Antioxidant activity of plants methanolic extracts from UiTM Pahang Forest Reserve

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ABSTRACT

Antioxidants are important substances that help to reduce the formation of free radicals that give deleterious effect to human body. This study was conducted to determine in vitro evaluation on the antioxidant activity of Melastoma sp. (Senduduk putih), Thottea corymbosa (Serapat), Thottea grandiflora (Hempedu beruang), Ficus sundaica (Ara), Epipremnum sp. (Pisang kera) and Smilax sp. (Rancang tembaga). To evaluate this activity, 1,1-diphenyl-2-picrylhydrazil (DPPH) method was used on six samples concentration; 50, 100, 150, 200, 250 and 500 ppm. Three control samples BHT (Butylated Hydroxyl toluene), Vitamin E and ascorbic acid (Vitamin C) were used as standard and were measured by using visible spectrometry. Result indicated that the Melastoma sp. was the highest scavenger and the lowest scavenger is the extract of Smilax sp.. Methanolic extract of Melastoma sp. had demonstrated significant free radical scavenging ability by giving IC_{50} values of 0.043 mg/ml (43 ppm). This indicates that Melastoma sp. is highly potential as an antioxidant source.

Keywords: *Antioxidant, Melastoma sp. (Senduduk putih), DPPH*

Introduction

Plants are potential sources of natural antioxidants. They absorb the radiation from the sun and generate high levels of oxygen as secondary metabolites of photosynthesis. Oxygen is easily activated by ultra violet (UV) radiation and heat from the sunlight to produce toxic, reactive oxygen species (ROS). ROS may be very damaging, since they can attack lipids in cell membranes, proteins in tissues or enzymes, carbohydrates, and DNA, to induce oxidations, which cause membrane damage, protein modification (including enzymes), and DNA damage (Pietta, 2000). Plants produce various anti oxidative compounds to counteract these ROS in order to survive (Lu and Foo, 1995). Such natural antioxidant substances are believed to play a potential role in interfering with the oxidation process by reacting with free radicals, chelating catalytic metals and scavenging oxygen in biological systems (Halliwell and Gutteridge, 1984).

Many plants have been examined to identify new and effective antioxidant and anticancer compounds, as well as to elucidate the mechanisms of cancer prevention and apoptosis (Pietta et al., 1998; Kim et al., 1998 and Swamy and Tan, 2000). Thus, antioxidants are important inhibitors of lipid peroxidation, not only for food protection but also as a defense mechanism of living cells against oxidative damage (Vimala and Adenan, 1999). Therefore, the objectives of this study were to investigate and identify natural antioxidants from edible plants even though they may not be comparable, in efficiency, to synthetic agents.

Materials and methods

Plant samples

Samples studied were collected from UiTM Pahang Forest Reserve. The plants were identified by botanist from Universiti Teknologi MARA (UiTM) Pahang, and voucher specimens were deposited in the herbarium.

Extraction

All the species studied were air-dried for 48 h at the room temperature, ground into powder and then soaked with methanol for 3 days. The entire extract was concentrated to dryness using rotary evaporator under reduced pressure.

Radical scavenging assay (DPPH)

