Preliminary Studies on Phytochemical Screening of Ulam and Fruit from Malaysia

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Abstract: Alkaloids, saponins, steroid, terpenoid, flavonoids, phenolic distribution in 14 Malaysian favourite ulam and fruit belonging to different families were assessed and compared. The plants investigated were *parkia speciosa* (petai), *solanum torvum* (terung pipit), *pithecellobium bubalinum* (kerdas), *moringa oleifera* (kacang kelor), *dryobalanops oblongifolia* (keladan), *cosmos caudatus* (ulam raja), *mentha arvensis* (pudina), *ocimum* sp. (selasih), *cymbopogon nardus* (serai wangi), *eugenia polyantha* (serai kayu), *Barringtonia scortechnii*, (Putat), *musa* sp. (pisang), *talinum paniculatum* (akar som) and *phyllanthus acidus* (cermai). *Moringa oleifera* leaf and *dryobalanops oblongifolia* fruit were found contain positive reactions of alkaloids. All the samples studied also show high content of saponin except in bark and seed of *parkia speciosa* and stem of *phyllanthus acidus*. Meanwhile, results of the phytochemical screening on saponins, steroids, terpenoids, phenolic and flavonoids showed that *cosmos caudatus*, *ocimum* sp., *mentha arvensis*, *barringtonia scortechnii* and *moringa oleifera* were the active compounds present in the leaves of the plant.

Keywords: Ulam, Fruit, Phytochemical studies, Alkaloids

Introduction

Most of Malay people eat a lot of vegetables and they usually eat the vegetable fresh (ulam). They believe that these ulam are beneficial against many diseases and had positive effects. The medicinal value of all the plants lies in some chemical substances. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds¹. Plant phenolics are commonly found in both edible and non-edible plants, and have been reported to have multiple biological effects, including antioxidant activity. Besides that, epidemiological studies have shown that there is a positive association

between intake of vegetables and fruits and reduced cardiovascular diseases² and certain cancers³. Along with other antioxidant components, polyphenols (*e.g.* flavonoids) present in fruits and vegetables have been reported to be potential sources in lowering cardiovascular diseases⁴.

Experimental

The herbs specimens were bought from Jengka, Pahang market and Jengka area. These specimens were then sent to the botanist for confirmatory identification.

Phytochemical screening

Alkaloid

The method of alkaloid testing was carried out according to the procedure of culvenor and Fitzgerald⁵. The presence of most alkaloids in the aqueous phase can be detected by the formation of a precipitate on addition of Mayer reagent (K_2HgI_4). The semi-quantitative results of the method have been rated from 1+ for faint turbidity to 4+ for heavy curdy precipitate.

Saponin

For saponin testing, the method used was the bubble testing. If the bubbles remain 30 minutes to one hour, it was rated as 1+, one to two hours: 2+ and two to three hours, 3+, and more than three⁶ hours, 4+.

Phenolic

Screening for phenolic was carried out by using chloroform extraction; the crude spray by $FeCl_3$ will give the blue dot showing the existence of the phenolic.

Terpenoid

Liquid-solid extraction was used for terpenoid determination. The samples were extracted using the methanol as solvent, then followed by vacuum filtration, and sprayed by the dyeing reagent. The terpenoid existence was shown by the greyish colour on the TLC plate⁷.

Results and Discussion

The phytochemical screening characters of ulam and fruit investigated are summarised in Table 1. Alkaloid, terpenoid, saponin and phenolic were present in all the plants studied but in the different part of the species.

Table 1. Phytochemical substances of ulam and fruit investigated

Samples	Alkaloid	Saponin	Steroid	Phenolic	Flavonoid	Terpenoid
<i>T. paniculatum</i>	3+ (St), + (Lf)	2+(St), 2+(Lf)	+(St), + (Lf)	+ (St), + (Lf)	+ (St), - (Lf)	+ (St), + (Lf)
<i>Musa sp.</i>	3+(Fl)	3+(Fl)	- (Fl)	- (Fl)	+ (Fl)	- (Fl)
<i>C. caudatus</i>	3+(St), 3+(Lf)	4+(St), 4+(Lf)	+(St), + (Lf)	- (St), + (Lf)	+ (St), + (Lf)	- (St), + (Lf)
<i>M. arvensis</i>	2+(St), 2+(Lf)	3+(St), 3+(Lf)	+(St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)
<i>Ocimum sp.</i>	1+(St), 1+(Lf)	4+(St), 4+(Lf)	+(St), + (Lf)	- (St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)
<i>E. polyantha</i>	2+(St), 2+(Lf)	4+(St), 4+(Lf)	+(St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)	- (St), - (Lf)

Contd.....

