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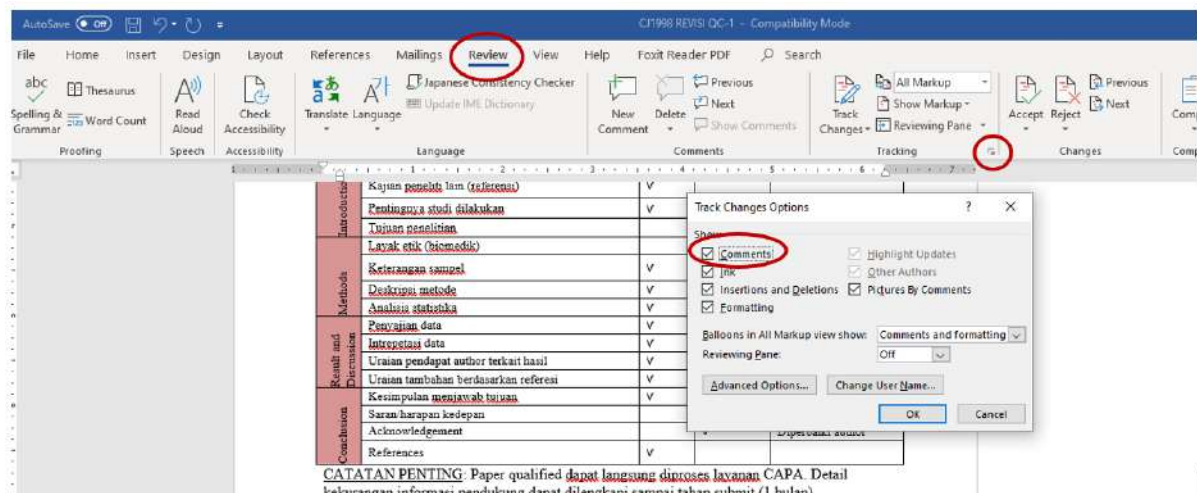
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Essential Oil from A Satisfying Evening Flower with Enfleuration Process

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Abstract. A Satisfying evening flower (Polianthes Tuberos) is done concurrently as cut flowers, so that many flowers are rotten and wasted as garbage, the other utilization as essential oil. The influence of adsorbent and texture type Polianthes Tuberos to essential oil yield. The results showed that each adsorbent gave the yield of a mixture of vegetable and animal fat with a water content of 0.21%, the amount of water content indicates the hardness degree of the adsorbent. The essential oil obtained clear yellow, smells typical a very strong of them, does not leave spots on the filter paper and the yield obtained 4.279%. Enfleuration technique is a good technique for the intake of essential oils from flowers

1. Introduction

Polianthes tuberos originated in Mexico, this plant is known in Indonesia and scattered in the sub-district Bangil and Rembang, Pasuruan, East Java. Year 2009 Until now the productivity of 659 stalk each square meter with an area of 5,790,800 square meter, costing range between IDR 400 to IDR 1000 per stalk, occupying the third order after Rose and Jasmine [1]. Based on the arrangement of flowers, distinguished by a single-layered petal, double-glazed petals and semi-double flowers. There are the same together, so that many flowers are rotten and wasted as garbage, other than as cut flowers, other utilization can be utilized as essential oil [2, 3, 4, 5, 6, 7]. A good refining technique for of essential oils on flowers is to use the enfleuration method. There is a technique to produce essential oils by capturing volatile essential oils from plant parts using a fat mixture as adsorbent at low temperature. Liquid triglyceride fats that have double bonds thus occur in the process of the binding of the Ester clusters in fat. The process of netting occurs due to the increasing tensile force between esters from fats with essential oils so that fats can absorb volatile essential oils [8,9], essential oils from tobacco leaf with batch distillation and flash distillation process [10, 11]. The enfleuration process ends at the time fats are saturated with flower oil. The success of the enfleuration process depends on the fat used, the fat used permissible has of the right level of hardness to absorb essential oils on flowers [12] essential oils on tobacco leaf with water distillation [13, 14], essential oils with hydrolysis process [15, 16, 17]. This research aims to obtain the right type and composition of adsorbent and has a high degree of hardness, and high essential oil yield with enfleuration process from Polianthes tuberos, essential oils were produced using enfleuration methods. Fats are used as adsorbent to essential oils from the luscious flower of the night. The savory flowers essential oil yield in previous studies with goat fat adsorbent amounted to 0.81%, while using a cow's fat adsorbent of 0.71%. The mixing of fatty adsorbents (cows, goats and white butter) and a mixture of fats (cows, goats and palm oil) is expected to yield a 4% yield.

2. Methode Enfleuration

The savory crops of the night or the *Polianthes tuberosa* is not a native Indonesian plant but it is derived from Mexico and scattered from Europe, Africa, Asia and up to Java Island. The savory flower of the night is a green plant derived from the family Agvaceae, the name *tuberosa* indicates if this plant has tuber, the evening flowers have their own uniqueness due to the night, this flower lives on a tropical and subtropical climate [18].

