Identification of secondary metabolite compounds and gc-ms test (gas chromatography mass spectroscopy) on purslane plant (*Portulaca oleracea L*)

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Abstract. This study aims to analyze the types of secondary metabolite compounds contained in purslane plants (*Portulaca oleracea*). Ethanol extract of roots, stems and purslane leaves was obtained by maceration of root, stem and leaf samples using 96% ethanol for 3x24 hours. Phytochemical tests for ethanol extracts of roots, stems and purslane leaves include examination of alkaloids, saponins, tannins, flavonoids, steroids and terpenoids. Phytochemical test results showed that the ethanol extract of roots and purslane positive stems contained alkaloids, tannins, saponins, steroids, flavonoids and terpenoids. While the phytochemical test results of positive purslane leaf ethanol extracts contain alkaloids, tannins, terpenoids and saponins. Then the secondary metabolite compounds are identified using GC-MS (Gas Chromatography Mass Spectroscopy). The results of the identification of ethanol extracts of roots, stems and purslane leaves found the most compounds. At the root are stigmast, phenol, propionate, hexadecanoic acid and octadecanoic acid. In the stems are ethylcholest, campasterol, borabicyclo[3.1.3] nonane, stigmast and phenol. The leaves are phenol, stigmast, phenol, methyl linolenic acid and headecanoic acid.

1. Introduction
Indonesia is the third country in the world after Brazil and Zaire which has large tropical forests. There are a variety of plants that are used for treatment and are the basic ingredients in the development of the pharmaceutical industry in the future. It is estimated that around 1,260 types of plants have medicinal properties. One of the compounds that act as medicine in plants is the content of secondary metabolites. The functions of these secondary metabolite compounds are as antioxidants, colorants, food aroma enhancers, perfumes, insecticides and drugs. The results showed that there were already 150,000 secondary metabolites identified and an increase of about 4,000 new secondary metabolites each year [1]. Palopo is one of the cities in South Sulawesi Province which has high land area and diversity. ANA. Purslane (*Portulaca oleracea L*) has many names. In Indonesia it is known as the bracelet (Sundanese), purslane (Javanese), resereyan (Madura), jalu-jalu kiki (Maluku) [2]. In the Malay area, people call it a sand bracelet, while in Thailand it is called phak bia-yai. In China, people prefer to call it ma chi xian. Some other names are as follows: common purslane (English), beldoegra (Portuguese), verdolaja (Spanish), gartenportulak (Germany) and kurfa (Arabic and Persian) [3]. Purslane is a weed plant that can be used as a source of natural antioxidants. This antioxidant function is related to the omega 3 fatty acids they contain [2]. One of the uniqueness of purslane is that it contains the highest omega 3 fatty acid component among other vegetables [4]. Apart from these...
contents, the antioxidant function is also related to the presence of endogenous antioxidant compounds in it, including alpha tocopherol, ascorbic acid, beta carotene and glutathione \[^5\]. Antioxidants are an interesting topic for the general public, experts in medicine, nutrition, health and food science research to determine the capacity and elements of antioxidants in the food we consume as well as in plants. One of the roles of antioxidants is to help fight reactive oxygen species (ROS) and other free radicals that can cause damage to the body \[^6\]. The high reactivity of free radicals causes damage to macromolecular cells, such as carbohydrates, proteins, nucleic acids and lipids. The presence of free radicals triggers the emergence of degenerative diseases and chronic diseases due to the destruction of molecules in the human body \[^7\]. The presence of antioxidant properties in plants is one of them due to the content of secondary metabolite compounds in these plants. Secondary metabolites are organic compounds in plants and function directly in the process of formation of carbohydrates, proteins and lipids in photosynthesis, assimilation of nutrients, differentiation, translocation, protein synthesis, respiration or respiration, solute transport, and growth. Generally, secondary metabolites are contained only in certain groups of species. This is different from the content of primary metabolites such as amino acids, nucleotides, sugars and lipids which are contained in almost all plant kingdoms \[^8\]. Several secondary metabolite compounds found in natural plant extracts that function as antibacterials are alkaloids, terpenoids, saponins, tannins and flavonoids. Researchers are interested in conducting phytochemical tests on purslane plants to determine whether or not there are metabolites in purslane plants. Furthermore, the researchers also examined the types of compounds contained in the roots, stems and leaves of purslane using the GC-MS (Gas Chromatography Mass Spectroscopy) instrument.

