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Research Article

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Antioxidant activities of various fruit extracts from three solanum sp. using DPPH and ABTS method and correlation with phenolic, flavonoid and carotenoid content

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ABSTRACT

The objectives of this research were to study antioxidant activities from various fruit extracts of three Solanum sp using two methods of antioxidant assays which were DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azinobis (3-ethyl-benzothiazoline-6-sulfonic acid) and correlation of total flavonoid, phenolic, and carotenoid content in various fruit extracts of three Solanum sp with IC_{50} of DPPH antioxidant activities and IC_{50} of ABTS antioxidant activities. Extraction was conducted by reflux apparatus using different polarity solvents. The extracts were evaporated using rotary evaporator. Antioxidant capacities were tested using DPPH and ABTS assays. Determination of total phenolic, and carotenoid content performed by UV-visible and their correlation with IC_{50} of DPPH and IC_{50} of ABTS antioxidant activities were analyzed by Pearson's method. Ethanolic fruit extract of S. torvum (ST3) had the lowest IC_{50} of DPPH scavenging activity 1.4 µg/ml, while ethanolic fruit extract of S. coagulans (SC3) had the lowest IC_{50} of ABTS scavenging activity 1.5 µg/ml. Ethanolic fruit extract of S. torvum (ST3) the highest total phenolic content (5.15 g GAE/100 g), ethyl acetate fruit extract of S. americanum (SA2) had the highest total flavonoid content (9.37 g QE/100 g), and the highest total carotenoid content (0.87 g BE/100 g). There were negatively high correlation between total phenolic content in all of fruit extracts of S. americanum, S. torvum, S. coagulans with their IC_{50} of DPPH and IC_{50} of IC_{50} of ABTS scavenging activities. The IC_{50} of DPPH scavenging activities of S. americanum, S. torvum, S. coagulans fruit extracts gave linear result with their IC_{50} of ABTS scavenging activities.

Keywords: Antioxidant, DPPH, ABTS, fruit, three Solanum sp, phenolic, flavonoid, carotenoid

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INTRODUCTION

Many degenerative diseases has related with oxidative stress. Antioxidant has potency to protect oxidative stress. Phenolic compounds are commonly found in plants, and they have reported to have multiple biological effects, including antioxidant activity [1-3]. Many studies had revealed that phenolic content in plants could be correlated to their antioxidant activities. Plants contained phenolic and polyphenol compounds can act as antioxidant [3-5].

Some of antioxidant methods such as DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS (2,2'-azinobis (3-ethyl-benzothiazoline-6-sulfonic acid) and CUPRAC (Cupric ion Reducing Antioxidant Capacity) were widely used to predict antioxidant capacity of fresh fruits, beverages, and food [3,6-7]. Previous studies [3,8] revealed that DPPH and ABTS methods could be used to measure antioxidant activity in many plants extracts. The previous studies [6,10-12] exhibited antioxidant capacities of some plants including Solanum sp.

The objectives of this research were to study antioxidant activities of various different polarities extracts (n-hexane, ethyl acetate and ethanol) from three Solanum sp (*Solanum americanum, Solanum torvum, Solanum coagulans)* fruits using DPPH and ABTS assays; and correlation of their antioxidant activities with total phenolic, flavonoid and carotenoid content in each extract.

EXPERIMENTAL SECTION

Materials: ABTS (2,2'-azinobis (3-ethyl-benzothiazoline-6-sulfonic acid), DPPH (2,2-diphenyl-1-picrylhydrazyl), gallic acid, quercetin, beta carotene purchased from Sigma-Aldrich (MO, USA), fruit from three Solanum sp. All other reagents were analytical grades.

Preparation of sample: Fruit from three Solanum sp that were: *S.americanum* Miller namely as sample SA from Pengalengan, West of Java, *S. torvum* Swartz as sample ST from Lembang, West of Java, *S.coagulans* Forsskal as sample PU from Sumedang, West of Java, were thoroughly washed with tap water, sorted while wet, cut, dried, and grinded into powder.