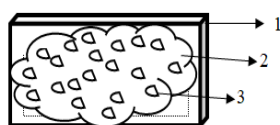


Scientific classification:
 Kingdom : Plantae
 Divisions : Magnoliophyta
 Class : Liliopsida
 Order : Asparagelas
 Family : Agvaceae
 Species : *Polianthes tuberosa*

Figure 1. *Polianthes tuberos*

The fats used as adsorbent should be free from the dirt, color or smell of the fat itself, as it can affect the color as well as the absolute aroma of the resulting flowers [19]. Animal fat or butter has a moisture content of not more than 16%, whereas vegetable or margarine fats have a moisture content of not more than 18%. Vegetable oils that can be used as adsorbent is coconut oil, palm oil, corn oil and soy oil. Mixing fat with oil will give you the right texture on adsorbent [12]. A commonly used method for producing essential oils is the extraction using cold fat or using hot fat (maceration) and distillation. In both extraction methods occurs the process of adsorb essential oil of flowers by fat as adsorbent. The absolute yield resulting from cold fat extraction is higher than that of distillation [20]. There is a way of taking essential oils with cold fats. By pasting a night of delicate flower petals on a fat surface that has been flattered above the chassis. The fat mixture is used to absorb the essential oils that are at night. Then the fat that has absorbed the essential oil is dissolved with alcohol and continued by distillation to obtain an absolute luscious flower of the Night [21].

Fat to be used mixed (fat beef, goat fat and white butter), and a mixture (beef fat, goat fat and palm oil). The fats to be mixed are washed until clean from dirt, after washing the drain, put on the glass beaker, then stir in the presence of heating, heating is done $\pm 50^{\circ}\text{C}$, do it until homogeneous, let stand at room temperature.



Description:
 1. Glass/Chassis
 2. Adsorbent
 3. Delicious Night Interest

Figure 2. Enfleuration Tools

Adsorbent (fat mixture) weighed 100 grams and applied on 2 glass surfaces of 5 mm each to 50 grams. A fine-weighted night interest is placed to one of the fat surfaces until evenly, combine the two chassis, close the meeting using the banana leaf, store it in a place that is not exposed to the light source, the savory flowers are changed every 24 hours for 1 week. Organoleptic test or sensory test is a test using the human senses as the primary tool for the measurement of a product. Organoleptic tests conducted on this study included color testing, smell testing and spot testing. Result analysis is a comparison of the amount of oil produced and uses percent (%) units. Gas chromatography is a mixed separation technique of several compounds based on the pace of motion of the components that are to be separated by the process of flowing a gas flow through the silent phase, the difference in motion rate is caused by the difference in weight molecules, boiling points and the pollutant of each of these compounds [22]. Then the filtrate that has been obtained was inserted into the three-neck flask, place the three neck flask over the electro coat. Install the condenser and the adaptor and then distillation at

$\pm 78^{\circ}\text{C}$ to separate the alcohol and essential oils, up to the evening flower essential oil is obtained. After 7 days of taking adsorbent and insert into beaker glass, alcohol 96% added with a comparison of fat and alcohol 1:2. Then stir and melt using magnetic stir with temperature no more than 50°C , then save for 24 hours, using what man filter paper until separate fat and produce filtrate.

3. Results and Discussion

Essential oils from the luscious flowers use adsorbent mix of animal and vegetable fats at room temperature with of them. The separation of essential oils from alcohol uses the distillation process. Goat fat and fat mixture with a ratio of 0.0833 have a high moisture content compared to other fats. If the fats used as adsorbents have a sufficiently high moisture content, low oil yield is obtained. This is due to the fat that the high water content tends to be softened and will be easily attached to the flowers and will be wasted at the time of interest turnover.

Organoleptic tests carried out include color testing, appearance, smell and spotting. There are three different colors: yellow, brownish yellow, and brown. Yellow color, much resulting from a fresh night flower condition. While the color of brownish yellow and brown color is produced from the condition of the savory flower dry night. In the smell test, there are three criteria that are the distinctive fragrance of the savory flower of the night is very smelled (+ +), fragrant typical night flowers that are vaguely smell (+), and smell fat (-). In the sighting test there are two criteria i.e. oil appears clear or oil appears cloudy. If the essential oil obtained is cloudy, then the essential oil obtained still contains oil or grease from adsorbent. It is also supported with spotting test. Spotting test is a common form identification in essential oils that are done with the essential oil in a hard strain. If the essential oil obtained does not leave stains on the filter paper because it evaporates, it indicates that the sample obtained is true essential oil, whereas if the essential oil leaves the stain spots on the filter paper, it signifies That which is acquired is not an essential oil but an oil or fat derived from adsorbent.

Table 1. Moisture content on cow fat, goat fat, white butter and palm oil

No.	Adsorbent type	Moisture content (%)	Ratio
1	1 LS : 1 LK : 2 MP	0,17	0,5000
2	1 LS : 2 LK : 3 MP	0,58	0,1667
3	1 LS : 3 LK : 4 MP	2,89	0,0833
4	2 LS : 1 LK : 3 MP	0,21	0,6667
5	3 LS : 1 LK : 4 MP	0,05	0,7500
6	1 LS : 1 LK : 2 MY	0,28	0,5000
7	1 LS : 2 LK : 3 MY	0,30	0,1667
8	1 LS : 3 LK : 4 MY	0,10	0,0833
9	2 LS : 1 LK : 3 MY	0,40	0,6667
10	3 LS : 1 LK : 4 MY	0,71	0,7500
11	MP	0,05	-
12	LS	2,89	-
13	LK	0,21	-
14	MY	-	-

Description: MP = White butter, LS = Beef fat, LK = Goat fat, MY = Palm oil

In this research, the savory interest of the night used as much as 350 grams using for 7 days. The savory flower is absorption with a mixture of fat (fat cow, fat goat and white butter) and a mixture of fat (fat cow, fat goat and oil palm). The fat mixture that has been saturated with the savory flower essential oil is extracted with an alcoholic solvent. It is then distilled to separate alcohol and essential oils. The blue colored chart indicates the mixture adsorbent LS: LK: MP, from the starting point at ratio 0.0833 to a ratio of 0.6667 charts increased, ratio 0.6667 is the highest point on this blue chart,

and further, the ratio of 0.75 decreases. The increase and decline caused by the texture in the mixture of adsorbent, in the ratio of 0.0833 adsorbent mixture used has a high enough water content that is 2.89% that can be said that the texture of the Adsorbent is very mushy so low of 0.602%.