2. Methodology

2.1 Sampling and collection

The samples to be used in this study were the roots, stems and leaves of purslane (\textit{Portulaca oleracea}) which were obtained from Purangi Village, Sendana District, Palopo City. Plants to be used in this experiment were plants that still fresh to be examined for the content of secondary metabolites.

2.2 Making purslane plant powder

Purslane plants that used are the roots, stems and leaves that are still fresh. Purslane plants separated between the roots, stems and leaves. After the separation was complete, then it was dried by aerating until the roots, stems and leaves of purslane are completely dry. The place to aerate should not be too humid and too hot because it can damage the compounds contained in it. Then each sample was cut into small pieces and crushed until smooth until it became a powder.

2.3 Extraction process

The extraction process was carried out in the form of maceration. Each sample, namely the roots, stems and leaves of purslane were weighed as much as 50 grams. After that, the sample was put into Erlenmeyer and added with 96% ethanol solvent soaked for 3 days at room temperature and protected from light. Every 1 day, do the stirring and solvent replacement. The stirring process was carried out in addition to homogenizing the solution as well because of the difference in concentration between the solution inside and outside the cell. If stirring was carried out, the high concentration solution will be pushed out and will be replaced by a low concentration solvent. This event will repeat itself until there was a balance of concentration between the solution outside and inside the cell.

2.4 Phytochemical Test

2.4.1 Alkaloid test. The test was carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent into different test tubes. After that each extract was added with 5 drops of Dragendorff reagent. If each sample was formed an orange precipitate was positive for containing alkaloids.
2.4.2 Flavonoid test. Tests were carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent. After that, each sample of 2 ml was added with 5 drops of 10% NaOH and shake until homogeneous. If the sample was formed a yellow color, it was positive for containing flavonoids [9].

2.4.3 Terpenoid test. Tests were carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent. After that, add 2 ml of CHCl₃ to each sample and shake it, then added 2-3 drops of H₂SO₄. If each sample forms a reddish brown or greenish brown color, it was positive for terpenoids [10].

2.4.4 Steroid test. Tests were carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent. After that, each sample was added with 3 drops of concentrated H₂SO₄. If each sample was formed red or orange then positive for steroids [11].

2.4.5 Tannin test. Tests were carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent. Then heated for ± 5 minutes. After heating each sample added 3 drops of 1% FeCl₃. If each sample was formed a greenish brown or blue-black color, it was positive for tannin content [12].

2.4.6 Uji saponin. Tests were carried out by taking 2 ml of each sample of purslane leaves, stems and roots extracted with ethanol solvent. Then 2 ml of hot water is added and then cooled, after that it was shaken vigorously until a solid foam was formed and 3 drops of 2 N HCl are added, if the foam was still positive it contains saponins [13].

2.5 Analysis of Secondary Metabolites using GC-MS
Analyze were performed using an Agilent Technologies 7890A GC system equipped with an Agilent Technologies 5975C inert XL EI / CI MSD with Triple-Axis detector and an Agilent 19091S-433, 325 °C (30m x 250μm capillary column, 0.25μm layer thickness). The carrier gas was using helium with a constraint rate of 1 mL / minute, injected as much as 1 μL (split ratio 10:1), the injector temperature was 250°C, the column temperature was programmed to 80°C (5 minutes) with the temperature increase set to 10°C/minute. GC-MS conditions: ion source temp 230°C, interface temp 300°C and solvent cut time 3 minutes. Components was identified by comparing the sample mass spectra with the Internal Library Search Report.

3. Results And Discussion

3.1 Phytochemical Test of 96% Ethanol Extract of Puslane Roots, Stems and Leaves
The results of maceration of the roots, stems and leaves of purslane were extracted using 96% ethanol, then the phytochemical test was carried out as shown in the following table.

| No. | Phytochemical Test | Reagents | Discoloration | Results Test |
|-----|--------------------|----------|---------------|--------------|
| 1.  | Alkaloids          | Dragendorff | Brick red color | +            |
| 2.  | Flavonoids         | NaOH     | Yellow, orange to red | +            |
| 3.  | Saponins           | HCl      | Foamy         | +            |
| 4.  | Steroids           | H₂SO₄    | Red/orange color | +            |
| 5.  | Tannins            | FeCl₃    | Greenish brown/ blackish blue color | +            |
| 6.  | Terpenoids         | CHCl₃    | Reddish brown/ greenish brown color | +            |

