

Crassula ovata

(Jade Plant, Money Plant)

& CAM photosynthesis

The Jade, or Money Plant, *Crassula ovata*, is a native of southern Africa and has long been popular with gardeners around the world. These succulent-leaved plants are particularly hardy, and almost seem to thrive on neglect! In fact, they are more likely to die from overwatering than from drought. However, they do need bright sunshine – see the reasons below. They require very little attention, and new plants can easily be grown from branches or even from leaves.

In South Africa, the Money Plant is known from the Eastern Cape and KwaZulu-Natal where it grows with other species of succulents, such as aloes and euphorbias.

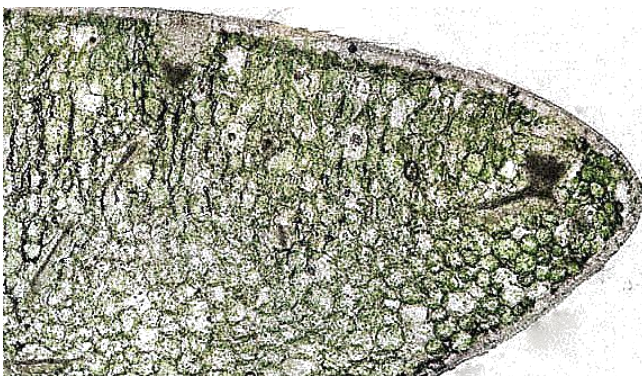


Crassula - a model example of CAM photosynthesis?

Crassula is one genus within the plant family Crassulaceae that includes more than 1,300 species in 34 genera. They are mostly succulent plants that thrive in hot, dry environments. How do they survive? They utilise a photosynthetic pathway that bears the family name – **Crassulacean Acid Metabolism (CAM)**.

The stomates of CAM plants are closed during the daylight hours. This is key to their survival in deserts, as closed stomates minimise water loss from excessive transpiration during the day. During the cooler and more humid night-time, when the stomates open, CO₂ is collected and stored as *malate* (malic acid) in vacuoles in the leaf cells. The next day while the stomates are again closed, *malate* (storing carbon) is released from the vacuoles and enters the chloroplasts where the CO₂ from the previous night is released to the Calvin cycle and photosynthesis can take place.

The acidic malic acid that accumulates at night explains why the fruit of another famous CAM plant, pineapple, is often pretty sour. Was it picked in the morning?



Section through a *Crassula* leaf.

The anatomy of CAM plants is very different from that of C₃ or C₄ plants. The leaf cells are large, thin-walled and spherical, with no clearly defined arrangement within the leaf. In fact, they look rather like loosely packed *balloons*. The vacuoles within the leaf are very large, and there tend to be far fewer chloroplasts in the surrounding cytosol than you would

expect in the faster-growing C₃ or C₄ plants. The vascular bundles are scattered randomly through the leaf and have no clearly defined attributes relating to CAM photosynthesis. The plant family Crassulaceae is unique in that it is the only plant family in which **all** species utilise the CAM photosynthetic pathway.

Christien Malan & Alice Notten, Kirstenbosch National Botanical Garden 2005

<http://www.plantzafrica.com/plantcd/crassovat.htm>

Map modified from *Discover Life*: www.discoverlife.org

Leaf section: Radboud University Nijmegen, Netherlands

<http://www.vcbio.science.ru.nl/en/image-gallery/show/PL0273/>

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