Extraction: Three hundred grams of powdered samples were extracted by reflux apparatus using increasing polarity of solvents. The extraction using n-hexane was repeated three times. The remaining residue was then extracted three times using ethyl acetate. Finally the remaining residue was extracted three times using ethanol. So totally there were nine extracts: three n-hexane extracts (SA1, ST1 and SC1), three ethyl acetate extracts (SA2, ST2, and SC2) and three ethanolic extracts (SA3, ST3 and SC3).

IC_{50} of DPPH scavenging activity: Preparation of DPPH solution was adopted from Blois [13] with minor modification. Various concentration of each extract were pipetted into DPPH solution 50 µg/ml (1:1) to initiate the reaction for obtaining a calibration curve. After 30 minutes incubation, the absorbance was read at wavelength 515 nm by using spectrophotometer UV-Vis Hewlett Packard 8435. Methanol was used as a blank. DPPH solution 50 µg/ml was used as control. Ascorbic acid was used as standard. Analysis was done in triplicate for standard and each extract. Antioxidant activity of each extract was determined based on the reduction of DPPH absorbance by calculating percentage of antioxidant activity [14]. IC_{50} of DPPH scavenging activity of each extract can be calculated using its calibration curve.

IC_{50} of ABTS scavenging activity: Preparation of ABTS radical solution were adopted from Li *et al*. [15] method with minor modification. ABTS diammonium salt solution 7.6 mM in aquadest and potassium persulfate solution 2,5 mM in aquadest were prepared. Each solution allowing to stand in the dark room for 12 hours. The two solutions were mixed with 30 minutes incubation, allowing to stand in refrigerator for 24 hours, then diluted in ethanol. Various concentration of each extract were pipetted into ABTS solution 50 µg/ml (1:1) to initiate the reaction for obtaining a calibration curve. The absorbance was read at wavelength 734 nm using spectrophotometer UV-Vis Hewlett Packard 8435. Ethanol (95%) was used as a blank. ABTS solution 50 µg/ml was used as control. Ascorbic acid was used as standard. Analysis was done in triplicate for standard and each extract. Antioxidant capacity of each extract was determined based on the reduction of ABTS absorbance by calculating percentage of antioxidant activity [14].

Total flavonoid content (TFC): Total flavonoid content was measured using adapted method from Chang *et al.* [16]. The absorbance was read at wavelength 415 nm. Analysis was done in triplicate for each extract. Standard solution of quercetin 36-120 µg/ml were used to obtain a standard curve. The total flavonoid content was reported as percentage of total quercetin equivalent per 100 g extract (g QE/100 g).

Total phenolic content (TPC): Total phenolic content were measured using the modified Folin-Ciolcalteu method adapted from Pourmorad [17]. The absorbance was read at wavelength 765 nm. Analysis was done in triplicate for each extract. Standard solution of gallic acid 40-165 µg/ml were used to obtain a standard curve. The total phenolic content was reported as percentage of total gallic acid equivalent per 100 g extract (g GAE/100 g).

Total carotenoid content (TCC): Total carotenoid content was measured using the modified carotene method adapted from Thaipong *et al* [3]. Each extract were diluted in n-hexane. The absorbance was read at wavelength 470 nm. Analysis was done in triplicate for each extract. Standard solution of beta carotene 5-55 µg/ml were used to obtain a standard curve. The total carotenoid content was reported as percentage of total beta carotene equivalent per 100 g extract (g BE/100 g).