Information: (-) : does not contain compounds; (+): contain compounds
Table 2. Results of stems observations

| No. | Phytochemical Test | Reagents | Discoloration | Results Tes |
|-----|-------------------|----------|---------------|-------------|
| 1.  | Alkaloids         | Dragendorff | Brick red color | +           |
| 2.  | Flavonoids        | NaOH     | Yellow, orange to red | +           |
| 3.  | Saponins          | HCl      | Foamy         | +           |
| 4.  | Steroids          | H₂SO₄    | Red/orange color | +           |
| 5.  | Tannins           | FeCl₃    | Greenish brown/ blackish blue color | +           |
| 6.  | Terpenoids        | CHCl₃    | Reddish brown/ greenish brown color | +           |

Information: (-) : does not contain compounds; (+) : contain compounds

Table 3. Results of leaves observations

| No. | Phytochemical Test | Reagents | Discoloration | Results Tes |
|-----|-------------------|----------|---------------|-------------|
| 1.  | Alkaloids         | Dragendorff | Brick red color | +           |
| 2.  | Flavonoids        | NaOH     | Brownish green | -           |
| 3.  | Saponins          | HCl      | Foamy         | +           |
| 4.  | Steroids          | H₂SO₄    | Blackish green | -           |
| 5.  | Tannins           | FeCl₃    | Greenish brown/ blackish blue color | +           |
| 6.  | Terpenoids        | CHCl₃    | Reddish brown/ greenish brown color | +           |

Information: (-) : does not contain compounds; (+) : contain compounds

Based on the test results in Table 1 and Table 2, in the roots and stems of positive purslane there were alkaloids, flavonoids, saponins, steroids, tannins and terpenoids. Whereas in the test results of purslane leaves in Table 3, it can be seen that in purslane leaves only Alkaloids, Saponins, Tannins and Terpenoids and there were not Flavonoids and Steroids.

3.1.1 Steroids. Steroids are a secondary metabolite compound that is widely used as medicine. Steroid hormones are generally obtained from natural steroid compounds, especially in plants [14]. In the research on the identification of steroid compounds, it was carried out by means of the purslane extract filtrate which had been macerated with ethanol for 3x24 hours, each of which was put into a test tube as much as 2 ml. after that, added 3 drops of concentrated H₂SO₄. Then, observed the color change that occurs, if it was red or orange it indicates that there was a steroid compound content [11]. The results obtained in the roots and stems after the addition of concentrated H₂SO₄ reagent are red which means the roots and stems contain with steroid compounds, as it was said that the steroid content in plants was tested which will later give a red or orange color change. While the results obtained on the leaves after the addition of H₂SO₄ reagent were blackish green color which means the leaves did not contain steroid compounds [13].

3.1.2 Flavonoids. Flavonoids are a secondary metabolite compound that acts as an antioxidant. The antioxidant properties of flavonoid compounds due to the ability to donate its hydrogen atoms. Flavonoid compounds are also able to chelate metals, in the form of glucosides (containing glucose side chains) or in the free form called agikon [15]. Generally, plants that contain flavonoid compounds can be used as antihypertensive, anti-cancer, anti-inflammatory, antioxidant, and allergy-allergenic. Flavonoids are often found in various kinds of plants in the form of glycosides or sugar group compounds in one or more phenolic hydroxyl groups. Flavonoids are also the largest phenol group consisting of C₆-C₃-C₆ [16]. In this research, the identification of flavonoid compounds was carried out by means of the purslane extract filtrate which had been macerated with ethanol for 3x24 hours, put
into a test tube as much as 2 ml. After that, 5 drops of 10% NaOH were added and shaken until homogeneous. Next, observe the color changes that occur. If it changes color to yellow, then the sample shows the presence of flavonoids \[9\]. The results obtained indicate that the roots and stems after the addition of 10% NaOH reagent are yellow, which means they contain flavonoid compounds, this was because flavonoids, including phenolic compounds, when reacted with alkaline or ammonia, will change color \[13\]. While the results obtained on the leaves after the addition of 10% NaOH reagent were brownish green color which means negative or does not contain flavonoid compounds.

