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## Development of a Low-cost Tensiometer Driven Irrigation Control Unit for Fruit Tree Irrigation

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### Abstract

Irrigated fruit tree production is an important source of income for upland farmers in northern Thailand. As water is an increasingly scarce resource in the hillsides, strategies for more efficient water use are fundamental for sustainably increasing agricultural production and ensuring farmers' livelihoods. However, modern technology for an improved irrigation is often not affordable to upland farmers. Therefore, an adapted solution for optimised irrigation was investigated.

An automatic tensio control (ATC) unit was developed to use soil water tension to open and close the inlet valve of a micro-irrigation lateral. It works without electric components, so that it can be operated in areas without access to electricity. Furthermore, it is assembled from cheap, locally available materials. Thus, it can be easily copied and adapted to different agro-ecological, as well a socio-economic environments.

The ATC was tested under controlled conditions, whereby soil water tension and the opening and closing times of the main valves were recorded. Additionally, soil water content was measured by use of time domain reflectometry (TDR). To monitor the functioning of the ATC under field conditions, three units were set up on commercial orchards in Mae Sa Mai, close to Chiang Mai. The operation was left to farmers, who participated in the evaluation of the device.

Testing the ATC on station and under field conditions, it has proven its reliability in maintaining a favourable moisture regime in the soil. Thereby an optimal water supply of the trees was obtained, avoiding over irrigation. For farmers, however, the complete automatic functioning of the device was considered to be the most favourable aspect.

**Keywords:** Adapted technology, automatic irrigation, soil moisture, soil water tension