The chart at a ratio of 0.0833 to a ratio of 0.6667 is increased which indicates that the texture belonging to adsorbent is getting better for a good night flower essential oil. Can be seen from the size of the amount obtained at ratio 0.6667 which has a water content of 0.21% is 4.297%. While in ratio 0.75 decreased, caused by moisture content contained in the low adsorbent mixture of 0.05% which indicates that the texture of the Adsorbent very hard and the harsh texture will complicate the absorption good night flower essential oil because the flowers do not stick well on the surface adsorbent so that the lowland obtained is low enough 1.213%. Orange-coloured graphics indicate that the adsorbent used is a mixture of palm oil with a mixture of animal fats (fat cow and fat goat). At ratio 0.0833 until the ratio of 0.1667 trend increased. The next point experienced a penurun at ratio 0.5 and increased slightly in ratio 0.667 then decreased again at ratio 0.75.

Table 2. Level analysis of savory flower oil night on fresh flower conditions

No	Ratio	Weight of essential oils (grams)	Essential oils levels (%)
1	0,5000	7,532	2,152
2	0,1667	7,144	2,041
3	0,0833	2,108	0,602
4	0,6667	15,040	4,297
5	0,7500	6,553	1,872
6	0,5000	4,244	1,213
7	0,1667	6,925	1,979
8	0,0833	4,182	1,195
9	0,6667	4,996	1,428
10	0,7500	4,148	1,185

The ups and downs of these graphs are caused by the moisture content contained in each adsorbent mixture, at the starting point of ratio 0.0833 has a fairly low water content of 0.10% which has a texture quite hard so it is difficult to absorb essential oils To the low night interest of 1.195%. Ratio 0.1667 is the maximum point found on the chart with a large size of 1.979% of the water content contained at the rate of 0.30% in other words adsorbent used to have a texture that fit not too soft and not too hard so can with maximum absorbing flowers essential oil night. And ratio 0.75 is the lowest result on this chart with a yield of 1.185%, this ratio has a fairly high water content of 0.71% when compared to the moisture content that belongs to a mixture of animal fat adsorbent and coconut oil This palm so that it has a fairly mushy texture that results in low-acquired lowland. The result is high enough to be 4.279% compared to previous research conducted [19]. The adsorbent used is a mixture of cow fat and goat fat, getting a yield of 0.174%. The texture of a fat adsorbent greatly affects its adsorption power. Because if too dense fat will be difficult to absorb essential oils, because the petals of the flower can't stick to the surface of fat. So the adsorb process cannot be maximized. And conversely, if the texture of fat is too soft then fat will stick to the flowers and will be wasted on the process of changing the flowers [23].

4. Conclusion

The highest low-night flower essential oil at 4.297% is obtained on adsorbent with a ratio of beef fat: goat fat: white butter on fresh flower conditions. Adsorbent goat fat an oil bath of 1.434% and beef fat adsorbent get a yield of 2.169%, both have a higher yield than the previous researcher 0.81% for goat

fat and 0.71% for beef fat. In the white butter adsorbent, there is a low 2.382% higher than the previous researcher was 0.7%. The best adsorbent type is the adsorbent that is white in color, odorless and has a suitable texture (not too hard and not too mushy). In this study, the best adsorbent gained with a mixture of beef fat + goat fat + white butter. In this research, obtained a comparison of the best adsorbent is a mixture of white butter with animal fat (fat cow and fat goat) by comparison (2 fat cows, 1 fat goat, and 3 butter white).

References

- [1] Suyanti 2002 Post Harvest Technology Journal of Agricultural Research and Development volume 2 no1 p 30-35, *Teknologi Pasca Panen Jurnal Penelitian dan Pengembangan Pertanian* volume 2 no1 p 30-35
- [2] M Ardiansyah, D Noeriati, and Muhandoyo 2013 The supply and demand of savory interest (Polianthes Tuberosa L.) Village Rembang District Pasuruan Journal Primordial volume 9 no 2 p 54-55, *Penawaran dan Permintaan Bunga Sedap Malam (Polianthes Tuberosa L.) Desa Rembang Kabupaten Pasuruan Jurnal Primordial* volume 9 no 2 p 54-55
- [3] M Tutt, T Kikas, and J Olt 2012 Influence of different pretreatment methods on bioethanol production from wheat straw Agronomy Research Biosystem Engineering volume 1 p 269-276
- [4] E C Bensah, and M Mensah 2013 Chemical Pretreatment Methods for the Production of Cellulose Ethanol: Technologies and Innovations Research Article Article ID 719607, 21 pages, <http://dx.doi.org/10.1155/2013/719607>
- [5] F Battista, G Mancini, B Ruggeri, and D Fino 2016 Selection of the best pretreatment for hydrogen and bioethanol production from olive oil waste products Renewable Energy, volume 88 p 401-407
- [6] Y Liu, H Zhou, S Wang, K Wang, and S Xiaojun 2015 Comparison of γ -irradiation with other pretreatments followed with simultaneous saccharification and fermentation on bioconversion of microcrystalline cellulose for bioethanol production Bioresource Technology volume 182 p 289-295
- [7] R C Kuhad, R Gupta, Y P Khasa, and A Singh 2010 Bioethanol Production from Lantana Camara (Red Sage): Pretreatment, Saccharification, and Fermentation Bioresource Technology, volume 101 p 8348-8354
- [8] R Faisal, R Purwanti, and N Chotijatun 2016 Pengaruh Jenis Adsorben dalam Proses Enfleurasi Minyak Atsiri Daun Kemangi. Jurnal Permata Indonesia volume 7 no 1 p 1-5
- [9] N Brosse, M N M Ibrahim, and A A Rahim 2011 Biomass to Bioethanol: Initiatives of the Future for Lignin Review Article, Article ID 461482, page 10, doi:105402/2011/461482
- [10] N K Sari and E Dira 2018 Comparasion Production Bioethanol from Cellulose using Batch Distillation and Flash Distillation Process Journal of GEOMATE volume 15 no 50 p 76-81
- [11] N K Sari, S Sutiyono, E Luluk, E Dira, W Putu, and S H Tatik 2016 Bioethanol Production from Liquid Waste of Rice Flour with Batch Process Proceeding MATEC Web of Conference. volume 58 no 01003 p 1-5
- [12] S Patrisia 2017 Influence of type of fat and vegetable oil in the process of extraction system of essential oil characteristics of Cambodian flowers sandalwood (Plumeria Alba) Journal of Agro-Industry engineering and management volume 5 no 2 p 39-44, *Pengaruh Jenis Lemak dan Minyak Nabati Pada Proses Ekstraksi Sistem Enfleurasi Terhadap Karakteristik Minyak Atsiri Bunga Kamboja Cendana (Plumeria Alba) Jurnal Rekayasa dan Manajemen Agro Industri* volume 5 no 2 p 39-44
- [13] N K Sari, K Sumada, A A Hendrix, and Y F Winda 2018 Atsiri Oil Production of Tobacco Leaves by Water Distillation Method Internasional Journal of Scientific & Technology Research volume 7 no 2 p 100-103
- [14] N K Sari, Y Nico, LTika, and E Dira 2017 Hydrolysis of Cellulose from Bamboo with Biology Process Using Enzyme Journal Advanced Science Letters volume 23 no12 p 12235-12238