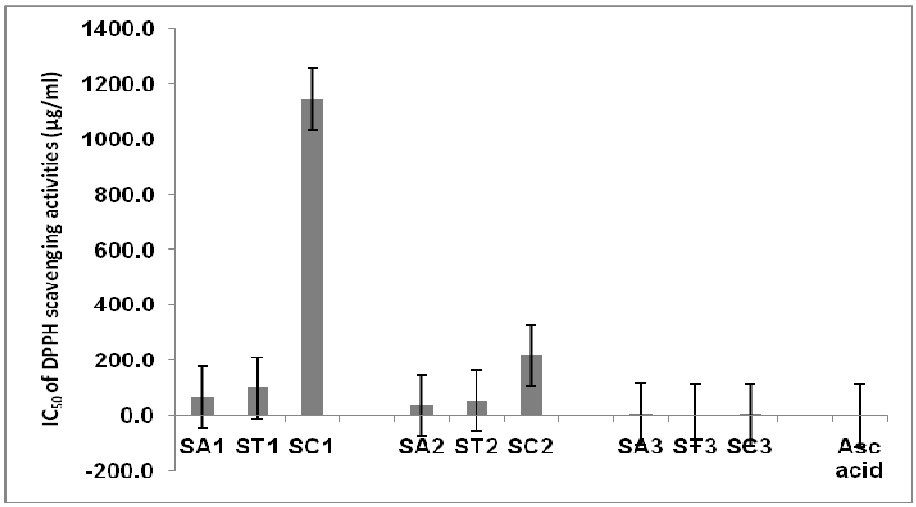
Statistical Analysis: Analysis of each sample was performed in triplicate. All results presented were the means (± SD) of at least three independent experiments. Statistical analysis (ANOVA with a statistical significance level set at $p < 0.05$ and post-hoc Tukey procedure) was carried out with SPSS 16.0 for Windows. Correlations between the total flavonoid, phenolic, carotenoid content and antioxidant activities were made using the Pearson's method ($p < 0.01$).

RESULTS AND DISCUSSION

The previous research [1-2,10,12,18] reported that Solanum sp had antioxidant capacity. There were no study regarding antioxidant capacity of three various polarities extracts (which were n-hexane, ethyl acetate and ethanol) of fruits from three Solanum sp using DPPH and ABTS assays.

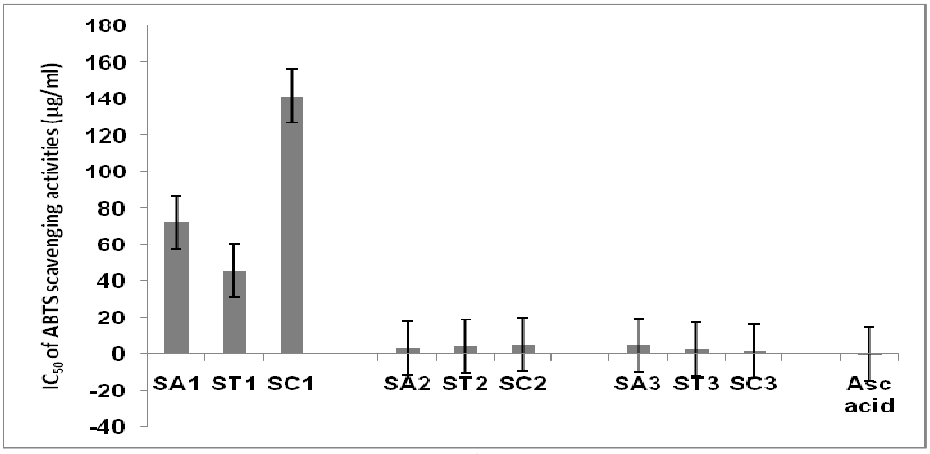
IC_{50} of DPPH scavenging activity and IC_{50} of ABTS scavenging activity: Both of DPPH and ABTS free radicals which dissolve in methanol or ethanol, and their colors have characteristic absorption at wavelength 516 nm or 734 nm, respectively. Colors ABTS and DPPH would be changed when the free radicals were scavenged by antioxidant [7,15].