3.1.3 **Alkaloids.** Alkaloids are one of the many secondary metabolite compounds found in nature. Alkaloid compounds generally come from various types of plants and are widely distributed in all parts of the plant. All alkaloids contain at least one nitrogen atom which is usually alkaline and is generally part of a heterocyclic ring \[17\]. In this research, the identification of alkaloid compounds was carried out by means of the purslane extract filtrate which had been macerated with ethanol solvent for 3x24 hours, and put it into a test tube as much as 2 ml. After that, 5 drops of dragendorff reagent were added and shaken until homogeneous. Next, observe the color changes that occur. If it changes color to brick red, the sample shows an alkaloid compound. The results obtained on the roots, stems and leaves after the addition of dragendorff reagent are brick red which means they contain alkaloid compounds. The identification of alkaloids in purslane extract shows the presence of alkaloid compounds which are indicated by the presence of brick red deposits. This was consistent with research from Marliana (2005) which states that alkaloids are characterized by the formation of white deposits with Mayer reagent and red precipitate with Dragendorff reagent. The precipitate was a potassium alkaloid \[18\].

3.1.4 **Saponins.** Saponins are a secondary metabolite compound in the form of complex glycoside compounds that have high molecular weight and are generally found in plants, some bacteria and low-level marine animals. Saponins also have high water solubility but are insoluble in ether. The main characteristic of saponins is that they are foamy, have a bitter taste and are toxic to cold blooded animals. In this research, the identification of saponin compounds was carried out by means of the purslane extract filtrate which had been macerated with ethanol for 3x24 hours, then put it into a test tube. After that, 2 ml of hot water was added and then cooled. After that, it was shaken vigorously until a solid foam was formed and 3 drops of 2 N HCl was added, if the foam was still positive it contained saponins \[13\]. The results obtained on the roots, stems and leaves after the addition of hot water and HCl are formed foam for 15 minutes which means that they contain saponin compounds, because foamy/froth, as stated by Marliana (2005), positive saponin test when added with hot aquadest will foam/froth for 15 minutes. The appearance of foam indicates the presence of glycosides which have the ability to form foam in water which was hydrolyzed into glucose and other compounds \[18\].

3.1.5 **Terpenoids.** Terpenoids are a secondary metabolite compound that is often used in the pharmaceutical field as raw materials or simplicia in drug manufacturing. This terpenoid compound consists of ketone and aldehyde hydroxyl groups. The identification research was carried out by means of macerated purslane extract filtrate with ethanol for 3x24 hours. After that, added 2 ml of CHCl\(_3\) then shake, then added 2-3 drops of H\(_2\)SO\(_4\). If each sample develops a reddish brown or greenish brown color then it was positive for terpenoids \[10\]. The results obtained on the roots, stems and leaves after the addition of H\(_2\)SO\(_4\) were greenish red. After a few days of resting the sample, it turns greenish brown. The color change occurs after the solution was stored for several days, this was because the identification process of secondary metabolites was influenced by reaction time, temperature, reagents and concentration.

3.1.6 **Tannins.** Tannins are a secondary metabolite compound commonly used as an antifungal or fungal. These tannins work by depositing proteins and can damage cell membranes so that fungal growth is inhibited. Tannins are also lipophilic compounds that easily bind to cell walls and cause cell
wall damage\textsuperscript{[19]}. In this study, the purslane extract filtrate was macerated with ethanol for 3x24 hours. Then heated for ± 5 minutes. After heating, each added 3 drops of 1% FeCl\textsubscript{3}. If each sample forms a greenish brown or blackish blue color, it was positive for tannin compounds\textsuperscript{[12]}. The results obtained on the roots, stems and leaves after the addition of FeCl\textsubscript{3} was greenish brown which means they contain tannin compounds, because according to Effendy (2007), tannins when reacted with FeCl\textsubscript{3} will form a greenish brown color which indicates the formation of complex compounds between Fe metal and tannins\textsuperscript{[20]}.

