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Potential Pathogenic Bacteria in Loose Oil Palm Fruit (LOPF) from Smallholdings in Serian, Sarawak

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Abstract

Oil palm (*Elaeis guineensis)* is a species of palm tree cultivated mainly for its oil. Malaysia is the second largest producer of oil palm behind Indonesia. During the harvesting of oil palm fruit bunch, some over ripped fruits will get detached from the fruit bunch and these loose fruits will be contaminated with bacteria from the soil. Collecting the loose fruits from the ground is normally done manually by hand and this may allow the transmission of bacteria from the soil to the workers.

According to Table 1, this study reported on the microbial contents of the oil palm loose fruits collected from three different locations of smallholding oil palm in Serian Sarawak, Malaysia. The result shows that F3S3 at Kampung Raeh Baru has the highest number of colonies, 20.4 x 10^5 CFU mL-1, while the lowest number of colonies was at F2S1, which was at Kampung Beradau, Siburan, with 2.4 x 10^5 CFU mL-1.

Table 1: Number of bacteria colonies of each sampling station

Locations	Sampling Stations	Colony Forming Unit (CFU)/mL
Kampung Paon Rimu (F1)	F1S1	4.4 x 10^5
	F1S2	3.1 x 10^5
	F1S3	3.3 x 10^5
Kampung Beradau (F2)	F2S1	2.4 x 10^5
	F2S2	4.4 x 10^5
	F2S3	3.6 x 10^5

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Kampung Raeh Baru (F3)	F3S1	15.2 x 10^5
	F3S2	16.0 x 10^5
	F3S3	20.4 x 10^5
	F3S4	7.2 x 10^5

*RED: The lowest counts; BLUE: The highest counts

This study was aimed to isolate and identify bacteria on the loose oil palm fruits (LOPF) and determine the microbial quality which may affect the safety and health of the farm workers. Loose oil palm fruits were collected from the ground of three smallholder farms located in Serian, Sarawak. The fruit were weighted and stomached with peptone water in stomacher bags and plated on Nutrient agar. The 16S rRNA PCR was carried out for the bacterial growing on the plate. The purified DNA product was sent to Apical Scientific Sdn. Bhd. for DNA sequencing. The sequences obtained were directly compared with the sequences in the Genbank through the Blastn server. The result obtained shows in Table 2 that 15 different bacterial species were identified from the loose fruit oil palm samples including *Chryseobacterium indologenes*, *Enterobacter hormaechei*, K*lebsiella pneumonia*, *Klebsiella quasipneumoniae*, *Klebsiella* sp., *Pantoe dispersa*, *Pantoe* sp., *Pseudomonas aeruginosa*, *Pseudomonas mendocina*, *Pseudomonas nitroreducens*, *Serratia marcescens, Simplicispira metamorpha.*

Table 2: Identity of the bacteria strain and its percentage similarity

Isolate	Colony Apperance	Organism	Accession Number	Percentage Similarity
F1S1:1	Pink	*Klebsiella pneumoniae*	CP085863. 1	100%
F1S1:2	Brownish Yellow	*Pseudomonas mendocina*	MT526544. 1	95.78%
F1S1:3	Pink	*Klebsiella pneumoniae*	CP085863. 1	100%
F1S1:4	Pink	*Klebsiella* sp.	MT550667. 1	100%
F1S1:5	Pink	*Klebsiella pneumoniae*	CP091582. 1	100%
F1S2:2	Pink	*Klebsiella quasipneumoniae*	MT125950. 1	100%
F1S2:3	Pink	*Klebsiella* sp.	MT550667. 1	100%
F1S3:2	Pink	*Klebsiella* sp.	MT550667. 1	100%
F1S3:4	Pink	*Klebsiella pneumoniae*	CP085863. 1	100%
F1S3:5	Pink	*Klebsiella pneumoniae*	OM243108. 1	99.59%
F2S1:1	Yellowish orange	*Serratia marcescens*	KC206270. 1	99.41%

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F2S1:4	Yellowish orange	*Serratia marcescens*	AF511431. 1	99.79%
F2S1:5	Yellowish orange	*Serratia marcescens*	MT131170. 1	99.79%
F2S2:1	White creamy	*Enterobacter hormaechei*	CP053190. 1	98.09%
F2S3:1	Yellowish orange	*Serratia marcescens*	MT131170. 1	100%
F3S1:3	Greenish	*Pseudomonas aeruginosa*	MK993516. 1	100%
F3S1:4	Greenish	*Pseudomonas nitroreducens*	MT464466. 1	100%
F3S2:1	Yellowish	*Chryseobacterium indologenes*	LN866620. 1	99.38%
F3S2:2	Yellowish orange	*Serratia nematodiphila*	MN691953. 1	99.79%
F3S2:3	Yellow	*Pantoe dispersa*	MT540024. 1	100%
F3S2:4	Yellow	*Pantoe* sp.	KU597508. 1	100%
F3S2:5	Yellow	*Pantoe dispersa*	MT540024. 1	100%
F3S3:1	White creamy	*Enterobacter hormaechei*	CP053190. 1	98.09%
F3S3:2	White colorless	*Leclercia* sp.	CP049786. 1	98.60%
F3S3:4	Brownish cream	*Simplicispira metamorpha*	MW079906. 1	97.82%
F3S3:5	Cream	*Kosakonia oryzae*	MT613376. 1	100%

Some of the bacterial species could be pathogenic, hence, it is important to communicate the findings of this research to provide sufficient knowledge to the farmers about the biological hazards associated with the loose oil palm fruits in order for them to take precaution in proper handling of the loose fruits.

Keywords
Loose oil palm fruits, Bacteria, Public health, Farm workers

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