

Imaging Kalanchoe Plantlet Initiation

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Kalanchoe daigremontiana reproduces by producing plantlets along its leaf margins, unlike other plants that reproduce by embryos in seeds. It was long thought that these plantlets arose from displaced axillary buds. Recent studies have shown that the LEC1 gene, typically expressed in the embryonic shoot apical meristem (SAM) of seedlings, is expressed in *Kalanchoe* leaves. The genetic basis for this atypical reproduction is now well understood, yet images of plantlet initiations have never been captured. Typically, the SAM is dome shaped while axillary buds initiate as lunate clusters of cells. It was hypothesized that plantlets in *Kalanchoe* would initiate as a domed structure rather than as lunate axillary meristems. Plants were propagated and mold impressions made on the leaf margins using dental impression material and mounted on slides. Replicas of the leaf margins were cast from the molds in epoxy plastic to record plantlet initiations. The mold replicas were prepared for scanning electron microscopy (SEM) to allow imaging the replicas at high magnification. Collected images clearly displayed an initial, undifferentiated dome-shaped structure. Plantlet initiation followed a disto-proximal succession along the leaf margin presenting progressively more mature stages of initiation on each leaf starting at the leaf tip. Thus a virtual record of temporal development occurred spatially along each margin. The images of initiation recorded in this study strongly support the hypothesis that plantlets initiate in a dome pattern similar to embryonic shoot apical meristematic initiation with no evidence of axillary character to the plantlet initials.