3.2 GC-MS Analysis of Ethanol Extract from Purslane Roots, Stems and Leaves
The results of the GC-MS (Gas Chromatography Mass Spectroscopy) compound analysis in purslane root extract yielded 25 peaks can be seen in the image below:

The results of the analysis of GC-MS (Gas Chromatography Mass Spectroscopy), the most secondary metabolites contained in the roots can be seen in the table below:

| Area% | Name of compound         | Molecular formula | Qual | Activity                        |
|-------|--------------------------|-------------------|------|---------------------------------|
| 20.25 | Stigmast                 | C\textsubscript{29}H\textsubscript{48}O | 97   | Anti fungus                     |
| 8.11  | Phenol                   | C\textsubscript{6}H\textsubscript{6}O | 99   | Antioxidants                    |
| 7.19  | Propionate               | CH\textsubscript{2}CH\textsubscript{2}CO\textsubscript{2} | 90   | Antifungal                      |
| 4.98  | Hexadecanoic acid        | C\textsubscript{17}H\textsubscript{34}O\textsubscript{2} | 99   | Antifungal and antibacterial    |
| 3.21  | Octadecanoic acid        | C\textsubscript{18}H\textsubscript{34}O\textsubscript{2} | 99   | Antioxidant and anti-inflammatory |

At the root of purslane the most compounds are Stigmast. The stigmast is a secondary metabolite group of phytoalexin compounds, which functions as an anti-fungal. The stigmast has a molecular weight of 412,702 g / mol, a stigmast with the molecular formula C\textsubscript{29}H\textsubscript{48}O\textsubscript{9} \cite{21}. It can be seen the structure of the compound in Figure 2.
Phenol is a secondary metabolite group of phenolic compounds, functions as an antioxidant, beneficial for the prevention of several chronic diseases such as heart disease and cancer\(^{[22]}\). Phenol has a molecular weight of 94.11 g/mol, phenol with the molecular formula C\(_6\)H\(_6\)O. It can be seen the structure of the compound in Figure 3.

![Figure 3. Structure of phenolic compounds](image)

Propionate is a secondary metabolite group of fatty acid compounds, functions as an antifungal. Propionate has a molecular weight of 186.22 g/mol, propionate with the molecular formula CH\(_3\)CH\(_2\)CO\(_2\). It can be seen the structure of the compound in Figure 4.

![Figure 4. Structure of propionate compounds](image)

Hexadecanoic acid is a secondary metabolite group of fatty acid compounds, functions as an antifungal and antibacterial. Hexadecanoic acid has a molecular weight of 270.457 g/mol, hexadecanoic acid with the molecular formula C\(_{17}\)H\(_{34}\)O\(_2\). It can be seen the structure of the compound in Figure 5.

![Figure 5. Structure of propionate hexadecanoic acid compounds](image)

Octadecanoic acid is a secondary metabolite group of fatty acid compounds, functions as an antioxidant and anti-inflammatory\(^{[25]}\). Octadecanoic acid has a molecular weight of 282.468 g/mol, octadecanoic acid with the molecular formula C\(_{18}\)H\(_{34}\)O\(_2\). It can be seen the structure of the compound in Figure 6.

![Figure 6. Structure of Octadecanoic acid compounds](image)
The results of the GC-MS (Gas Chromatography Mass Spectroscopy) compound analysis on purslane stem extract yielded 28 peaks which can be seen in the image below:

![Figure 7. Observation results of purslane stems](image)

The results of the analysis of GC-MS (Gas Chromatography Mass Spectroscopy), the most secondary metabolites contained in the stem can be seen in the table below:

| Area% | Name of compound       | Molecular formula | Qual | Activity         |
|-------|------------------------|-------------------|------|------------------|
| 19.54 | Ethylcholest           | C₂₉H₅₀O           | 99   | Anti cancer      |
| 8.08  | Campasterol            | C₂₈H₄₈O           | 93   | Anti cancer      |
| 7.79  | Borabicyclo[3.1.3]nonane | C₈H₁₅B       | 91   | -                |
| 6.74  | Stigmast               | C₂₉H₴₈O           | 95   | Anti fungus      |
| 6.13  | Phenol                 | C₆H₆O             | 96   | Antioxidants     |

Based on Figure 7, it can be seen that the results of the analysis on the roots showed that there were 28 peaks and among the 28 peaks had the most 5 compounds seen at peaks 25, 23, 28, 24 and 11. The compounds were Ethylcholest, Campasterol, Borabicyclo [3.1.3] nonane, Stigmast and Phenol. Stigmast compounds are also present in roots and leaves, while Phenol is also present in roots.

