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Soil Management Systems Improve Water Use Efficiency of Rainfed Rice in the Semi-Arid Tropics of Southern Lombok, Eastern Indonesia

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Abstract: Rice (*Oryza sativa*) grown on rainfed Vertisols in the semi-arid tropics of southern Lombok, Eastern Indonesia, is usually flooded in the short wet season, creating a considerable demand for water. However, rice crops and secondary crops frequently suffer from water stress as the soil dries after the wet season. Four systems of soil management for rice were studied at Wakan and Kawo, with average annual rainfalls of 984 mm and 1665 mm respectively. The objective was to improve water use efficiency (grain yield/m³ water consumed). The four systems were unflooded permanent raised beds with tillage (RMT) or without tillage (RNT), and flooded flat land with tillage (FMT, the conventional system, *gogorancah*), or without tillage (FNT). Water was kept at 0.1 m depth in the furrows (RMT, RNT) or at 0.05 m depth on flat land (FMT, FNT). Excess water was collected in a dam (*embung*), and used when necessary to keep the water at the desired depth.

Compared with FMT, RNT reduced crop water requirement for rice by 50% at Wakan and by 44% at Kawo. Water use efficiency in RNT was increased by 90% at Wakan, and by 56% at Kawo, compared with that in FMT. There were no differences between treatments in the yield of rice at Kawo (4.5 t/ha), but at Wakan yield was better in FMT or FNT (4.2 t/ha) than RMT or RNT (2.8 t/ha). Hence, on rainfed Vertisols of Southern Lombok, rice grown on permanent raised beds, with or without tillage, could successfully replace rice grown under the conventional flooded system with tillage on flat land

(gogorancah), where the rainfall is higher. The extra water saved with permanent raised beds could be used to irrigate secondary crops.

Keywords: [Evaporation](#), [Paddy](#), [Precipitation](#), [Water requirement](#)

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