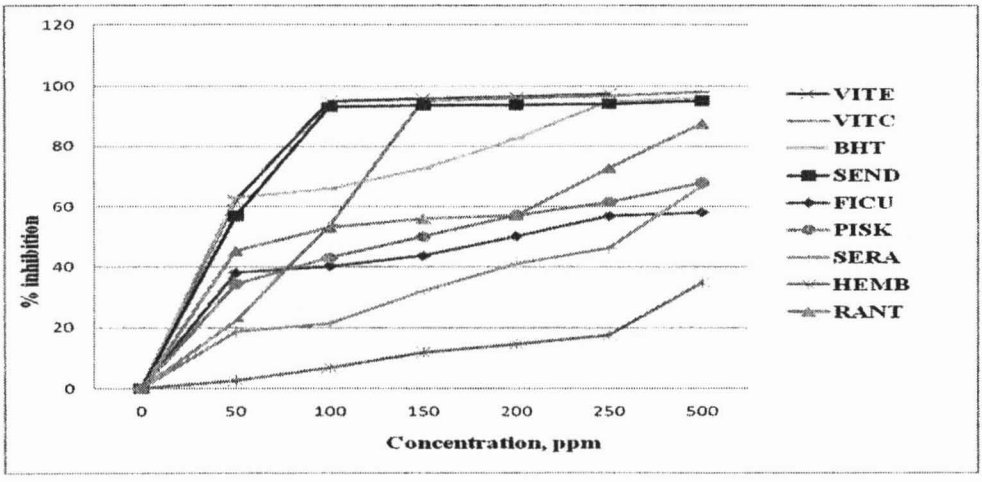
This test was measured following the method of Blois (1958). The solutions were prepared by adding 0.6 ml of samples extracts from each concentrations (50, 100, 150, 200, 250 and 500 ppm) to 4.5 ml of 0.1M methanolic solution of DPPH and were shaken vigorously. The mixture was incubated for 20 min at room temperature for allowing reaction to occur. The controls were prepared as above without any sample extract. The changes in the absorbance of the solutions were measured at 517 nm and methanol was used as the blank solution. The free radical scavenging activity of each solution was determined by comparing its absorbance with the control solution (no sample). Radical scavenging activity was expressed as percent inhibition and was calculated using the following formula:

$$\% \text{ scavenging activity} = 1 - (\text{Abs sample} / \text{Abs control}) \times 100$$

where Abs control is the absorbance of DPPH solution without extracts

Results and discussion

The result of the samples studied is shown in Figure 1.



VITE - Vitamin E, **VITC** - Vitamin C/Ascorbic acid, **BHT** - Butylated Hydroxyl toluene, **SEND** - methanolic extract of *Melastoma sp.*, **FICU** - methanolic extract of *Ficus sundaica*, **PISK** - methanolic extract of *Epipremnum sp.* **SERA**- methanolic extract of *Thottea corymbosa*, **HEMB** - methanolic extract of *Smilax sp.*

Figure 1: DPPH radical scavenging activity of the methanol extracts of herbs studied

The IC_{50} value is defined as the concentration that causes a decrease in the initial amount of DPPH radicals by 50% (Huang et al., 2005). It is the concentration where the active crude extract will exhibit 50% of antioxidant activity (Chiang et al., 2003) and crude extracts exhibit 50% of inhibition at concentration less than 20 µg/ml. These concentrations are considered positive for antioxidant activity (Geran et al., 1972).

The DPPH and IC_{50} percent scavenging activity were widely used parameters to measure free radical scavenging activity. All samples also displayed lower scavenging activity compared to BHT, vitamin V and ascorbic acid except *Melastoma sp.* Their percent inhibitions are in the range 18.68 – 95.14% (Figure 1). The highest scavenger is *Melastoma sp.* while the lowest scavenger is *T. grandiflora.* It has been determined that the antioxidant effect of plant products is mainly due to radical scavenging activity of phenolic compounds such as flavonoids, polyphenols, tannins, and phenolic terpenes (Rahman and Moon, 2007).

All the samples studied had demonstrated major free radical scavenging ability by giving IC_{50} values ranging from 0.043 mg/ml (43 ppm) to 0.26 mg/ml (26 ppm), respectively except for *T. grandiflora.* The lower value of IC_{50} indicate the higher antioxidant power and from this study crude extract of *Melastoma sp* show a significant value as an antioxidant agent compared to the standard, vitamin C with IC_{50} values 0.043 mg/ml (43ppm).

The percentage of scavenging activity for extracts of *T. corymbosa, F. sundaica, Epipremnum sp.* and *Smilax sp,* were considered moderate as they also showed values of IC_{50} and positively effective as an antioxidant agent. Meanwhile, *T. grandiflora* did not show any values of IC_{50}, and therefore it is not effective as an antioxidant compared to the other extracts.

Conclusion

It could be concluded that all the samples studied show a significant value for the antioxidant activity and value of IC_{50} except for *T. grandiflora* and *Melastoma sp.* was the best antioxidant agent. The compound concentration and polarities of the compound itself were important factors to determine the samples scavenging activity. Therefore not all the samples show a significant value of antioxidant activity. Since this plant is found scattered in UiTM Pahang forest reserve and the samples studied showed a significant antioxidant activities, this study suggest that these species may be utilized as an effective antioxidant source.

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