

strain hyphal fusions have been seen to occur also with this strain. Should this inference be confirmed, the high frequency with which non-conidial mutants have been found, even without irradiation⁶, would simply be the consequence of dominance.

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- ¹ Baker, G. E., *Bull. Torrey Bot. Club*, **71**, 367 (1944).
- ² Hansen, H. N., *Phytopathology*, **32**, 639 (1942).
- ³ Dodge, B. O., *Bull. Torrey Bot. Club*, **69**, 75 (1942).
- ⁴ Lindgren, C. C., *J. Genet.*, **28**, 425 (1934).
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Diurnal Fluctuation in a Physical Property of Leaf Cuticle

THE extent to which the outer surface of a leaf is wetted by water may depend on factors varying with species, age, and position on the plant. A series of investigations on advancing contact angles has made it clear that, in addition, the adhesion of water for leaf surfaces may vary considerably with the condition of the leaf, and, in particular, with factors showing a cyclic diurnal change.

Measurements made at intervals over periods of up to 26 hours have shown the existence of distinct diurnal fluctuations in the magnitude of the advancing contact angle of water on the leaves of the two plant species so far investigated from this point of view. Contact angles were determined by a method similar to that of Ebeling¹, in which a value is derived from the characteristics of the curve obtained by tracing the projected profile of a drop resting on a horizontal surface. The accompanying graph represents results obtained with *Brassica sinapis* Visiani growing in an outdoor plot. Contact angle increased after dawn, reaching a maximum in the afternoon and falling after sunset to a minimum before sunrise. The difference between the two extremes was of the order of 30°. In other experiments contact angle has been observed to rise again to a second maximum after the minimum occurring about four hours after sunset, afterwards falling once more to a low value

just after dawn. Essentially similar fluctuations through a smaller range (6–9°) have been found to occur in *Triticum vulgare* Host. under both greenhouse and outdoor conditions. When the two species have been compared, the changes in contact angle of *Triticum* have been found to parallel very closely those of *Brassica*.

In detached leaves the effect of temperature has been found to be negligible; but a marked rise in the value of contact angle has been observed in wilting leaves and it appears that the water relations of the leaf are of considerable importance in determining its magnitude. The following results were obtained using the upper surface of leaves, removed in the morning from young *Triticum* plants, left to dry out under laboratory conditions of temperature and humidity. Control leaves, kept from the start of the experiment with their cut ends immersed in water, showed no statistically significant change in the characteristics investigated. Each value for contact angle is the mean of nine determinations.

Time in hours	0.0	0.5	1.0	1.5	2.0	2.5	4.0
Mean contact angle for water (θ)	123.7°	128.6°	133.2°	138.3°	141.6°	145.2°	152.4°
Standard deviation of θ	2.0	2.2	1.9	1.1	1.7	0.8	2.7
Wt. of leaves as % of initial value	100.0	96.0	92.1	86.2	84.5	82.4	72.0

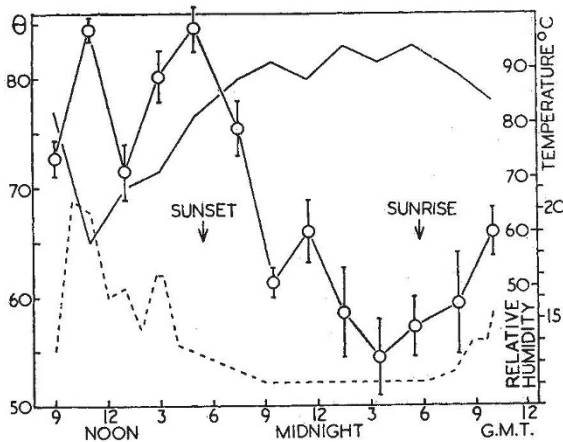
Such a change in contact angle is fully reversible on recovery of turgor. Thus the contact angle of water on *Triticum* leaves rose on wilting for three hours from 117.7° ± 2.3 to 146.0° ± 0.8, but returned to 118.4° ± 2.4 after the leaves had stood with their cut ends in water for a further three hours. Water applied directly to the surface of the leaf appears to be ineffective in restoring the low value of contact angle.

The contact angle of water on wilted or turgid leaves stretched uniformly has been found not to differ appreciably from that on similar unstretched leaves. It seems unlikely, therefore, that the observed changes in the surface properties of the cuticle can be due simply to alteration in the closeness of packing of hydrophilic or hydrophobic units, produced by expansion or contraction in response to turgor changes. Variation in the extent of water-imbibition of the cuticle is possibly of more importance in determining the magnitude of contact angle.

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¹ Ebeling, W., *Hilgardia*, **12**, 665 (1939).



DIURNAL FLUCTUATION IN THE ADVANCING CONTACT ANGLE OF WATER (θ) ON THE UPPER SURFACE OF LEAVES OF *Brassica sinapis* VISIANI GROWING IN AN OUTDOOR PLOT (SEPTEMBER 1943). EACH VALUE IS THE MEAN OF TEN DETERMINATIONS, THE STANDARD DEVIATION OF THE MEAN BEING INDICATED. CONTACT ANGLE, —○—; RELATIVE HUMIDITY (BY WHIRLING HYGROMETER), - - - - -; TEMPERATURE,

Wilting of Shoots in Scented Geranium (*Pelargonium odoratissimum*)

Pelargonium odoratissimum Ait. (scented geranium) is a perennial trailing herb extensively cultivated for the essential oil present in the leaves, which is used as a cheap substitute for the attar of roses. Large numbers of these plants growing in Bangalore were parasitized by a species of *Sphaeropsis* which caused the wilting of the shoots. When the infection extended up to the collar region it resulted in the death of the entire plant.

A detailed microscopic and cultural study of the fungus was undertaken and the pathogenicity of the