The IC_{50} of DPPH scavenging activities and IC_{50} of ABTS scavenging activities in various fruit extracts from three Solanum sp using DPPH and ABTS assays were shown in Fig 1 and Fig 2. The IC_{50} of DPPH scavenging activities and IC_{50} of ABTS scavenging activities in various fruit extracts compared to IC_{50} of ascorbic acid standard.



n=3

Fig 1: IC_{50} of DPPH scavenging activities in various fruit extracts from three Solanum sp



n=3

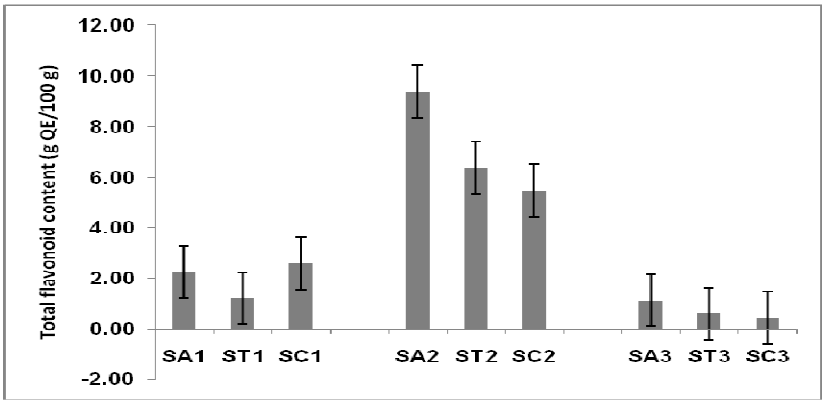
Fig 2: IC_{50} of ABTS scavenging activities in various fruit extracts from three Solanum sp

IC_{50} of DPPH scavenging activity is the concentration of sample or standard that can inhibit 50% of DPPH scavenging activity and IC_{50} of ABTS scavenging activity is the concentration of sample or standard that can inhibit 50% of ABTS scavenging activity. The lowest IC_{50} means had the highest antioxidant capacity. The IC_{50} were used to categorize antioxidant activity of a sample that compared to standard. Sample that has IC_{50} less than 50 µg/ml is a very strong antioxidant, 50-100 µg/ml is a strong antioxidant, 101-150 µg/ml is a medium antioxidant, while IC_{50} greater than 150 µg/ml is a weak antioxidant [13].

The result of the present study exposed that IC_{50} of DPPH scavenging activities of various fruit extracts from three Solanum sp in the range of 1.4 – 1145.7 µg/ml. Ethanolic fruit extract of *S.torvum* (ST3) had the lowest IC_{50} of DPPH radical scavenging activity 1.4 µg/ml, followed by ethanolic extract of *S. coagulans* (SC3) 3.0 µg/ml, and ethanolic extract of *S. americanum* (SA3) 5.4 µg/ml, while ascorbic acid standard expressed IC_{50} of DPPH

scavenging activity 0.1 µg/ml. All of ethyl acetate and ethanolic fruit extracts of three Solanum sp (except ethyl acetate fruit extract of *S. coagulans*) could be categorized as very strong antioxidant because of their IC_{50} of DPPH scavenging activity value less than 50 µg/ml. The current study revealed that IC_{50} of DPPH scavenging activities of n-hexane, ethyl acetate, ethanolic fruit extracts of *S. americanum* and *S. torvum* were 65, 34.8, 5.4 µg/ml and 99.6, 51.1, 1.4 µg/ml, respectively, and the lowest IC_{50} of DPPH scavenging activity was given by ethanolic fruit extract of *S. torvum*. It was different with the previous study [12] which demonstrated that chloroform fruit extract of *S. torvum* had the lowest IC_{50} of DPPH scavenging activity among acetone, chloroform and methanolic extract of leaf and fruit parts of *S. nigrum* (*S. americanum*) and *S. torvum.* IC_{50} of ABTS scavenging activities of n-hexane, ethyl acetate and ethanolic extracts of *S. americanum* and *S. torvum* were 71.85, 3.05, 4.73 µg/ml and 45.51, 4.17, 2.36 µg/ml, respectively, and ethanolic fruit extract of *S. torvum* had the highest antioxidant activity which had the lowest IC_{50} of ABTS scavenging activity. In the previous study by Loganayaki [12] exposed that methanolic fruit extract of *S. nigrum* had highest antioxidant activity among the chloroform, methanolic and acetone of leaf and fruit parts of *S. americanum* and *S. torvum* by ABTS method. Research by Nithiyanantham [19] stated that methanolic extract of boiled fruit of *S. torvum* had lower IC_{50} of DPPH scavenging activity 1.9 g extract/g DPPH than the fresh fruit 7.6 g extract/g DPPH and the boiled fruit had lower IC_{50} of ABTS scavenging activity 80.3 µmol Trolox/g extract compared to fresh fruit 226.1 µmol Trolox/g extract. The previous research [10] revealed that methanolic fruit extract *S. anguivi* had the highest percentage of DPPH scavenging activity compared to methanolic extract of *S. pubescens*, *S. torvum*, *S. trilobatum*, *S. nigrum* and *S. surratense*. Study by Somawathi *et al.* [2] regarding variety of *S. melongena* with different peel color demonstrated that water fruit extract of sampel S1 (purple with no line) had the lowest IC_{50} of DPPH scavenging activity 3.51 mg/ml compared to sample S2 (light purple with lines), S3 (dark purple with lines), S4 (pink color) and S5 (purple with green lines), while in the ABTS method the highest percentage of ABTS scavenging activity was given by water fruit extract of S3. The similar result with FRAP method, water extract of S3 gave the highest FRAP capacity (7.16 mmol/g). The previous research by Sultana [18] reported that percentage of DPPH scavenging activity of methanolic peel extract of *S. melongena* was higher than its flesh extract.