- [15] S K Thangavelu, A S Ahmed, and F N Ani 2014 Bioethanol Production from Sago Pith Waste Using Microwave Hydrothermal Hydrolysis Accelerated by Carbon Dioxide Applied Energy, volume 128 p 277-283
- [16] G S Geetha, and A N Gopalakrishnan 2011 Bioethanol production from Paper Fibre Residue Using Diluted Alkali Hydrolysis and the Fermentation Process E-Journal of Chemistry, volume 8 no 4 p 1951-1957
- [17] F Teymouri, L L Peres, Alizadeh, and B E Dale 2005 Optimization of the Ammonia Fiber Explosion (AFEX) Treatment Parameters for Enzymatic Hydrolysis of Corn Stover Biores. Tech. volume 96 p 2014-2018
- [18] R Maryan 2009 Fine oil Extraction Night Maceration Method distillation Vacuum journal Technology and Food volume 5 no 2 p 1-6, *Ekstraksi Minyak Sedap Malam Metode Maserasi Destilasi Vacuum Jurnal Teknologi dan Pangan* volume 5 no 2 p 1-6
- [19] D Yulianingsih, Amiarsi1, and S Sabari 2004 Enfleuration techniques in the process of making Rose Oil Horticultural Journal volume 17 no 4 pp 39-45, *Teknik Enfleurasi dalam Proses Pembuatan Minyak Mawar Jurnal Hortikultura* volume 17 no 4 pp 39-45
- [20] M Hetik, D Maghfoer, and T Wardiyati 2013 Influence of adsorbent type on quality essential oil in two cultivars savory flower night (Polianthes Tuberosa) Journal of Crop Production volume 1 no 4 p 308-310, *Pengaruh Jenis Adsorben Terhadap Kualitas Minyak Atsiri Pada Dua Kultivar Bunga Sedap Malam (Polianthes Tuberosa) Jurnal Produksi Tanaman* volume 1 no 4 p 308-310
- [21] Sulong and M Faisal 2006 Extraction of Essential Oils from Jasmine Flower Using Solvent Extraction Method. Faculty of Chemical & Natural Resources Engineering, Thesis University College of Engineering & Technology Malaysia Johor Bahru Malaysia
- [22] Suryani and Mutia 1999 Research on production process of the delicate flowers essential oil (Polianthes Tuberosa Var Gracilis) with the method of Enfleuration Faculty of Agricultural Technology Bogor Institute of Agriculture, West Java Indonesia, *Kajian Proses Produksi Minyak Atsiri Bunga Sedap Malam Tunggal (Polianthes Tuberosa Var Gracilis) Dengan Metoda Enfleurasi Fakultas Teknologi Pertanian Institut Pertanian Bogor Jawa Barat Indonesia*
- [23] R Prapassorn, U Dilokkunanant, U Sukkatta, and S Vajrodya 2009 Extraction Methods for Tuberosa Oil and Their Chemical Components Journal Kasetsart. volume 43 no 2 p 204-211

