Name	Counterpart	Title
Herdatha Augusta	A02	Variability of infiltration rates under different understory vegetation in oil palm during the wet and dry season

Research Summary

There is limited information on the impact of understory vegetation, especially of moss which grows extensively in oil palm plantations, on soil infiltration and moistening, and its contribution to improve ecosystem service.
The objective of this study was to identify the role of understory vegetation – moss and weeds – on cumulative infiltration rates and infiltration capacities during the wet and dry season in mineral soils (terrestrial area) and riparian areas of oil palm plantations of smallholder and corporate farmers.

The study was conducted at a) HOR3 at Sungkai (riparian area, age of plantation of 12-16 years) and at PTPN VI, and b) at HOR2 at Singkawang & PTPN VI (mineral soil).
The destructive area outside of the core plots area was selected as the observation point. Data collection took place in the dry season (August-October 2022) and the rainy season (October-December 2022). The observation frequency was conducted three times in the rainy season and twice in the rainy season. The observation area was situated in a riparian zone in PTPN6 with a distance to the water body of less than 40m and HOR3, and a terrestrial area with a distance to the water body of more than 40m in PTPN6 and 3 oil palm smallholder farmers in Singkawang, Kabupaten Batanghari. The sampling area represents each oil palm distance spacing at 9 m x 9 m x 9 m considering the contribution of the circle area and active path area. Vegetation that emerged at the frond pile area was not observed. The measured parameters are the following: 1. Soil covering rate with weeds and moss, 2. cumulative infiltration rate in 4 hours in the first infiltration time and infiltration capacity (K_s) with manual double-ring infiltrometer.

At the area where minimum sunlight transmission (5–10%), i.e., at the circle area in a radius of ±1.6m around the oil palm trunk, it was found, that the moss growth in the riparian area was more intensive in the dry season rather than in rainy season (Table 1). On the contrary in the same season, the weed growth showed the lower dominancy against the most growth. The main concern at the active path area of the oil palm plantation at the riparian zone in the rainy season showed a similar occurrence, where the growth of mosses covered approximately 312% compared to the weed cover rate. The total covering rate of both vegetation amounted to 61.7%. In the active path of terrestrial area weed growth dominated the surface cover of oil palm plantations in both seasons, where the cover of weeds reached 67.8% and moss covers at the level of averagely 11.3%. The total covering rate by the vegetation was 79.1%, and 20.9% of the surface area was without any vegetative protection.

Table 1. Moss and weed covering rate at the riparian area and terrestrial area in dry and rainy season oil palm plantation.

Area	**Cover**	Surface covering rate (%)			
		Dry Season		Rainy Season	
		Circle area	Active path	Circle area	Active path
Riparian	Moss	55±22	36±16	32±27	46±17
	Grass	13±6	30±7	14±9	15±17
Terrestrial	Moss	21±17	8±4	3±5	14±6
	Weed *	38±16	70±6.	39±12	67±10

*± (standard deviation)

In the riparian area, there was no evidence of the difference of infiltration rate measured in Ks both in the circle area and active path area, which reached very low at the value of 1.74-4.02 cm h^{-1} in the dry season and 3.29-3.88 cm h^{-1} in the rainy season (Table 2). However, in the terrestrial area at the active path area, the Ks value reached an average of 12.13 cm h^{-1} in the dry season and 5.86 cm h^{-1} in the rainy season. The Ks-value in the oil palm circle in the terrestrial area showed no difference value, which was a very low category value ranging from 3.37-3.80 cm h^{-1}. The cumula-

tive value of infiltrated water during the first four hours in the riparian zone in the active path ranged from 10.35-18.52 cm. This value is lower than cumulative infiltrated water in terrestrial areas, which ranges from 25.83-110.55 cm in the first 4 hours of infiltration time.

Table 2. Infiltration rate at the circle and active path area of oil palm in dry and rainy seasons in categorized riparian and terrestrial zone

Categorized zone	Season	Infiltration rate	Circle area	Active path
Riparian area	Dry season	K_S-value (cm h^{-1})	4±2	1±0.27
		Cum. infiltration (cm)*	22±10	10±1
	Rainy season	K_S-value (cm h^{-1})	3±0.90	3±1
		Cum. infiltration (cm)*	20±1	18±4
Terrestrial area	Dry season	K_S-value (cm h^{-1})	3±0.67	12±9
		Cum. infiltration (cm)*	33±7	110±20
	Rainy season	K_S-value (cm h^{-1})	3±0.97	5±2
		Cum. infiltration (cm)*	17±2	25±10

*Cumulative infiltration value in 4 hours infiltration time; ± (standard deviation)

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