TFC in various fruit extracts from three Solanum sp: The TFC among the various fruit extracts expressed in term of quercetin equivalent using the standard curve equation y = 0.006 x - 0.019, R^2 = 0.998. TFC in various fruit extracts from three Solanum sp showed different results ranged from 0.44 to 9.37 g QE/100 g (Fig 3). Ethyl acetate fruit extract of *S. americanum* (SA2) had the highest total flavonoid content (9.37 g QE/100 g) and ethanolic fruit extract of *S. coagulans* (SC3) had the lowest (0.44 g QE/100 g).



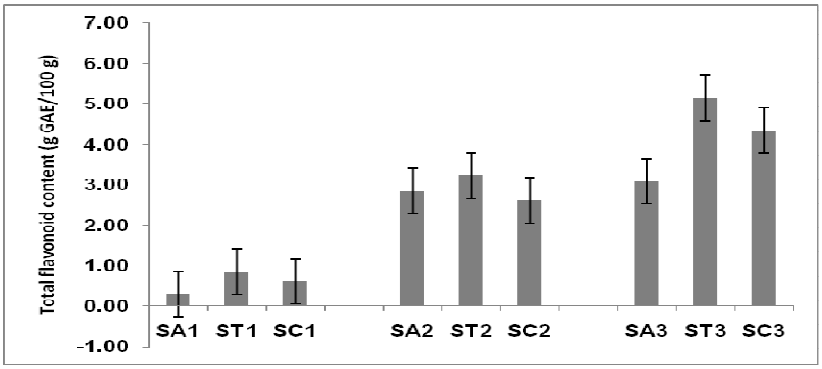
n=3

Fig 3: Total flavonoid content in various Solanum sp fruit extracts

In the present study TFC in ethanolic fruit extract of *S. americanum* was 1.13 g QE/100 g, while in previous research by Adebooye [1] reported that TFC in water fruit extract of *S. nigrum* by chopping only had the highest TFC 64.3 mg catechin equivalent/100 g fresh weight compared to other process before cooking. Padmashree [20] exposed that the highest TFC was given by methanol-water (4:1) leaves extract of *S. nigrum* (1.51 g/100 g) compared to methanol extract (1.01 g/100 g), ethyl acetate extract (0.65 g/100 g) and water extract (0.54 g/100 g). Previous research [21] regarding methanolic fruit extract of five varieties of eggplant demonstrated that SM1 (uniform, purple, moderate size) had the highest TFC 3.95 g catechin equivalent/100 g compared to SM2 (white and green, moderate size), SM3 (long green), SM4 (striped green, moderate size) and SM5 (uniform, pale green, small size). It was contrast with the present study which revealed that ethanolic extract of eggplant (*S. coagulans*) was 0.44 QE g/100 g.