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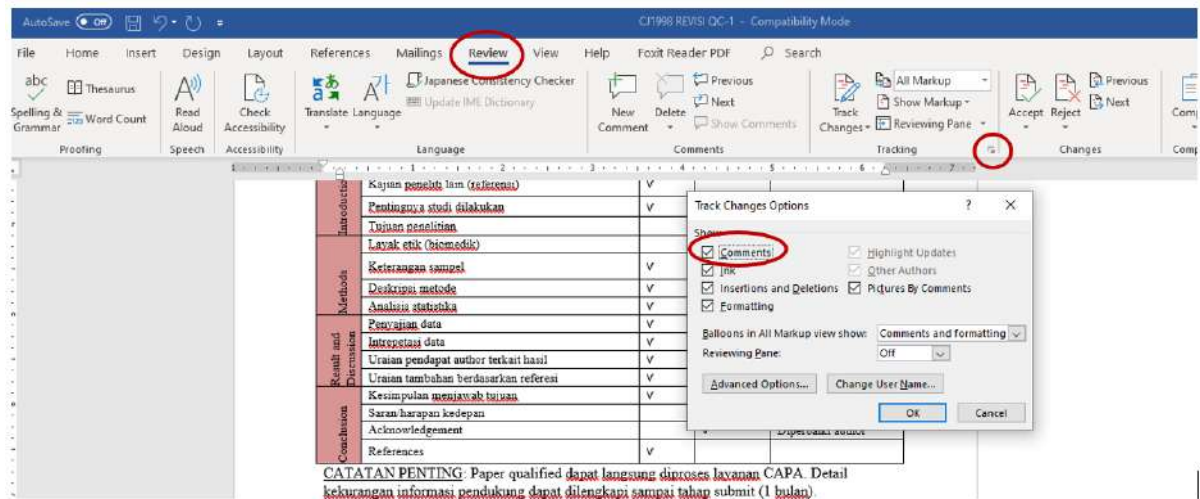
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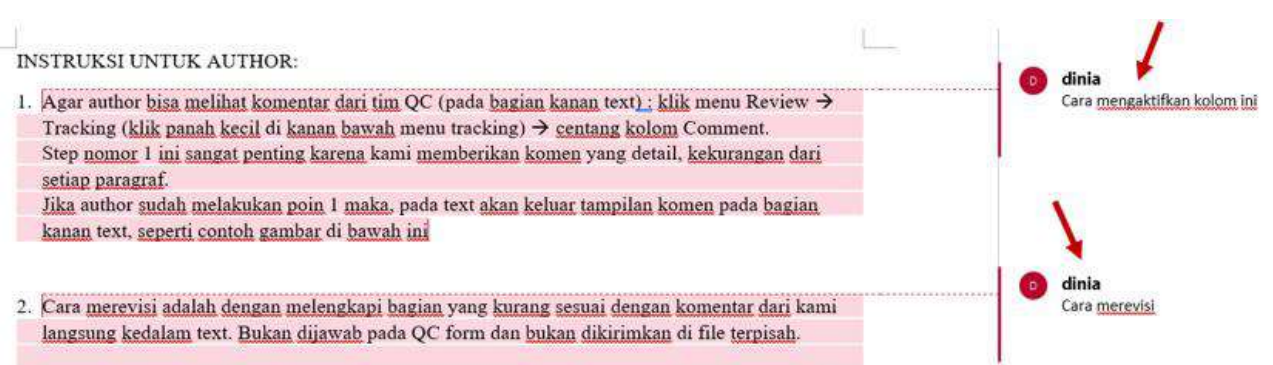
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Moisture Reduction on Essential Oil with Batch Distillation Process from A Polianthes Tuberos

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Abstract. Polyanthes tuberos mostly used as cut flowers, with limited time, many flowers become rotten and wasted as garbage, sought another alternative to the utilization it is an essential oil, with distillation process to produce essential oils. The results obtained in the distillation process are each adsorbent giving the results of a mixture of vegetable fats and animals with a moisture content of 0.2169%, the amount of water content indicating the level of hardness of adsorbent. The essential oil obtained crystal clear yellow, a very strong distinctive smell of them, did not leave the place on the filter paper and the results obtained 4.279%. The distillation process is a good technique for the acquisition of essential oils from it is with a water content of 0.11%,

1. Introduction

Polianthes tuberos originated from Mexico, this plant in Indonesia is scattered in the district Bangil and Rembang, Pasuruan, East Java, until now the productivity is very high, the price ranges from IDR 400 to IDR 1000 per stalk, is cheaper than Rose and Jasmine [1]. Based on the arrangement of flowers, differentiated by single layered petals, double layered petals and semi-double flowers. There are equal together, so many rotten and wasted flowers are not used, other uses as essential oils [2, 3, 4, 5, 6, 7]. A good purification technique for essential oils on flowers is to use a distillation process, producing essential oils by capturing volatile essential oils from parts of the plant using a fat mixture as adsorbent at low temperatures. Increased tensile forces between esters from fats with essential oils can absorb volatile essential oils [8, 9], essential oils of leaf tobacco with batch distillation and a Flash distillation process [10, 11]. The distillation process ends when the saturated fat with the flower oil is approximately 10% of the volume used. The success of the distillation process depends on the fats used, the fats used to have a level of hardness for essential oils that are absorbed by the flowers [12] essential oils on tobacco leaves with water distillation [13, 14], essential oils with hydrolysis process [15, 16, 17].

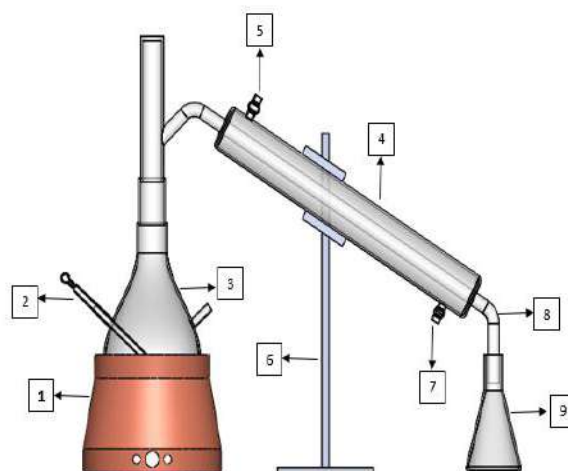
This research aims to obtain the right type and composition of adsorbent and has a high degree of hardness, and high essential oil yield with distillation process of them, essential oils were produced using distillation process. Fats are used as adsorbent to essential oils from the luscious flower of the night. There is essential oil yield in previous studies with goat fat adsorbent amounted to 0.81%, while using a cow's fat adsorbent of 0.71%. The mixing of fatty adsorbents (cows, goats and white butter) and a mixture of fats (cows, goats and palm oil) is expected to yield a 4% yield.

