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-Short communication

ANTIBACTERIAL ACTIVITY OF *SYNSEPALUM DULCIFICUM* LEAF EXTRACT AGAINST *LISTERIA MONOCYTOGENES* AND ITS COMPARISON WITH *STROBILANTHES CRISPUS* AND *MORUS ALBA*

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Traditionally, the aqueous extract from *Strobilanthes crispus* has been used by local folks in South East Asian countries including Malaysia and Indonesia for medicinal practices to manage various ailments (Fadzelly et al. 2006). Ethanolic extract of *S. crispus* was found to contain active compounds with good antibacterial activity (Lim et al. 2015). Mulberry (*Morus alba*), a shrub plant from temperate areas with bright red fruit has been used for animal feed and food for human consumption. Since *M. alba* is rich with antioxidant, it has been used widely in cosmetic and drug development (Emniyet et al. 2015). *Synsepalum dulcificum* is a tropical plant which native to West Africa (Chen et al. 2015) and commonly known as miracle fruit due to the unique properties of altering human taste bud by replacing the sour into sweet taste (Njoku et al. 2015). Previously, Chen et al. (2015) reported some effects of miracle fruit leaf extract on mutation and oxidative damage. To date based on our current knowledge; no specific research has been carried out regarding the antibacterial activity of *S. dulcificum* extract. Since *L. monocytogenes* has been reported as resistant to many types of antibacterial drug, finding antibacterial activity compound against it is very difficult (Abbasiliasi et al. 2014). Thus, this research was conducted to investigate the potential of the above mentioned leaf extracts on the antibacterial activity against *L. monocytogenes*.

L. monocytogenes was cultured on brain heart broth (BHB) and incubated at 37°C for two days. After activation, the bacterial was inoculated into BHB and after overnight grown, *L. monocytogenes* was spread onto BHB agar plate. The well (6 mm in diameter) was made using sterile yellow tip. Sample was put in the well and stored in chill temperature (4°C) for 2 hours before incubation (37°C) overnight and the diameter of the clear zone produced was measured (as inhibition zone). The well without inhibition zone was considered as no antibacterial activity. Bacteriocin-like Inhibitory Substance (BLIS) and sterile distilled water (or DMSO-dimethyl sulfoxide) was used as positive and negative control, respectively (Niratker et al. 2015). The DMSO solution was used as received. Antibacterial activity was defined as Activity Unit, AU (mm^2/ ml) and the inhibition zone was observed 24 hours after incubation (Abbasiliasi et al. 2014). The calculation of antibacterial activity was performed using the following equation; $AU = (Lz - Ls)/V$. *Lz* represents the clear zone in mm^2 whereas the *Ls* represents the area of well in mm^2, divided by the volume of sample in ml

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loaded into the well. Results of antibacterial activity of the both alcoholic extracts were compared with positive control (BLIS) and negative control (DMSO).

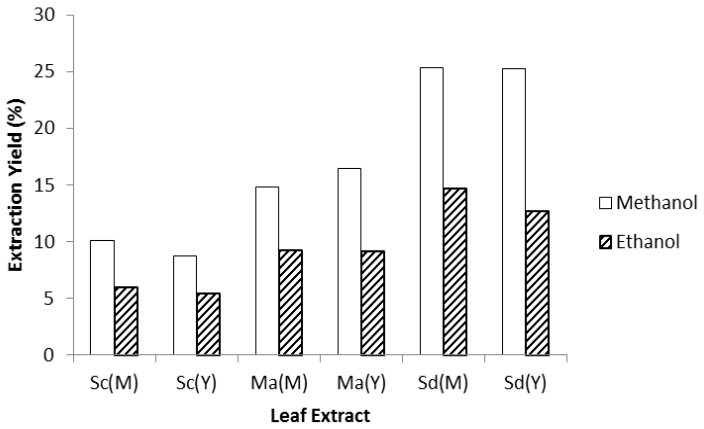

Fig. 1. Yield (%) of methanolic and ethanolic leaf extracts; *Sc* (M) = *Strobilanthes crispus* (mature), *Sc* (Y) = *Strobilanthes crispus* (young), *Ma* (M) = *Morus alba* (mature), *Ma* (Y) = *Morus alba* (young), *Sd* (M) = *Synsepalum dulcificum* (mature), *Sd* (Y) = *Synsepalum dulcificum* (young); Values of each curve are means ± standard deviation (number of samples, n = 3), P <0.05.

Fig. 1 shows percentage yield of the methanolic and ethanolic extracts of *S. crispus, M. alba* and *S. dulcificum* respectively. Based on the methanolic extracts, the highest yield was obtained from *S. dulcificum* mature leaves of 25.35% followed by *S. dulcificum* young leaves of 25.26% and finally *M. alba* young leaves of 14.78%. Meanwhile, for ethanolic extracts, the highest yield was obtained from *S. dulcificum* mature leaves of 14.66% which was much lower compared to the methanolic extracts.

Table 1. Antibacterial activity of *Strobilanthes crispus, Morus alba,* and *Synsepalum dulcificum* extracts on the growth of *Listeria monocytogenes.*

	Activity unit, AU (mm^2/ml)	
	Methanolic extract	Ethanolic extract
Mature (adult)		
S. crispus	-	-
M. Alba	848.34	756.04
S. dulcificum	284.74	271.47
Young		
S. crispus	-	-
M. Alba	583.23	159.06
S. dulcificum	159.06	232.59

Key: (-) = without antimicrobial activity; values are average of three samples of each leaves, analyzed individually in triplicate.

The effect of methanolic and ethanolic extracts (for both young and mature leaves) on the growth of pathogenic bacteria (*L. monocytogenes*) was studied (Table 1). Higher antibacterial activity (against *L. monocytogenes*) for the methanolic extract of *M. alba* was obtained compared to the ethanolic extract. Antibacterial activity of the methanolic extract of *M. alba* mature leaves was observed to be higher than the young leaves suggesting that the mature leaf contains a higher amount of antibacterial compounds against *L. monocytogenes*. Meanwhile, the antibacterial activity against *L. monocytogenes* observed for *S. dulcificum* was smaller than *M. alba*, regardless of the age of the leaves nor the solvents used for the extraction. *L. monocytogenes* was found to be sensitive towards leaf extracts using in this study, even though it is well known as multi-resistance to many drugs (Kümmerer 2009).

Based on the results, it can be concluded that antibacterial compound against *L. monocytogenes* can be obtained from the crude extract of *S. dulcificum* and *M. alba* from both mature and young leaves with better performance from mature leaf of the methanolic extract of *M. alba*. More researches need to be conducted since both extracts shows good result for *L. monocytogenes* and may also good potential for other pathogenic bacteria.

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