TPC in various fruit extracts from three Solanum sp: TPC among the various fruit extracts expressed in term of gallic acid equivalent using the standard curve equation y = 0.004 x + 0.0025, R^2 = 0.998. TPC in various fruit

extracts from three Solanum sp exposed different result in the range of 0.3 – 5.15 g GAE/100 g. Ethanolic fruit extract of *S. torvum* (ST3) had the highest TPC (5.13 g GAE/100 g) (Fig 4).



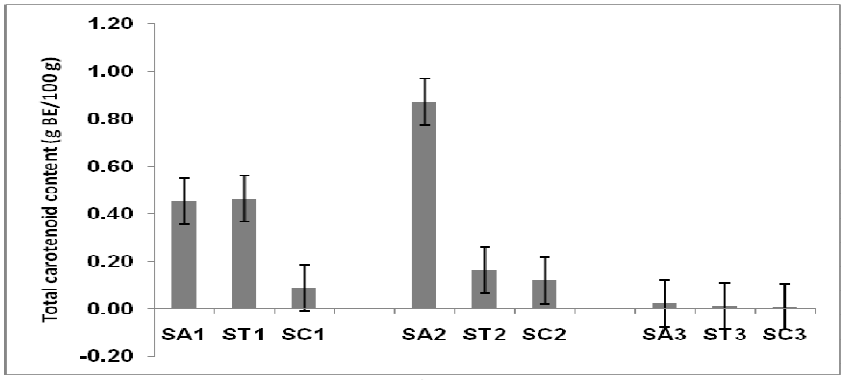
n=3

Fig 4: Total phenolic content in various Solanum sp fruit extracts

The total phenolic content can be contributed in antioxidant capacity [5]. Phenolic acid might contributed in antioxidant capacity. Cinnamic acid had higher antioxidant capacity than phenyl acetic acid and benzoic acid [22]. The previous study [21] exposed that TPC in methanolic fruit extract of SM2 (*S. coagulans*, varieties white and green, moderate size) had the highest TPC (1,12 g GAE/100 g). It was contrast with the current study which showed that ethanolic fruit extract of *S. coagulans* had TPC 4.34 g GAE/100 g. Research by Loganayaki [12] stated that chloroform fruit extract of *S. torvum* had the highest TPC (8.50 g TAE/100 g extract) compared to the acetone and methanol fruit and leaf extracts. The previous study [1] exhibited that water fruit extract of *S. nigrum* by chopping only had the highest TPC 70.4 mg GAE/100 g fresh weight, while in the present study ethanolic fruit extract of *S. americanum* was 3.08 g GAE/100 g. TPC in S3 (*S. melongena*, varieties dark purple with lines) had the highest TPC (61 mg/100 g) compared to S1, S2, S4 and S5 [2]. Research by Sultana [18] revealed that methanolic peel extract of round variety of *S. melongena* had the highest TPC compared to other parts of *S. melongena* and other variety of *S. melongena*.

TCC in various fruit extracts from three Solanum sp: The TCC among the various extracts expressed in term of beta carotene equivalent using the standard curve equation $y = 0.015x + 0.002$, $R^2 = 0.9999$. TCC in various fruit extracts from three Solanum sp showed different result ranged from 0.01 to 0.87 g BE/100 g (Fig 5). Ethyl acetate fruit extract of *S. americanum* (SA2) had the highest TCC (0.87 g BE/100 g), while ethanolic fruit extract of *S. coagulans* (SC3) and *S. torvum* (ST3) had the lowest carotenoid content (0.01 g BE/100 g).

