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Budaragaet al.JAAST 3(2):226-238(2019)230PyrolysisEach cocoa shell sample is weighed as much as 1000 g based onthe treatment starting from the water content (25%, 20%, 15%, and10%) then put into the pyrolysis reactor which is equipped with a series of condensation equipment and cooling condenser (Budaraga et al., 2016).The reactor is equipped with a temperature gauge. Electric heating is in the form of a reactor sheath with a current of 10 amperes. Pyrolysis runs at 400 °C. Pyrolysis was stopped after no liquid smoke dripped into the shelter. The results of pyrolysis inthe form of liquid smoke are collected in dark bottles and then left to stand, then filtered using filter paper and activated carbon and gauze to separate tar and liquid smoke (Kadiret al., 2010).After being deposited for 1 (one) week, an analysis of antioxidant activity was carried out.Determining Antioxidant Activities oftheDPPHmethod(Molyneux, 2003)The DPPH method is an effective and fast colorimetric method for estimating antiradical/antioxidantactivity. This chemical test is widely used in natural product research for antioxidant phytochemical isolation and to test the capacity of extracts and pure compounds to absorb free radicals. DPPH method used to measure a single electron as the hydrogen transfer activity at onceto measure the inhibitory activity of free radicals(Pratimasari, 2009).DPPH (1,1-diphenyl-2-pikrilhidrazil) radical is an unstable nitrogen-containing organic compound with strong absorbance at λmax517 nm and dark purple. afterreactingwith antioxidant compounds, DPPH will be reduced and the color will change to yellow. These changes can be measured by a spectrophotometerand plotted against concentration. Decreasing color intensity is caused by reduced conjugated double bonds in DDPH. This occuredif there is an electron capture by an antioxidant, causing no chance of these electrons to resonate (Pratimasari, 2009). The existence of an antioxidant which can donate electrons to DPPHproduces yellow which is a specific characteristic of DPPH radical reactions. Capture of 2free radicals causes electrons to become pairs which then causes color loss that is proportional to the number of electrons taken (Sunami, 2005). The work procedure measures the antioxidant activity as follows:-DPPH was weighed as much as 0.0045 and then dissolved with methanol in a 100ml volumetric flask to obtain a DPPH with a concentration of 45 ppm. Budaragaet

al.JAAST 3(2):226-238(2019)231-The Sample was weighed as much as 1 gram, diluted in pumpkin 100 for a concentration of 1000 ppm mother liquor.-The main solution of 1000 ppm is diluted by piping 0.125.0.5, 1, 1.5, 2. 2.5 ml dissolved in a 10 ml flask with methanol to the boundary mark, a dilutionthat has been obtained in 1 ml pipette plus 2 ml methanol plus 1 ml DPPH and then in the vortexand incubated for 30 minutes.-The solution that has been buried is then measured using UV-VIS spectrophotometer.-The results of the data obtained were analyzedby using Excel 2007 to get a simple geneticline. Formula : APRB = 1−#$%&'$()*+&-%(./0+#$%&'$()*+x100%3.Results and DiscussionAntioxidantActivityAfter obtaining the optimum wavelength, which is at a wavelength of 515 nm, then the absorbance measurement is done on the tube (blank) containing 1 ml of methanol and 1 mL of DPPH. Then an absorbance meter was measured to measure the absorbance of liquid cocoa peel smoke with DPPH using a UV-Vis spectrophotometer before applying the maximum wavelength of DPPH. The maximum DPPH wavelengthused was at a wavelength of maximum wave 515nm. ThisDPPH wavelengthgives the maximum absorbance of the test solution and provides the greatest sensitivity. Furthermore, the amount 1of the antioxidant activity of cocoa on the shell smoke used wasmeasured at the maximum wavelength. The comparisonused is vitamin C from each representingsynthetic antioxidant and naturalantioxidants. VitaminC is used as the comparison because it serves as the secondary as an antioxidantcapture free radicals and preventswith a chain. Vitamin C is referred to as a secondary anti-oxidant group capable of counteracting various free radicals that can counteract various extracellular free radicals. because vitamin C has a free hydroxy group that acts as a free radical catcher and if it has a polyhydroxy group it will increase antioxidant activity(Isnindaret al., 2011).The average results of the 1analysis of the antioxidant activity of cacao shell liquid smoke at different pyrolysis temperatures and water content can be seen in Table 1,2,3,4 and antioxidant activity of vitamin C in Table 5.Table 1.The average of the resultantioxidant activity atliquid smoke on cocoashell at10% moisture contentConcentrationAbs Aprb Budaragaet al.JAAST 3(2):226-238(2019)233graphs of linear and linear regression equation between the

