexion of the curve of leaf lamina. Shortly, the three breadth measurements were taken by dividing the length of lamina roughly into 4 equal segments. The average value of the three breadth measurements was also calculated. Correlation coefficients between leaf area and mean breadth and between leaf area and the product of mean breadth and maximum length were also calculated and are given in Table 2. It was found that the product of length of leaf and mean breadth of leaf had a strong positive correlation with leaf area. About 94 per cent of the total variation in leaf area measurements could be explained by the regression equation of leaf area on this variable. For a rapid estimation of leaf area a simpler form of the relationship was devised. This is of the form $Y = k X$ where Y = leaf area; X = mean breadth x maximum length and k is a constant. The constant k was estimated to be equal to 0.7152.

Table 1
Relationship between leaf area and leaf dimensions

Associated variables	Correlation coefficients
Leaf area and maximum length (L)	0.6326**
Leaf area and maximum breadth (B)	0.6555**
Leaf area and L x B	0.5923**
Logarithm of leaf area and L x B	0.7261
Leaf area log L x B	0.7431
Leaf area and square of L x B	0.7339

** Significant at P = 0.01

Table 2
Relationship between leaf area and size measurements

Size measurements	Correlation coefficient	Regression equation
Mean breadth	0.82**	
Product of mean breadth and maximum length	0.97**	Y - 4.008 + 0.6341 x

** **Significant at P — 0.01**

സംഗ്രഹം

കോസ്റ്റസ് സ്പീസിയോസസ് എന്ന ഒരിനം മരുന്നു ചെടിയുടെ പർണ്ണ വിസ്തീർണ്ണം നിർണ്ണയിക്കുന്നതിന് ഒരെളുപ്പ മാർഗ്ഗം കണ്ടെത്തുകയുണ്ടായി. ഇതിന് ഇലയുടെ നീളത്തെ ശരാശരി വീതി കൊണ്ടു ഗുണിച്ചു കിട്ടുന്ന സംഖ്യയെ 0.7152 എന്ന സ്ഥിരാങ്കം കൊണ്ട് ഗുണിച്ചാൽ മതിയാകും.

College of Horticulture
Vellanikkara 680 654
Trichur, Kerala, India

P. V. Prabhakaran
P. K. Sudha Devi

References

Arora, J. S. and Chanana, Y. R. 1975 Measurement of leaf area on grapes, *Punjab Hon. J,* 15, 95-97.

Madhusoodana Rao, D. V. 1975, The constant for calculating leaf area in Bajra. *Andhra agric. J.* 22, 35-37.

Spencer, S. 1962. Estimation of leaf area in cassava. *Trop. Agric, Trin.* 39, 147-148.

Yadav, R. B, R. and Kumar, V. 1974. A note on the rapid method for estimating leaf area in growing arecanut palm. *Indian J. agric. Res.* 44, 129-131.