2. Distillation Process

Adsorbent (fat mixture) weighed 100 grams and applied on 2 glass surfaces of 5 mm each to 50 grams. A fine-weighted night interest is placed to one of the fat surfaces until evenly, combine the two chassis, close the meeting using the wrapper, store it in a place that is not exposed to the light source, the savory flowers are changed every 24 hours for 1 week. Organoleptic test or sensory test is a test

using the human senses as the primary tool for the measurement of a product. Organoleptic tests conducted on this study included color testing, smell testing and spot testing. Result analysis is a comparison of the amount of oil produced and uses percent (%) units. Gas chromatography is a mixed separation technique of several compounds based on the pace of motion of the components that are to be separated by the process of flowing a gas flow through the silent phase, the difference in motion rate is caused by the difference in weight molecules, boiling points and astringent substance of each compound [18].

The filtrate has been obtained was inserted into the three-neck flask, place the three neck flask over the electro coat. Install the condenser and the adaptor and then distillation at $\pm 78^{\circ}\text{C}$ to separate the alcohol and essential oils, up to the evening flower essential oil is obtained. After 7 days of taking adsorbent and insert into beaker glass, alcohol 96% added with a comparison of fat and alcohol 1:2. Then stir and melt using magnetic the stirrer with temperature no more than $\pm 50^{\circ}\text{C}$, then save for 24 hours, using what man filter paper until separate fat and produce filtrate.



Description:

- | | | |
|-----------------|----------------|---------------|
| 1. Electro Coat | 2. Thermometer | 3. Flask |
| 4. Condenser | 5. Water out | 6. Clamp |
| 7. Water inlet | 8. Adapter | 9. Erlenmeyer |

Figure 1. Distillation apparatus

3. Results and Discussion

Essential oils from the luscious flowers use adsorbent mix of animal and vegetable fats at room temperature with distillation process. The separation of essential oils from alcohol uses the distillation process. Goat fat and fat mixture with a ratio of 0.0833 have a high moisture content compared to other fats. If the fats used as adsorbents have a sufficiently high moisture content, low oil yield is obtained. This is due to the fat that the high water content tends to be softened and will be easily attached to the flowers and will be wasted at the time of interest turnover.

Organoleptic tests carried out include color testing, appearance, smell and spotting. There are three different colors: yellow, brownish yellow, and brown. Yellow color, much resulting from a fresh night flower condition. While the color of brownish yellow and brown color is produced from the condition of the savory flower dry night. In the smell test, there are three criteria that are the distinctive fragrance of the savory flower of the night is very smelled (+ +), fragrant typical night flowers that are vaguely smell (+), and smell fat (-). In the sighting test there are two criteria i.e. oil appears clear or oil appears cloudy. If the essential oil obtained is cloudy, then the essential oil obtained still contains oil or grease from adsorbent [19]. It is also supported with spotting test.

Table 1. Moisture content on cow fat, goat fat, white butter and palm oil

No.	Adsorbent type	Moisture content (%)	Ratio
1	1 LS : 1 LK : 2 MP	0,17	0,5000
2	1 LS : 2 LK : 3 MP	0,58	0,1667
3	1 LS : 3 LK : 4 MP	2,89	0,0833
4	2 LS : 1 LK : 3 MP	0,21	0,6667
5	3 LS : 1 LK : 4 MP	0,05	0,7500
6	1 LS : 1 LK : 2 MY	0,28	0,5000
7	1 LS : 2 LK : 3 MY	0,30	0,1667
8	1 LS : 3 LK : 4 MY	0,10	0,0833
9	2 LS : 1 LK : 3 MY	0,40	0,6667
10	3 LS : 1 LK : 4 MY	0,71	0,7500
11	MP	0,05	-
12	LS	2,89	-
13	LK	0,21	-
14	MY	-	-

Description: MP = White butter, LS = Beef fat, LK = Goat fat, MY = Palm oil

Spotting test is a common form identification in essential oils that are done with the essential oil in a hard strain. If the essential oil obtained does not leave stains on the filter paper because it evaporates, it indicates that the sample obtained is true essential oil, whereas if the essential oil leaves the stain spots on the filter paper, it signifies That which is acquired is not seed but an oil or fat derived from adsorbent. In this research, the savory interest of the night used as much as 350 grams using distillation process for 7 days. The savory flower is adsorbed with a mixture of fat (fat cow + fat goat + white butter) and a mixture of fat (fat cow + fat goat + oil palm).

Table 2. Color test, apparition, smell of spotting tires savory flower night in fresh flower conditions

No.	Ratio	Color	Sightings	Smell	Test spots
1	0.17	Yellow	Clear	+	No
2	0.58	Yellow	Clear	+	Yes
3	2.89	Yellow	Clear	++	No
4	0.21	Yellow	Clear	++	No
5	0.05	Yellow	Clear	+	Yes
6	0.28	Yellow	Clear	+	Yes
7	0.30	Yellow	Clear	+	No
8	0.10	Yellow	Clear	+	Yes
9	0.40	Yellow	Clear	+	Yes
10	0.71	Yellow	Clear	-	Yes

The fat mixture that has been saturated with the savory flower essential oil is extracted with an alcoholic solvent. It is then distilled to separate alcohol and essential oils.

