

ABS - Spatial distribution of soil moisture in oil palm plantations in an undulating landscape in Jambi, Sumatra



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DFG Deutsche Forschungsgemeinschaft

SUMMARY

Inactive path area of oil palm plantations, where pruned fronds are placed after harvest, plays a significant role to keep soil humidity. However, its application area is only 13%. Its function is most important in undulating landscapes of medium and heavy slopes, where runoff is more intensive and water recharge and soil moisture are consequently lower.

OBJECTIVES:

To assess the soil water distribution in oil palm plantations at different soil depths and for different slope classes in an undulating landscape in Jambi.

METHODS:

Gravimetric soil moisture was analyzed at depths of 0-10 cm, 10-20 cm, 20-30 cm, 30-40 cm, 40-60 cm and 60-100 cm. The sampling points (4 replicates each) were located in 'weeding circles' (< 100 cm distance from the trunk), on 'active' path area (at 280 and 370 cm distance, respectively) and on 'inactive' path area. 'Inactive' paths are the locations for the placement of pruned fronds in inter-rows (about 2 m wide); of every three inter-rows, one is prepared as 'inactive' path, and the remaining as 'active' paths, i.e. for maintenance and harvest activities. 'Weeding circles', around the trunks of the palms, show no ground vegetation due to frequent harvesting operations as well as weed control application.

Measurements were conducted between May and August 2014. Slopes were categorized into the classes 'slight' (6-12%), 'medium' (12-25%) and 'heavy' (25-40%).

RESULTS

Weeding circles occupied 5% of the plantation area, active paths 82% and inactive paths 13%.

Weeding circles were less moist than both active and inactive path areas, especially in the upper soil layer (0-30 cm). In deeper layers, there was no significant difference in soil water content under weeding circles and active path area, while under inactive path area, soil water content was significantly higher (Fig.1).

Soil water content was similar for all slope classes in the upper soil layer (0-20 cm), but decreased to 17.2% to a depth of 80 cm under medium and heavy slopes. It did not decrease with increasing depth under slight slopes (Fig.2).

RECOMMENDATIONS

The inactive path area of oil palm plantations should be maintained and extended in order to improve soil moisture status, particularly in undulating landscapes where plant water supply is potentially at risk due to limitations in water cycling.

Fig. 1. Soil water content in oil palm plantations under weeding circles, active and inactive paths at 0-100 cm soil depth (average of the three gradient slopes)