In the previous study [1] exposed that water fruit extract of *S. nigrum* by chopping only had the highest TCC (20 mg BE/100 g) compared to other process before cooking. It was similar with the present study which reported that TCC in ethanolic fruit extract of *S. americanum* 20 mg BE/100 g).



n=3

Fig 5: Total carotenoid content in various Solanum sp fruit extracts

Correlations between total phenolic, flavonoid, carotenoid content with DPPH scavenging activities, and ABTS scavenging activities in various fruit extracts from three Solanum sp: Pearson's correlation coefficient was positively high if $0.61 \leq r \leq 0.97$ [3] and negatively high if $-0.61 \leq r \leq -0.97$. The highest antioxidant activity will be given by sample which had the lowest IC_{50} of DPPH scavenging activity or IC_{50} of ABTS scavenging

activity. So the good correlation between TPC, TFC and TCC with IC_{50} DPPH or IC_{50} ABTS will be shown in highly and negative correlation.

Table 1. Pearson's correlation coefficient of total flavonoid, phenolic, carotenoid of fruit extracts from three Solanum sp and IC_{50} of DPPH scavenging activities, IC_{50} of ABTS scavenging activities

	TFC	TPC	TCC	IC_{50} ABTS SA	IC_{50} ABTS ST	IC_{50} ABTS SC
IC_{50} DPPH SA	0,064^{ns}	-0,896**	0,491 ns	0,853**		
IC_{50} DPPH ST	0,163^{ns}	-0,961**	0,973**		0,883**	
IC_{50} DPPH SC	0,063^{ns}	-0,941**	0,412 ns			0,988**
IC_{50} ABTS SA	0,452^{ns}	-0,949**	-0,17 ns			
IC_{50} ABTS ST	-0,313^{ns}	-0,860**	0,959**			
IC_{50} ABTS SC	-0,09^{ns}	-0,878**	0,266 ns			

*Note: DPPH = DPPH scavenging activity, ABTS = ABTS scavenging activity, TPC = total phenolic content, TFC = total flavonoid content, TCC = total carotenoid content, SA = sample SA, ST = sample ST, SC= sample SC, ns = not significant, * = significant at p < 0.05, ** = significant at p < 0.01*

The highest and negative between TPC and IC_{50} of DPPH scavenging activity (r = -0.961, p<0.01) was given by sample *S. torvum*. The highest and negative correlation between TPC and IC_{50} of ABTS scavenging activity (r = -0.949, p<0.01) was given by sample *S. americanum* (Table 1). All of fruit extracts sample showed negatively and high correlation between TPC and IC_{50} of DPPH and IC_{50} of ABTS scavenging activities. It means that increasing in TPC in all of extracts sample would give increasing in antioxidant activity by DPPH and ABTS method. Based on this data it could be supposed that antioxidant capacities in three Solanum sp fruit extracts with DPPH and ABTS assays might be estimated indirectly by measuring their TPC. In previous study [12] reported that TPC in fruit and leaf extracts of *S. nigrum and S. torvum* had no significant correlation with their percentage of DPPH, ABTS scavenging activities and FRAP capacities. Somawathi [2] demonstrated that TPC in water fruit extracts of *S. melongena* with different peel color had negative and high correlation with their IC_{50} of DPPH scavenging activities, while the TPC had positively high correlation with their percentage of ABTS scavenging activities and percentage of FRAP capacities.

Phenolic compound included flavonoid, phenolic acid, tannins and other compounds. Flavonoid which OH in A ring and/or B ring will be included in phenolic groups. Phenolic acid had lower antioxidant capacity than flavonoid [22]. Position OH in C-3'-C-4', OH in C-3, oxo function in C-4, double bond at C-2 and C-3 would affect higher antioxidant capacity in flavonoid. Ortho position of hydroxyl group in C-3'-C-4' had the highest influence in antioxidant capacity of flavonoid. The flavonoid glycosides would give lower antioxidant capacity than flavonoid aglycone [22].