<i>C. nardus</i>	2+(St), 2+(Lf)	2+(St), 2+(Lf)	- (St), - (Lf)	- (St), + (Lf)	+ (St), + (Lf)	- (St), + (Lf)
<i>B. scortechinii</i>	2+(St), 2+(Lf)	1+(St), 1+(Lf)	+ (St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)	+ (St), + (Lf)
<i>P. speciosa</i>	- (Lf), 2+(Sd), 1+(Br), 1+(Sc)	4+(Lf), - (Sd), - (Br), 4+(Sc)	+ (Lf), - (Sd), - (Br), - (Sc)	+ (Lf), - (Sd), + (Br), - (Sc)	+ (Lf), + (Sd)- (Br), + (Sc)	- (Lf),+(Sd) - (Br), - (Sc)
<i>S. torvum</i>	1+(Fr), 1+(Br)	2+(Fr), 1+(Br)	+ (Fr), + (Br)	+ (Fr), + (Br)	+ (Fr), - (Br)	- (Fr), - (Br)
<i>P. acidus</i>	1+(St), 2+(Lf)	- (St), 3+(Lf)	+ (St), - (Lf)	- (St), + (Lf)	+ (St), - (Lf)	- (St), + (Lf)
<i>M. oleifera</i>	4+(Lf)	2+(Lf)	+ (Lf)	+ (Lf)	+ (Lf)	+ (Lf)
<i>D. oblongifolia</i>	4+(Fr)	4+(Fr)	+ (Fr)	+ (Fr)	- (Fr)	- (Fr)
<i>P. bubalinum</i>	4+(Fr)	4+(Fr)	- (Fr)	- (Fr)	+ (Fr)	- (Fr)

*Lf(leaves), Br(bark), St(stem),Fr(fruit), Sd(seed), Sc (seed coat), Present of constituents; Steroid; +, present and -, absent, Phenolic; +, present and -, absent, Flavonoid; +, present and -, absent, Terpenoid; +, present and -, absent

Alkaloid was present in all the samples but in the different parts of the plants except on *P. speciosa* leaves. The *P. speciosa* leaves also shown negative result on terpenoid existence but shown positive result on saponin existence (4+). However, *P. speciosa* seeds reported by Che Yunus *et al.*,⁸ contain terpenoids compounds of β -sitosterol and squalene. It is interesting to note that the analysis of different plant parts (leaf, seed, bark and seed coat) resulted in various existence of the entire compound studied. *P. acidus* also show an existence of alkaloid compound and phenolic compound (leaf). Similar result were obtained by Komuraiah *et al.*,⁹ that revealed the presence of high amounts of alkaloids and phenols in the extract of the same genera of the sample studied, *P. amarus*.

Most positive existence of alkaloid can be found on *M. oleifera* leaf, *D. oblongifolia* fruit and *Pi. bubalinum* fruit with 4+. *M. oleifera* result are parallel to the earlier studies conducted on root of the species that shown the existence of alkaloid¹⁰. Besides that, other researcher reported that the leaves of *M. oleifera* can be good sources of proteins for animal feeds¹¹. Siddhuraju and Becker¹² also reported that *M. oleifera* show an existence of phenolic content, where their study reported on total phenolic content in three different climates.

Phenolic compound existence are negative on stem of *C. caudatus*, *Ocimum* sp., *C. nardus*, *P. acidus*, flower of *Musa* sp., fruit of *P. bubalinum*, seed and seed coat of *P. speciosa*. This result is contrast to study done by Mustafa *et al.*,¹³ who reported that *C. caudatus* show an existence of phenolic content. The difference in the findings might be due to part of the sample studied. However, this study is parallel to the finding of their study based on the existence of flavonoid compound in *C. caudatus*. And most of the sample studied gives a positive result on flavonoid compound. Alkaloids¹⁴ and phenols¹⁵ have been reported to possess antimicrobial activity.

Study done by Mohd Azizi *et al.*,¹⁶ reported that other species of *Pithecellobium*, *P. jiringan* seeds contain terpenoids, flavonoid and alkaloid compounds. This study confirms the result on *P. bubalinum* that show an existence on the entire compound except absence on terpenoid compound on seed/fruit. From the study, fruit and bark of *S. torvum* gave positive reactions of alkaloid, saponin, steroid and phenolic. Previous studied confirm the main constituents in the fruits of *S. torvum* are steroidal alkaloids¹⁷, tannins and saponins¹⁸. And the methanolic extract from the fruits of *S. torvum* showed interesting growth inhibiting activity against bacterial species commonly associated with pyogenic infections¹⁹.

For saponin test, stem and leaves of *C. caudatus*, *Ocimum* sp and *E. polyantha*, leaves and seed coat of *P. speciosa* and fruit of *D. oblongifolia* and *P. bubalinum* extract gave a strong positive reaction in all parts studied (4+), which indicated that the part containing high content of saponin. Absence of saponin content was shown on seed and bark of *P. speciosa* and stem of *P. acidus*. Meanwhile study on flavonoid content shown negative results on leaf of *T. paniculatum*, *P. acidus* and bark of *P. speciosa*, and fruit of *D. oblongifolia*. Based on this study, it also shown that stem of *T. paniculatum*, leaves of *M. oleifera*, stem and leaves of *B. scortechinii* and *M. arvensis* shown positive reaction on alkaloids, saponins, steroid, terpenoid, flavonoids, phenolic content.

Conclusion

Major of the ulam and fruit studied had the compound that can be introduced antimicrobial and antioxidant sources. Further studies need to be done for better understanding on their clinical actions against many diseases. This study also reconfirms the potential of Malaysian favourite fruit and ulam are potential in usage in the treatment of bacterial diseases besides developing some new drugs. It is important to include these ulam and fruit in health promotion campaigns. In addition, some of these ulam have the potential to be used and processed as food products for local consumption.

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