Bothalia 12, 4: 737 (1979).

Miscellaneous ecological notes

VARIOUS AUTHORS

ALLOMETRIC BIOMASS RELATIONS APPLIED TO SUCCULENT PLANT FORMS

The writer is not aware of any reports in which relations between plant dimension and total plant biomass have been applied to succulent plant forms such as are found in Karoo areas. To test the feasibility of such applications, a pilot study was carried out in succulent Karoo vegetation in the foothills of the Hex River mountains near Worcester, Cape. Rainfall occurs mostly in winter with an annual rainfall of roughly 240 mm. *Cotyledon paniculata* (Crassulaceae) a dwarf arborescent succulent plant form common in this vegetation type (Olivier, 1966) was selected as test species.

Height and stem circumference of each of a range of eleven individuals were measured and total above ground freshmass of each was determined and subsampled individually for conversion to dry mass (at 85°C). Various formulae (allometric and non-allometric) and axes transformations were applied to relate the dimensions (in cm) to dry mass (in kg).

It was found that the relation with the highest correlation coefficient of 0,973 was in the form of:

ln (dry mass)= $-7{,}070+0{,}816$ ln [(height) (diameter)^2]

with a standard error of estimate of 0,230; a standard error of first regression coefficient of 0,615 and a standard error or second regression coefficient of 0,065.

The optimum biomass relation (Fig. 1) found for *C. paniculata* is thus of the same allometric type as has been found for tree forms in many parts of the world (for example, Kira & Shidei, 1967; Newbould, 1967). Considering the relatively small sample (eleven), the correlation coefficient of 0,973 is high relative to that sometimes found for low numbers of woody plants. Sampling took place in winter (August) when there was a mean water content of 82,8% of freshmass with little variation between individuals, that is with a 95% confidence interval of $\pm 1{,}8\%$. High mean water content for the wet season is likely to decrease significantly in the arid hot summer period as indicated by Walter's (1939) data on transpiration and osmotic pressure for several Karoo succulents in the dry season. Resultant decreases in turgor and stem circumference in the dry season may require that the above relation for *C. paniculata* only apply to the winter period with plant water content between 80 and 85% of freshmass.

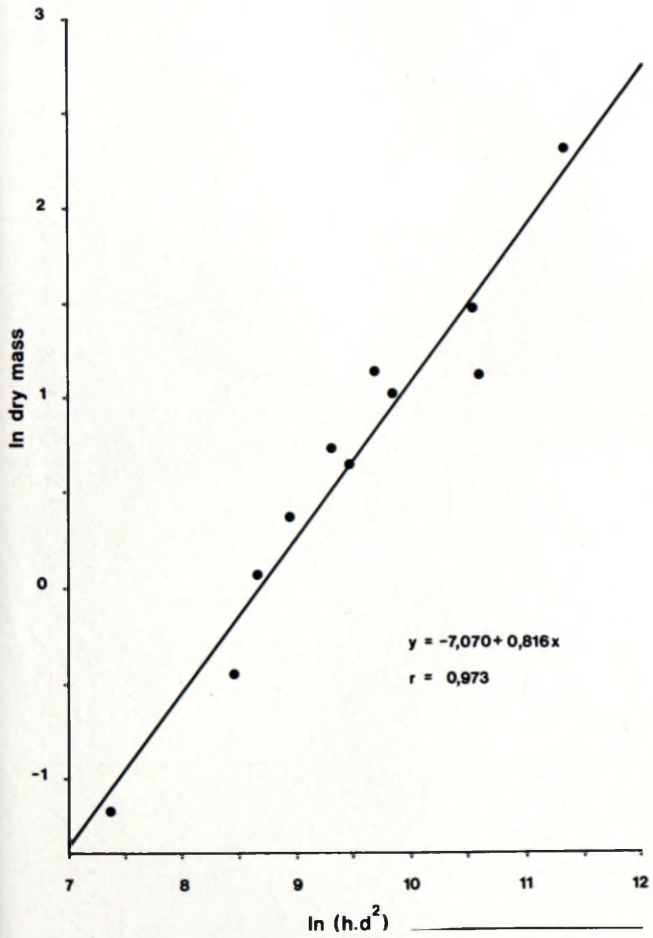

FIG. 1.—Allometric biomass relation in *Cotyledon paniculata*.

It appears that to maintain the high level of biomass correlation found in succulents such as *C. paniculata* determination of seasonal changes in allometric relations may become increasingly important in future work of this kind.

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