Effect of Ethanolic Extract Terong Belanda (Solanum betaceum Cav.) Peels of Antioxidant Activity by In Vitro

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Abstract. The use of antioxidants from natural ingredients has been carried out research to test the antioxidant activity of Terong Belanda (Solanum betaceum Cav.) peels. Flavonoids contained in the peels of Terong Belanda (Solanum betaceum Cav.). Natural antioxidants could inhibit the formation of free radicals in the body. Free radicals that too much in the body would be oxidative stress, thus required an antioxidant to inhibit it. This purpose of research to determine the antioxidant activity of flavonoid compounds from Terong Belanda (Solanum betaceum Cav.) peels by IC50 value. The method of ethanolic extract of Terong Belanda (Solanum betaceum Cav.) peels by maceration for 1x24 hours with 70% ethanol solvent. The filtrate obtained was then evaporated with waterbath until thick extract was obtained and continued for antioxidant testing. The antioxidant power in this extract determined by the radical capture test of 2,2-diphenyl-1-picrylhydrazyl (DPPH) used UV-Vis spectrophotometry with a wavelength of 517 nm. The results showed positive from Terong Belanda (Solanum betaceum Cav.) peels contained flavonoids with an average value of IC50 45.14 ppm, while vitamin C value of IC50 4.730 ppm both of showed very strong antioxidants.

1. Introduction
Terong Belanda (Solanum betaceum Cav.) in Indonesia may not yet much known by the public, while the fruit is a commodity in a country that has the potential either to be developed. Terong belanda over much consumed as fruit, made syrup or juice. But there is also the fruit are used for seasoning cooking, even also for vegetables [8]. This plant can be used as traditional medicine, for example it can be used as a natural antioxidant, fever, anti bacterial, constipation, heart and cancer prevention [3]. Terong belanda (Solanum betaceum Cav.) peels compounds are terpenoids, phenols, flavonoids and saponins. Flavonoid compounds flavon, flavonol and isoflavone groups are thought to inhibition free radicals so that they can be used as antioxidants [10]. The ethanol extract of Terong Belanda (Solanum betaceum Cav.) peels supports being able to react fat peroxidation in the blood plasma of wistar rats [2].

The content of flavonoid compounds as antioxidants is caused by the capture of free radicals through the donor of hydrogen atoms from hydroxyl groups that can counteract free radicals in the body [7]. Free radical in the body are very reactive and if over will cause oxidative stress, so that the necessary efforts to handling and awareness to do the protection yourself one of them is with antioxidants. Antioxidants are naturally required by the body as if it happened exposure to radical free of excessive, then the body will require antioxidants exogenous from intake of food and vitamins. One of the most commonly used antioxidant activity tests is the method 1,1-diphenyl-2-picrylhydrazyl (DPPH). This testing method is based on the ability of these antioxidant substances to neutralize DPPH free radicals [6].
2. Research Methods

2.1 Tool
Spektrofotometer UV-Vis (Genesys 10 UV scanning electron Thermo co.), Blenders (Philips), vacuum rotary evaporator (Heidolph WB 2000), oven (Heraeus), analytical balance (Shimadzu d = 0.0001 and DJ-series excellent scale d = 0.01), Vortex (Thermolyne and VM3), moisture balance (Shimadzu 0.01%), micro pipette (Socorex 50-200 mL, and 100-1000 mL), beaker glass (pyrex), cawan porselin.

2.2 Material
Terong belanda (Solanum betaceum Cav.) peels, DPPH (1,1-diphenyl-2-picrylhydrazyl) pa (Sigma. Co.), ethanol p.a, ethanol 70% , methanol and aquadest.

2.3 How to research
This research was conducted in several stages including plant determination, maceration extraction followed by remaseration with 70% ethanol solvent, phytochemical screening and IC₅₀ determination of ethanol extract of Terong belanda (Solanum betaceum Cav.) peels with DPPH reduction method.

3. Result And Discussion

3.1 Terong belanda (Solanum betaceum Cav.) peels extraction
Terong belanda (Solanum betaceum Cav.) peels that has been dried, then the extraction process is carried out by maceration method. Maceration is done with the purpose of exciting compounds that exist in the bulbs by using the solvent ethanol 70%. Maceration for ± 24 hours and the stirring process is carried out. The filtrate is filtered and the pulp is remaseration. The filtrate obtained was then collected and evaporated with a rotary vacuum evaporator until a concentrated ethanol extract was obtained. Extract of terong belanda (Solanum betaceum Cav.) peels results obtained as many as 27,0572 grams which is dark brown. The results of Extract of terong belanda (Solanum betaceum Cav.) peels are presented in Table 1.

| Simplisia (gram) | Etanol 70% (mL) | Extract (gram) | Yield (%) |
|------------------|----------------|----------------|-----------|
| 240              | 2400           | 27,0572        | 11,273    |

