（第３号様式）(Form No. 3)

学 位 論 文 要 旨
Dissertation Abstract

氏名： Sartika Laban
Name

学位論文題目：
Title of Dissertation

Agricultural Water Use for Rice, Mung Bean and Chili Pepper Cultivations in Dry and Rainy Seasons, South Sulawesi, Indonesia
(インドネシア・南スラウェシの乾季・雨季における水田，リョクトウ畑，トウガラシ畑の農業水利用)

学位論文要旨：
Dissertation Abstract

Renggang WUA agriculture area was located in the downstream area of Bili-Bili irrigation system where the irrigation water supplied by Bili-Bili multi-purpose dam through Kampili primary canal and Pammase secondary canal. In the first dry season (May to August) and rainy season (December to April), mostly rice was cultivated. While, in the very dry condition or in the second dry season (September to November), mostly mung bean was cultivated. The main water supply for agriculture cultivation in the rainy season was rainfall. The main water supply in the first dry season was surface irrigation, but some farmers use shallow groundwater as well. In the second dry season, mostly farmers use shallow groundwater by pumping for crops cultivation.

The study area focused on the downstream area of Bili-Bili irrigation system. We assumed that if the agriculture area in the downstream could fully irrigate, then agriculture area in the upstream and middle stream of Bili-Bili irrigation system also probably could get the surface water irrigation. However, even in the first dry season, the irrigated area could not reach 100% of the agriculture area in Renggang WUA.

In this study, we explained the story of irrigation system development especially in Renggang WUA, calculating the water balance in the dry and rainy season for rice, mung bean and chili pepper, measured the evapotranspiration by lysimeter method and Bowen Ratio Energy Balance (BREB) method, calculated the amount of

shallow groundwater uptake in the dry season, observed manually the shallow groundwater level during dry and rainy season. Finally, estimate the irrigation water requirement for different crops in each season.

In the first dry season showed that the three ways of irrigation, which consisted of the canal irrigation (Qi), the reused water irrigation of drainage from the adjacent region (Qr) and the groundwater irrigation from wells (Gi), contributed 72 % to the gross water supply in 2012 and 67 % in 2013. Among the three ways of irrigation, Qr accounted for the largest part in 2012, while Qi did in 2013. It was revealed that an alternative way like reusing water from drainage could be functioned as an important water supply under some problems in the irrigation system in 2012.

In the second dry season, water use for mung bean was 186.06 mm/season in 2012 and slightly decrease to 169.04 mm/season in 2013. Where more irrigation supply for land preparation, another water supply for irrigated the mung bean crops during its vegetative stages, and no irrigation practice was found during the generative stages. In addition, the water use for rice in the second dry season was higher than the first dry season. Therefore, the study concluded that the importance of shallow groundwater due to supporting the agriculture cultivation during very dry condition. However, the deepest of shallow groundwater level occurred in the second dry season and close to the soil surface occurred during the rainy season.

In the rainy season, agriculture water was abundant for rice cultivation. The abundance of water affects the increasing the shallow groundwater level. Finding in this study show that the function of paddy field as the water storage could be clearly shown in the changing of shallow groundwater level that the value of R^2 is 0.97. This study found that recharging shallow groundwater in the paddy field could be used as one of the shallow groundwater management options in the irrigation paddy field. Measuring the level and amount of shallow groundwater uptake is very important due to the understanding of the function of paddy field for conserving the water to the ground and water management for irrigation.

Lastly, the evaluation of irrigation practice through irrigation water requirement in rice, mung bean and chili pepper crops resulting that there was a discrepancy between the amount of water supply by the farmer and the irrigation water requirement during the dry and rainy season. Resulting in the decreasing of yields, especially rice crops. Thus, the relationship between water supply and crops yield could determine by polynomial regression (R^2 = 0.908).