Table 3. Color test, apparition, smell of spotting tires savory flower night in dry flower conditions

No.	Ratio	Color	Sightings	Smell	Test spots
-----	-------	-------	-----------	-------	------------

1	0.17	Brownish yellow	Murky	-	No
2	0.58	Brownish yellow	Murky	-	Yes
3	2.89	Brownish yellow	Murky	-	Yes
4	0.21	Brownish yellow	Murky	-	No
5	0.05	Brownish yellow	Murky	-	Yes
6	0.28	Brownish yellow	Murky	-	Yes
7	0.30	Brownish yellow	Murky	-	Yes
8	0.10	Brownish yellow	Murky	-	No
9	0.40	Brownish yellow	Murky	-	No
10	0.71	Brownish yellow	Murky	-	Yes

Description:

(+ +) = Fragrant flowers are very smell

(+) = Fragrant flowers are sketchy, smelly smell

(-) = smelling fat

Table 4. Level analysis of savory flower oil night on fresh flower conditions

No	Ratio	Weight of essential oils (grams)	Essential oils levels (%)
1	0,5000	7,532	2,152
2	0,1667	7,144	2,041
3	0,0833	2,108	0,602
4	0,6667	15,040	4,297
5	0,7500	6,553	1,872
6	0,5000	4,244	1,213
7	0,1667	6,925	1,979
8	0,0833	4,182	1,195
9	0,6667	4,996	1,428
10	0,7500	4,148	1,185

On the Figure 2 the blue colored chart indicates the mixture adsorbent LS: LK: MP. From the starting point at ratio 0.0833 to a ratio of 0.6667 charts increased. Ratio 0.6667 is the highest point on this blue chart. And further, the ratio of 0.75 decreases. The increase and decline caused by the texture in the mixture of adsorbennya, in the ratio of 0.0833 adsorbent mixture used has a high enough water content that is 2.89% that can be said that the tektur of the Adsorbennya is very mushy so low of 0.602% [20]. The chart at a ratio of 0.0833 to a ratio of 0.6667 is increased which indicates that the texture belonging to adsorbent is getting better for a good night flower essential oil. Can be seen from the size of the amount obtained at ratio 0.6667 which has a water content of 0.21% is 4.297%. While in ratio 0.75 decreased, caused by moisture content contained in the low adsorbennya mixture of 0.05%

which indicates that the texture of the Adsorbennya very hard and the harsh texture will complicate the absorption good night flower essential oil because the flowers do not stick well on the surface adsorbent so that the lowland obtained is low enough 1.213%[21].

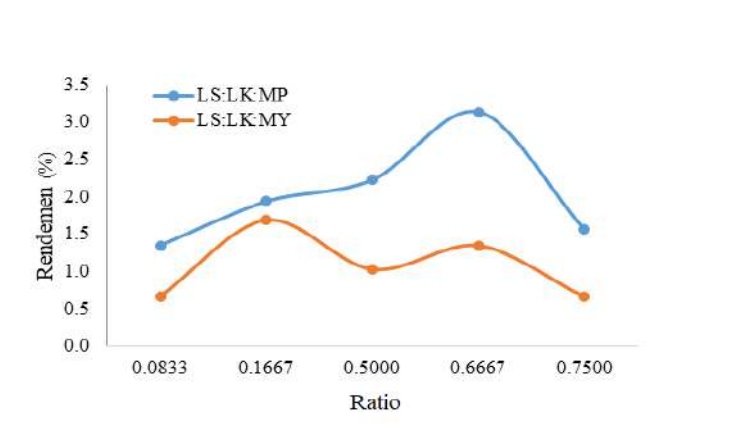


Figure 2. Graph of relationship between adsorbent comparison with fresh flower conditions.

Orange-coloured graphics indicate that the adsorbent used is a mixture of palm oil with a mixture of animal fats (fat cow + fat goat). At ratio 0.0833 until the ratio of 0.1667 trend increased. The next point experienced a penuruan at ratio 0.5 and increased slightly in ratio 0.667 then decreased again at ratio 0.75. The ups and downs of these graphs are caused by the moisture content contained in each adsorbent mixture, at the starting point of ratio 0.0833 has a fairly low water content of 0.10% which has a tektur quite hard so it is difficult to absorb essential oils To the low night interest of 1.195%. Ratio 0.1667 is the maximum point found on the chart with a large size of 1.979% of the water content contained at the rate of 0.30% in other words adsorbent used to have a tektur that fit not too soft and not too hard so can with maximum absorbing flowers essential oil night. And ratio 0.75 is the lowest result on this chart with a yield of 1.185%, this ratio has a fairly high water content of 0.71% when compared to the moisture content that belongs to a mixture of animal fat adsoben and coconut oil This palm so that it has a fairly mushy texture that results in low-acquired lowland. The result is high enough to be 4.279% compared to previous research conducted [22]. The adsorbent used is a mixture of cow fat and goat fat, getting a yield of 0.174%. The texture of a fat adsorbent greatly affects its adsorb power. Because if too dense fat will be difficult to absorb essential oils, because the petals of the flower not stick to the surface of fat. So the adsorb process cannot be maximized. And conversely, if the texture of fat is too soft then fat will stick to the flowers and will be wasted on the process of changing the flowers [23].

4. Conclusion

The highest yield essential oil of interest is obtained 4.297% in adsorbents with a ratio of beef fat: goat fat: white butter on fresh flower conditions, the distillation process is a good technique for the acquisition of essential oils from *Polianthes tuberos* with a water content of 0.11%, with adsorbent goat fat acquired essential oil 1.434%, cow adsorbent 2.169%, both have higher yield than the previous researcher 0.81%. With white butter adsorbent obtained 2.382% higher than the previous researcher was 0.7%. The best adsorbent type is the white adsorbent, odorless and has a suitable texture (not too harsh and not too inert). In this study, the best adsorbent comparison gained was a mixture of white

butter with animal fats (fatty goat fat cows) with comparisons (2 fat cows, 1 goat fat, and 3 white butter).