concentration liquid smoke with an adsorbance such as Figure1,2,3,4 and antioxidant activity of vitamin C in Figure1below.Figure 1. Linear regression graph of antioxidant activity and 1liquid smoke of cocoa shell at 10% moisture contentFigure 2. Linear regression graph antioxidant activity of liquid smoke of cocoa shell at 15 % moisture contentFigure 3. Linear regression graph antioxidant activity of liquid smoke of cocoa shell y = 31,594x + 24,314R^2 = 0,97880102030405060708090100000,511,522,5absorbanceconcentration (ppm) y = 29,916x + 15,498R^2 = 0,98220102030405060708000,511,522,5absorbanceconcentration (ppm) y = 39,612x + 36,612R^2 = 0,927402040608010012000,511,52absorbanceconcentration (ppm) Budaragaet al.JAAST 3(2):226-238(2019)234at 20% moisture contentFigure 4. Linear regression graph 1antioxidant activity of liquid smoke of cocoa shell at 25% moisture contentFigure 5. Linear regression graph antioxidant activity of vitamin CThe value of IC 50with AAI for the liquid smoke of cocoa peel at different water content and vitamin C variations is presented in Tables 6,7,8,9 and 10 below.Table 6. Results of antioxidant activity of cocoa shell liquid smoke moisture content of 10 percentConcentration (ppm)Absorbanceaverage(%)IC 50(ppm)AAI0,25320,542,35151,020,81325,53361,575,51286,56Form DPPH0,457y = 39,61x + 36,61R^2 = 0,967020406080100000,511,522,5absorbanceConcentrationy = 6,819x + 26,701R^2 = 0,998901020304050607001234 56absorbanceconcentration (ppm) Budaragaet al.JAAST 3(2):226-238(2019)235Table 7. Results of antioxidant activity of liquid cocoa smoke in watercontent of 15 percentConcentration (ppm)Absorban average(%)IC 50(ppm)AAI0,2521,140,531,32145,140,09244,11931,564,76272,19Form DPPH0,482Table 8. The results 1of the antioxidant activity of liquid cocoa smoke in watercontentof 20 percentConcentration (ppm)Absorbanceaverage(%)IC 50(ppm)AAI0,12533,330,25480,564,570,42380,0010178,851,592Form DPPH0,482Table 9. Results of antioxidant activity of cacao shell liquid smoke of 25 percentmoisture contentConcentration (ppm)Absorbanceaverage(%)IC 50(ppm)AAI0,2548,190,552,95162,470,31370,00141,572,83293,14Form DPPH0,482Table 10.

Antioxidant results of vitamin CConcentration (ppm)Absorbanceaverage(%)IC 50(ppm)AAI0,2533,330,540,19147,80,73756,10161,553,9260,57Form DPPH0,482In Table 6,7,8,9 and 10 showed that thevalues of IC50 of liquid smokecocoa shell on the graph view IC50values of liquid smoke cacaosmaller shell of vitamin C except forliquid smoke water content of 10%. Itis because the liquid smokeof cocoa shellis not a pure Budaragaet al.JAAST 3(2):226-238(2019)236compound but still contains other compounds that may have antioxidant activity. IC50value at 10% moisture content greater than the value of the IC50water content 15%, 20% and 25% of small.IC50meansthathigher antioxidant activity. The compound is said to be an antioxidant very strong if the IC50value is less than 50 ppm, strong for IC is worth 50-100 ppm, medium for 100-150 ppm and weak if IC50avalue of more than 150 ppm(Blois, 1958). This means that 1the antioxidant activity of liquid smoke from each different pyrolysis temperature has a very strong activity because the IC50value obtained from the regression equation is smaller than 50 ppm. Water content is one of the factors that affect the quality of liquid smoke from the pyrolysis products produced. The moisture content of the raw materials used can affect the resultand quality ofliquid smoke produced. The water content that is too high will reduce the quality of liquid smoke because it will reduce the level of products produced, such as acid and phenol. The liquid produced will decrease further. The use of high temperatures in making liquid smoke will increase the solubility of phenol. High temperatures can release wall cell phenol compounds or bound phenolic compounds caused by damage to cell elements, causing more phenol compounds found in liquid smoke so that antioxidants will increase. (Luditama, 2006)who obtained liquid smoke phenol levels using old coconut coir materials, which is around 0,89 % and in coconut shell around 11.40%. The difference in phenol levels produced from this study is caused by the lignin content of the fumigant. Lignin is a wood component which when decomposed will produce phenol compounds. According to (Djatmiko, Ketaren, & Setyakartini, 2009)that lignin content in ripe coconut fruit is around 29.2%, in raw coconut fruitis 20.1%, whereas that coconut shell contains lignin is 33.30%. The difference in the lignin content of the fumigant material affects the phenol content of

the liquid smoke produced.4.ConclusionsBased on the results obtained in the study of cacao liquid smoke at different water levels which weretested for antioxidant activity. IC50value in liquid smoke samples of cocoa peel at 10% moisture content is 0.8132 ppm, at 15% moisture content of 1.0924 ppm, 20% moisture content of 0.4238 ppm, 1water content of 25% at 0.1411 ppm, and vitamin C of 0.7375. This shows that liquid smoke sampleswith water content ranging from 10%, 15%, Budaragaet al.JAAST 3(2):226-238(2019)23720%, and25% have strong antioxidant activity because the IC50values obtained are still below 50 ppm.5. AcknowledgmentWe would like to thank the Directorate of Research and Community Service, Directorate General ofResearch and Development Strengthening of the Ministry of Research, Technology and Higher Educationaccording to the 2019 Budget Year Research contract number 005/LPPM-UNES/Contract-Research-J /2019.Chancellor of EkasaktiUniversity, Chair of the Institute for Research and Service to the Community ofEkasakti University, Dean of the Faculty of Agriculture, Ekasakti University, research team and students whoassisted this research.

Sources

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