Ethylcholest is a secondary metabolite group of sterol compounds, whose activity as an anticancer functions to lower cholesterol. Ethylcholest has a molecular weight of 414.718 g / mol, ethylcholest with the molecular formula C₂₉H₅₀O. It can be seen the structure of the compound in Figure 8.

![Figure 8. Structure of Ethylcholest compounds](image)

Campasterol is a secondary metabolite group of sterol compounds, which have the same activity as ethylcholest as an anticancer, which functions to lower cholesterol. Campasterol has a molecular weight of 400.68 g / mol, campasterol with the molecular formula C₂₈H₄₈O. It can be seen the structure of the compound in Figure 9.
Figure 9. Structure of campasterol compounds

Borabicyclo [3.1.3] nonane has a molecular weight of 247.914 g/mol, Borabicyclo [3.1.3] nonane with the molecular formula C$_8$H$_{15}$B. It can be see the structure of the compound in Figure 10.

Figure 10. Structure of borabicyclo [3.1.3] nonane compounds

The results of the GC-MS (Gas Chromatography Mass Spectroscopy) compound analysis on purslane leaf extract yielded 19 peaks which can be seen in the image below:

Figure 11. Observation results of purslane leaves

The results of the analysis of GC-MS (Gas Chromatography Mass Spectroscopy) of the most secondary metabolites contained in leaves can be seen in the table below:

| Area% | Name of compound     | Molecular formula | Qual | Activity               |
|-------|----------------------|-------------------|------|------------------------|
| 28.04 | Phytol              | C$_{20}$H$_{40}$O | 91   | Antifeedant            |
| 17.98 | Stigmast             | C$_{29}$H$_{48}$O | 92   | Anti fungus            |
| 5.47  | Phenol               | C$_6$H$_6$O       | 98   | Antioxidants           |
| 4.36  | Methyl linolenate    | C$_{19}$H$_{32}$O$_2$ | 99 | Fatty acid             |
| 3.60  | Hexadecanoic acid    | C$_{17}$H$_{34}$O$_2$ | 99 | antifungal and antibacterial |
The results of the analysis on the leaves showed that 19 peaks and among the 19 peaks had the most 5 compounds seen at the peaks of 5, 16, 6, 4 and 2. These compounds were Phytol, Stigmast, Phenol, Methyl linolenate and Hexadecanoic acid. Hexadecanoic acid compounds are also found in the roots. The compound that has the highest peak on purslane leaves is Phytol. Senayawa Phytol is a secondary metabolite group of diterpenoid compounds, which functions as an antifeedant. Phytol has a molecular weight of 296.54 g/mol, phytol with the molecular formula C20H40O. You can see the structure of the compound in Figure 12.

Methyl linolenate is a secondary metabolite group of fatty acid compounds, functions as an antifungal. Methyl linolenate has a molecular weight of 292.463 g / mol, methyl linolenate with the molecular formula C19H32O2. It can be seen the structure of the compound in Figure 13.

4. Conclusion
Based on the results of phytochemical tests on the roots, stems and leaves of purslane with 96% ethanol solvent macerated for 3x24 hours, it can be concluded that the roots and stems contain alkaloid compounds, tannins, steroids, terpenoids, saponins and flavonoids. While the leaves contain alkaloid compounds, tannins, saponins and terpenoids. In the GC-MS (Gas Chromatography Mass Spectroscopy) test, the results were obtained that the most compounds in the roots were stigmast, phenol, propionate, hexadecanoic acid and octadecanoic acid. The compounds in the stem are ethylcholest, campasterol, borabicyclo [3.1.3] nonane, stigmast and phenol. The compounds found in the leaves are phenol, stigmast, phenol, methyl linolenate and hexadecanoic acid.