It could be seen in Figure 3, TFC in n-hexane fruit extract of sample *S. americanum* (SA1) 2.25 g QE/100 g was similar with TFC in n-hexane fruit extract of sample *S. coagulans* (SC1) 2.57 g QE/100 g, but IC_{50} of DPPH scavenging activities of SA1 (65 µg/ml) was lower than SC1 (1145 µg/ml). Based on the data above it can be predicted that many flavonoid in n-hexane fruit extract of sample *S. coagulans* had OH in C5, C7, or C3' only, or C4' only, or C3 only without oxo function in C4, that had no and low antioxidant capacities. In contrast, almost all of flavonoid in n-hexane fruit extract of sample *S. americanum* were flavonoid that had OH in position which can affect high antioxidant capacities.

TPC in ethyl acetate fruit extract of *S. americanum* (SA2) 2.85 g GAE/100 g was similar with TPC in ethyl acetate fruit extract of *S. coagulans* (SC2) 2.62 g GAE/100 g, but IC_{50} of DPPH scavenging activity of SA2 (34.8 µg/ml) which was categorized as very strong antioxidant was lower than IC_{50} of DPPH scavenging activity of SC2 (218.1 µg/ml) and categorized as weak antioxidant. Based on this data it could be supposed that almost all of phenolic compounds in SA2 which was can influence higher antioxidant activity and many phenolic compounds in SC2 had low antioxidant capacity.

Carotenoid had antioxidant capacity by scavenging free radical. More double bonds in carotenoid would give higher free radical scavenging capacity [23]. Carotenoid that contained above 7 double bonds gave higher free radical scavenging activity than 7 double bonds [24]. Decreasing in lipophilicity of carotenoid would decrease free radical scavenging capacity [25]. Beta carotene was used as standard because it had conjugation double bonds due to its ability to scavenge free radicals [26-27]. Ethyl acetate fruit extract of *S. americanum* (SA2) 0.87 g BE/100 g was the highest among all of extracts and the lowest was given by ethanolic fruit extract of *S. torvum* (ST3) 0.01 g BE/100 g, but IC_{50} of DPPH scavenging activity of ST3 (1.4 µg/ml) was lower than IC_{50} of DPPH scavenging activity of SA2 (34.8 µg/ml). Based on the data it can be predicted that almost all of carotenoid in ST3 had more than 7 double bonds and only a little of carotenoid in SA2 had more than 7 double bonds. The Pearson'correlation result expressed that had no correlation between TCC in sample SA and IC_{50} of DPPH scavenging activities of sample SA and

negatively high correlation between TPC in SA and IC_{50} of DPPH scavenging activities of sample SA. It could be seen in IC_{50} of DPPH scavenging activities of fruit extract of *S. americanum* had high correlation with its TPC and no correlation with its TCC.

The DPPH and ABTS methods had the same mechanism reaction. Mechanism of DPPH and ABTS that was electron transfer assays [28], but the results of the two methods not always linear. The Pearson's correlation coefficient indicated that all of fruit extracts of three Solanum sp that were *S. americanum, S. torvum, S. coagulans* had positively high correlation between IC_{50} of DPPH scavenging activities and IC_{50} of ABTS scavenging activities. DPPH and ABTS assays gave linear result for fruit extracts of *S. americanum, S. torvum, S. coagulans*.

CONCLUSION

Different methods could give different results. Variety of methods must be used in parallel to assess the antioxidant capacity of sample. All of ethanolic and ethyl acetate fruit extracts (except ethyl acetate extract of *S. coagulans*) had IC_{50} of DPPH scavenging activities less than 50 µg/ml that means were very strong antioxidant. There were negatively high correlation between TPC with IC_{50} of DPPH scavenging activities and IC_{50} of ABTS scavenging activities were given by all of fruit extracts sample. Antioxidant capacity using DPPH and ABTS assays in *S. americanum, S. torvum, S. coagulans* extracts might be estimated indirectly by using TPC. Phenolic compounds were the major contributor in antioxidant capacity in *S. americanum, S. torvum, S. coagulans* fruit extracts. Antioxidant capacities of *S. americanum, S. torvum, S. coagulans* gave linear result by DPPH and ABTS assays. *S. americanum, S. torvum, S. coagulans* fruit extracts may be exploited as natural antioxidant sources.

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