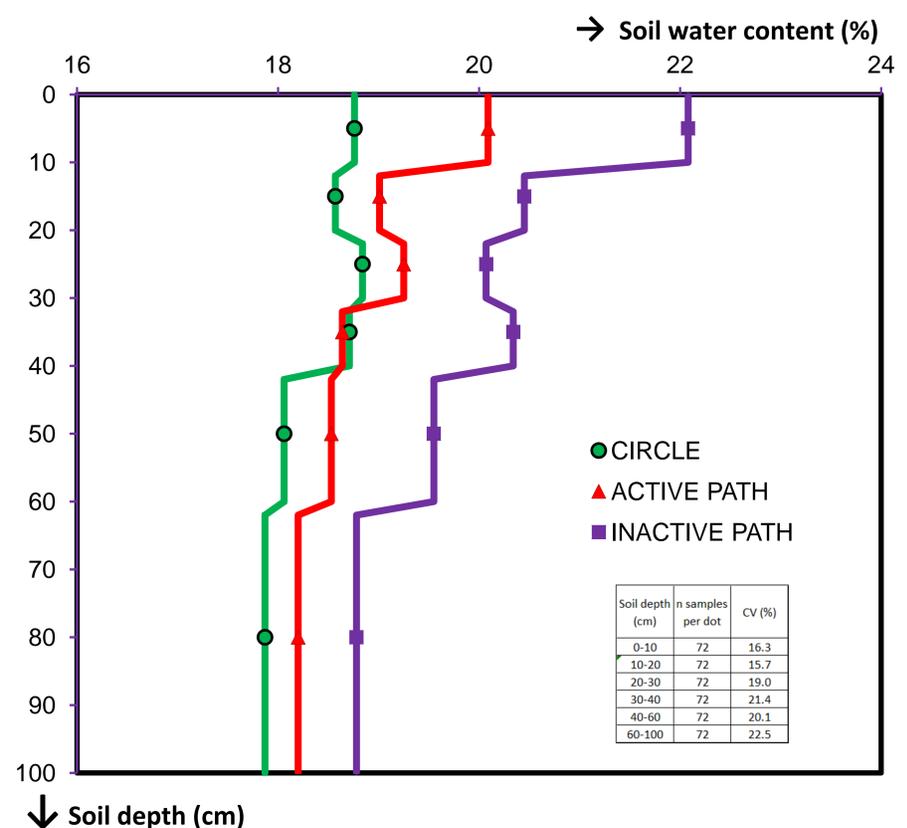
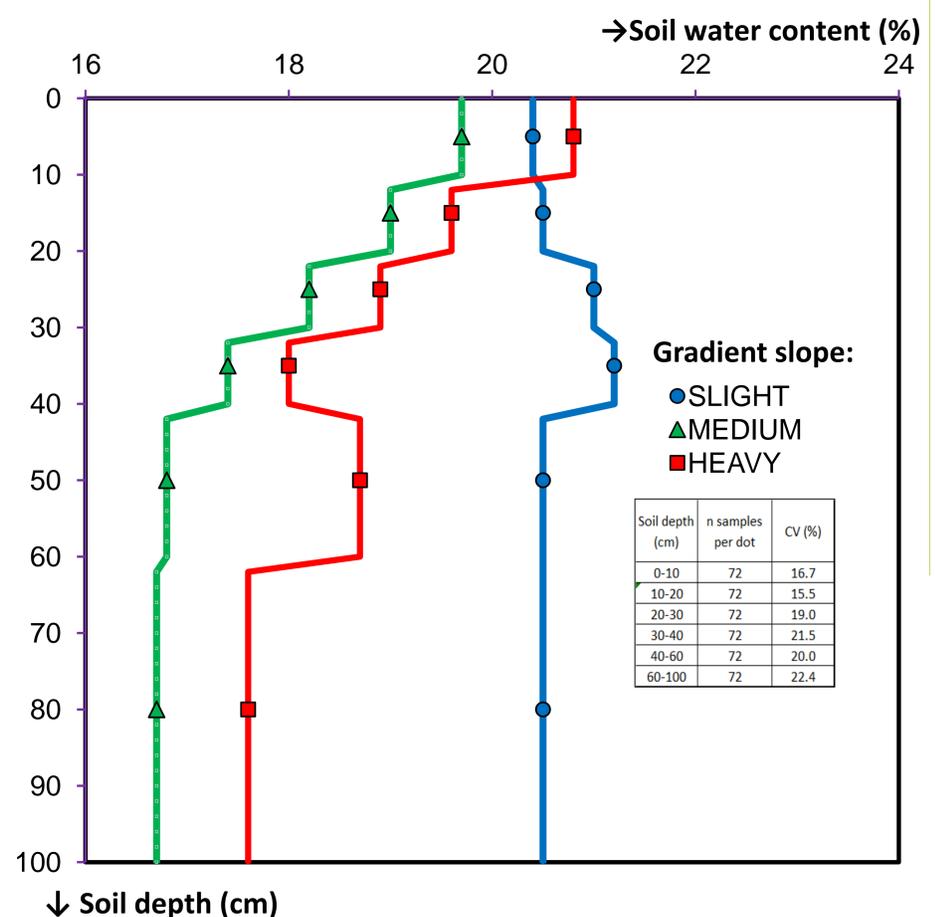


Fig. 2. Soil water content in oil palm plantations under slight, medium and heavy slopes at 0-100 cm soil depth (proportional average of circle area, active path and inactive path)



ACKNOWLEDGEMENTS

Supported by BOPTN (Decentralization Program of Indonesian Ministry of Education & Culture) and ABS FUND of CRC990: Georg-August-Universität Göttingen, Germany-UNJA-IPB.