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References
[1] Indrayanto G. Prospek (Kimia) Bahan Alam untuk Penemuan Obat Baru. Seminar Umum Pendidikan Program Studi, Universitas Mulawarman. http://journal.ui.ac.id/science/article/viewFile/877/836. 2006
[2] Rahardjo, M. Kroket (Portulaca oleracea) gulma berkhasiat obat mengandung omega 3. Warta Penelitian dan Pengembangan. 1:1-4. https://eprints.uns.ac.id/343/1/163332708201011551.pdf. 2007
[3] Dweck A.C. Purslane (Portulaca oleracea) the global panacea. Personal Care Magazine. 4:7-15. https://eprints.uns.ac.id/343/1/163332708201011551.pdf. 2001.
[4] Rashed A.N., Afifi F.U., Shaedah.M., Taha M. Investigation of the active constituents of Portulaca oleracea L. (Portulacaceae) growing in Jordan. Pakistan Journal of Pharmaceutical Sciences. 17:37-45. https://eprints.uns.ac.id/343/1/163332708201011551.pdf. 2004.
[5] Simopoulos A.R. Omega 3 fatty acids and antioxidants in edible wild plants. Biol. Res. 37:263-77. https://eprints.uns.ac.id/343/1/163332708201011551.pdf. 2004.
[6] Wang, L.J.H. Yen, H.L. Liang, M.J. Wu, J. Food and Drug Anal. 11/1-60. http://journal.ui.ac.id/science/article/viewFile/877/836. 2003.
[7] Nia, R. D.H. Paper, E.E. Essien, K.C. Iyadi, A.I.L. Bassey, A.B. Antai, G. Franz. African Journal of Biomedic Research 7-129. https://journal.ui.ac.id/science/article/viewFile/877/836. 2004.
[8] Mastuti. Evaluation of Wound Healing of Agertaun Conyzoides L Extract in Combination With Honey in Rats as Animal Modes. International J of Molecular and Advance Science. 2006.
[9] Leelaprakash, G., J. Caroline, Gowtham B.M., Pradep., K., dan Shivram P. 2011. In Vitro Antimicrobial and Antioxidant Activity Of Momondica Chanrantia Leaves. Pharmacophore. 2. (4) : 242-252.
[10] Usha Veerachari1and A. K. Bopaiah. Preliminary phyto-chemical evaluation of the leaf extract of five Cassia Species. J. Chem. Pharm. Res. Vol.3 No.5. (Hal. 574-58). 2011.
[11] Egwaikhide PA, Gimba CE. Analysis of the Phytochemical Content and Anti-microbical Activity of Plectranthus Glandulosis Whole Plant. Vol.2. No.4 (Hal.135-138). 2007.
[12] Setyowati, W.A.E dkk. Skrining Fitokimia dan Identifikasi Komponen Utama Ekstrak Metanol Kalit Durian (Durio zibethinus Murr) Varietas Petruk. Jurnal Seminar Nasional Kimia dan Pendidikan Kimia VI. ISBN. 2014.
[13] Harborne. Metode Fitokimia Penuntun Cara Modern MenganalisisTumbuhan. Terbitan Kedua. Terjemahan K. Padmawinata dan I. Soediro. Bandung : ITB. 1996.
[14] Djamil, R. Tumbuhan Sebagai Sumber Bahan Obat. Pusat Penelitian. Universitas Negeri Andalas. https://media.neliti.com. 1988.
[15] Cuppett.S.M, dan Schrepf, C. Hall III. Netral Antioxidant Are They Reality. Dalam Foreidoon Shahidi: Natural Antioxidant, Chemistry, Health Effect and Applications, AOCS Press, Champaign, Illinois: 12-24. 1998.
[16] Effendy. Perspektif Baru Kimia Koordinasi Jilid I. Malang: Banyu Media Publishing. 2007.
[17] Achmad, S.A. Kimia Organik Bahan Alam. Jakarta: Karnunika. 1986.
[18] Marliana Soerya Dewi, dkk. Skrining Fitokimia dalam Analisis Kromatografi Lapis Tipis Komponen Kimia Buah Labu Siam (Sechium eduleJacq. Swartz.) dalam Ekstrak Etanol. Biofarmasi 3 (1): (Hal 27). 2005.
[19] Effendy. Perspektif Baru Kimia Koordinasi Jilid I. Malang: Banyu Media Publishing. 2007.
[25] Rajeswari and Rani S. *GC-MC analysis of Phytochemical Compound in the Ethanol Extract of Root of Lawsonia inermis L.* International Journal of ChemTech Research Volume 7 Nomor 1 Pages 389-399. ISSN : 0974-4290. 2015.

[26] Ansari. Wawasan Ilmu Kimia. https://wawasanilmukimia-wordpress.com. 2014.