3.2 Skrinning test Extract of Terong Belanda (Solanum betaceum Cav.) Peels
Skrinning test Extract of Terong Belanda (Solanum betaceum Cav.) Peels with 70% ethanol showed that the Extract of Terong Belanda (Solanum betaceum Cav.) Peels contained phenol and flavonoid compounds. It is evidenced by the change in color becomes dark after reacted with FeCl₃ on the test phenol and change the color of the paper filter becomes yellow after evaporated on ammonia on flavonoid test. The results of skrinning test Extract of Terong Belanda (Solanum betaceum Cav.) Peels presented in Table 2.

| Skrinning test | Reactor | Colour | Conclusion |
|----------------|---------|--------|------------|
| Phenol         | FeCl₃   | Black  | +          |
| Flavonoid      | ammonia | Yellow | +          |

3.3 Percentage of Antioxidant Activity (% inhibition) Extract of Terong Belanda (Solanum betaceum Cav.) Peels
The results of Percentage of Antioxidant Activity (% inhibition) Extract of Terong Belanda (*Solanum betaceum* Cav.) Peels presented in Table 3.

**Table 3.** Percentage of Antioxidant Activity (% Inhibition) Extract of Terong Belanda (*Solanum betaceum* Cav.) Peels

| Concentration | Replication | % antioxidant activity |
|---------------|-------------|------------------------|
| 130 ppm       | I           | 61.2%                  |
|               | II          | 63.5%                  |
|               | III         | 63.5%                  |
|               | Mean        | **62.7%**              |
| 150 ppm       | I           | 62.9%                  |
|               | II          | 64.6%                  |
|               | III         | 65.5%                  |
|               | Mean        | **64.3%**              |
| 190 ppm       | I           | 70.13%                 |
|               | II          | 66.8%                  |
|               | III         | 67.3%                  |
|               | Mean        | **68.1%**              |
| 210 ppm       | I           | 70.4%                  |
|               | II          | 69.9%                  |
|               | III         | 70.4%                  |
|               | Mean        | **70.2%**              |

Based on Table 3, it can be seen that the results of the experiments obtained, the value of percent (%) of antioxidant activity is not less than 50%, this indicates that the extract of Terong Belanda (*Solanum betaceum* Cav.) Peels can be said to be active as an antioxidant. High and low of antioxidant activity is influenced by various factors including its nature which is easily damaged when exposed to oxygen, light, high temperatures, and drying [1].

After obtaining a percent (%) of antioxidant activity, then each extract was calculated IC$_{50}$ value with a linear regression equation. IC$_{50}$ value inversely proportional to the antioxidant ability of a compound. The smaller the IC$_{50}$ value, the stronger the ability of a compound as an antioxidant [6].

### 3.4 IC50 Value Calculation Results Testing Antioxidant Activity

Calculation of antioxidant activity in the table 4.

**Table 4.** Result of IC50 Value Calculation Results for Antioxidant Activity Testing

| Replication | Regresi Linier | R$^2$  | IC$_{50}$ (ppm) |
|-------------|----------------|-------|-----------------|
| 1.          | Y= 0.1282x +   | 0,9525| 43,90           |
|             | 44,372         |       |                 |
| 2.          | Y= 0.075x +    | 0,9414| 46              |
|             | 53,45          |       |                 |
| 3.          | Y= 0.078x +    | 0,9459| 45,53           |
|             | 53,415         |       |                 |
| Mean        |                |       | 45,14           |

(Very strong)

Based on Table 4, it can be known that from the third trial found the average value of the IC$_{50}$ of 45.14 ppm which showed that extract of Terong Belanda (*Solanum betaceum* Cav.) Peels have antioxidant activity that is very strong. It is compound is said to be as antioxidants very strong if it has a value of IC$_{50}$ of less than 50 ppm, antioxidants strong has the value of the IC$_{50}$ of 50-100 ppm,
antioxidants currently has a value of IC$_{50}$ 100-500 ppm, antioxidants weak if the value of the IC$_{50}$ 150 - 200 ppm and antioxidants are very weak if the value of the IC$_{50}$ is more than 200 ppm [4].

The mechanism of antioxidant compounds in Terong Belanda (Solanum betaceum Cav.) peels include flavonoid compounds by donating hydrogen ions so that they can neutralize free radicals [9]. Polyphenol compounds have the ability to neutralize free radicals to form phenoxyl radicals that are relatively stable [5]. Alkaloid compounds have the ability to stop free radical reactions by acting as a hydroxyl radical reducer [11].

4. Conclusion
The results of testing the activity of the antioxidant to extract of Terong Belanda (Solanum betaceum Cav.) Peels using a UV-Vis spectrophotometer at a wavelength of 517.8 indicates antioxidant activity with the average value of the IC$_{50}$ 45.14 ppm. So demonstrated that extract of Terong Belanda (Solanum betaceum Cav.) Peels has the activity of antioxidant that is very strong.

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