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Hydathodes in *Ficus Formosana* Maxim Form. Himadai Hay

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Leaf blades of *Ficus formosana* Maxim form. Shimadai Hay were cut into small cubes in fixation buffer containing 2.5% glutaraldehyde. These cubes were transfered to a fresh fixation buffer for 2h, postfixed in 1% osmium tetraoxide for 4h, dehydrated through an ethanol series, and then infiltrated and embedded in Spurr's resin. Sections in golden color were collected on grids, doubly stained with uranyl acetate and lead citrate, and observed with a Hitachi H-600 transmission electron microscope (TEM). Thick sections, 1 mm in thickness, were stained with Toludine blue and photographed with a Zeiss Photomicroscope III. For surface observation, samples were critical-pointly dried after dehydration with ethanol, coated with gold in an ion sputter and examined with a Hatachi S-520 scanning electron microscope (SEM).

Hydathodes of *Ficus formosana* unexceptionally distrubute on the adaxial surface of leaf blade, whereas stomata are always on the abaxial side. They arrange parallelly in two rows along the axis of leaf blade and one on each side of the midrib. The number of hydathodes on leaf surface is closely related to successive appearance in phylotaxy, and is determined in young extended leaf and independent of leaf developmental stage. The passive hydathodes consist of numberous water pores and enclosed by a distinct trichome and several cellular glands which involve in active secretion. Water pores are preferentially located within the regions of sunken hydathodes and their number per each hydathode are around 60. The openings of water pores are much smaller than that of stomata. They are hydropassive and release water passively under the control of root pressure. Mineral crystals, bacterial sludges and fungal mycelia are often oberved on the surface of hydathodes. The complex hydathodes of this fig contain five parts: water pores, enclosed by two peripheral cells; subaperature chamber, bounded by 2 layers of parenchymatous cells which are larger than that of epithem; epithem proper, consisted of a group of thin-walled and more or less elongated smallest cells; sheath layer, extend from vascular bundles is 1-2 celled in thickness surrounding the epithem proper; vascular endings, contacted with epithem proper. Ultrasctructural studies show that: peripheral cells of water pore contain amyloplasts and employ with the partially wall-thickening around pores; the pattern of their wall thickening is differerent from that in guard cells in stoma complex. Epithemal cells are surrounded by the waveringly wall-thickening and irregular in shape. Cells in sheath layer are characterized by the centrifugal location of plastids which is in intermediate type mediated between mesophyllous cells and epithemal cells. Tracheid with distinct secondary wall are found in vein ending contact with epithem.

Two major ways of water discharge from plant leaves are vapour transpiration and liquid guttation through stomata and hydathodes, respetively. Besides pure water, guttation fluid also contains various minerals, sugars and other organic substances which cause injury to plants or microbial infections through their accummulation on leaf surface. Functionally, hydathodes not only play an important role on water excretion but also on retrieval minerals. Their structure are different from those of stomata, even though both have same phylogenic origin. *F. formosana* Maxim form. Shimadai Hay. are small shrubs in height of 1-2 m and grow in the regions near the creeks or beneath the large trees in the leeward-slope of low mountains. They like low light intensity, high humicity and non-windy weather condition. The distribution and structure of hyperdermal hydathodes and hypodermal stomata could be fiffted with the habitation of the shrubs. Moreover, the observations of the complex passive hydathodes at ultrastruc-

tural level are certainly limited. Epithemal cells with special wall inward-growth referred as transfer cells were reported in some plant species. Sheath cells tightly contacted each other with cutinized adjacent cells were also observed before. However, epithemal cells only with wave-formed wall pattern and sheath cells without cutinization on cell wall were observed in this studies.