References

- [1] Suyanti 2002 Post Harvest Technology Journal of Agricultural Research and Development volume 2 no1 p 30-35, *Teknologi Pasca Panen Jurnal Penelitian dan Pengembangan Pertanian* volume 2 no1 p 30-35
- [2] M Ardiansyah, D Noeriati, and Muhandoyo 2013 The supply and demand of savory interest (Polianthes Tuberosa L.) Village Rembang District Pasuruan Journal Primordial volume 9 no 2 p 54-55, *Penawaran dan Permintaan Bunga Sedap Malam (Polianthes Tuberosa L.) Desa Rembang Kabupaten Pasuruan Jurnal Primordial* volume 9 no 2 p 54-55
- [3] M Tutt, T Kikas, and J Olt 2012 Influence of different pretreatment methods on bioethanol production from wheat straw Agronomy Research Biosystem Engineering volume 1 p 269-276
- [4] E C Bensah, and M Mensah 2013 Chemical Pretreatment Methods for the Production of Cellulose Ethanol: Technologies and Innovations Research Article Article ID 719607, 21 pages, <http://dx.doi.org/10.1155/2013/719607>
- [5] F Battista, G Mancini, B Ruggeri, and D Fino 2016 Selection of the best pretreatment for hydrogen and bioethanol production from olive oil waste products Renewable Energy, volume 88 p 401-407
- [6] Y Liu, H Zhou, S Wang, K Wang, and S Xiaojun 2015 Comparison of γ -irradiation with other pretreatments followed with simultaneous saccharification and fermentation on bioconversion of microcrystalline cellulose for bioethanol production Bioresource Technology volume 182 p 289-295
- [7] R C Kuhad, R Gupta, Y P Khosa, and A Singh 2010 Bioethanol Production from Lantana Camara (Red Sage): Pretreatment, Saccharification, and Fermentation Bioresource Technology, volume 101 p 8348-8354
- [8] R Faisal, R Purwanti, and N Chotijatun 2016 Pengaruh Jenis Adsorben dalam Proses Enfleurasi Minyak Atsiri Daun Kemangi. Jurnal Permata Indonesia volume 7 no 1 p 1-5
- [9] N Brosse, M N M Ibrahim, and A A Rahim 2011 Biomass to Bioethanol: Initiatives of the Future for Lignin Review Article, Article ID 461482, page 10, doi:105402/2011/461482
- [10] N K Sari and E Dira 2018 Comparasion Production Bioethanol from Cellulose using Batch Distillation and Flash Distillation Process Journal of GEOMATE volume 15 no 50 p 76-81
- [11] N K Sari, S Sutiyono, E Luluk, E Dira, W Putu, and S H Tatik 2016 Bioethanol Production from Liquid Waste of Rice Flour with Batch Process Proceeding MATEC Web of Conference. volume 58 no 01003 p 1-5
- [12] S Patrisia 2017 Influence of type of fat and vegetable oil in the process of extraction system of essential oil characteristics of Cambodian flowers sandalwood (Plumeria Alba) Journal of Agro-Industry engineering and management volume 5 no 2 p 39-44, *Pengaruh Jenis Lemak dan Minyak Nabati Pada Proses Ekstraksi Sistem Enfleurasi Terhadap Karakteristik Minyak Atsiri Bunga Kamboja Cendana (Plumeria Alba) Jurnal Rekayasa dan Manajemen Agro Industri* volume 5 no 2 p 39-44
- [13] N K Sari, K Sumada, A A Hendrix, and Y F Winda 2018 Atsiri Oil Production of Tobacco Leaves by Water Distillation Method Internasional Journal of Scientific & Technology Research volume 7 no 2 p 100-103
- [14] N K Sari, Y Nico, LTika, and E Dira 2017 Hydrolysis of Cellulose from Bamboo with Biology Process Using Enzyme Journal Advanced Science Letters volume 23 no12 p 12235-12238
- [15] S K Thangavelu, A S Ahmed, and F N Ani 2014 Bioethanol Production from Sago Pith Waste Using Microwave Hydrothermal Hydrolysis Accelerated by Carbon Dioxide Applied Energy, volume 128 p 277-283

- [16] G S Geetha, and A N Gopalakrishnan 2011 Bioethanol production from Paper Fibre Residue Using Diluted Alkali Hydrolysis and the Fermentation Process E-Journal of Chemistry, volume 8 no 4 p 1951-1957
- [17] F Teymouri, L L Peres, Alizadeh, and B E Dale 2005 Optimization of the Ammonia Fiber Explosion (AFEX) Treatment Parameters for Enzymatic Hydrolysis of Corn Stover Biores. Tech. volume 96 p 2014-2018
- [18] R Maryan 2009 Fine oil Extraction Night Maceration Method distillation Vacuum journal Technology and Food volume 5 no 2 p 1-6, *Ekstraksi Minyak Sedap Malam Metode Maserasi Destilasi Vacuum Jurnal Teknologi dan Pangan* volume 5 no 2 p 1-6
- [19] D Yulianingsih, Amiarsi1, and S Sabari 2004 Enfleuration techniques in the process of making Rose Oil Horticultural Journal volume 17 no 4 pp 39-45, *Teknik Enfleurasi dalam Proses Pembuatan Minyak Mawar Jurnal Hortikultura* volume 17 no 4 pp 39-45
- [20] M Hetik, D Maghfoer, and T Wardiyati 2013 Influence of adsorbent type on quality essential oil in two cultivars savory flower night (Polianthes Tuberosa) Journal of Crop Production volume 1 no 4 p 308-310, *Pengaruh Jenis Adsorben Terhadap Kualitas Minyak Atsiri Pada Dua Kultivar Bunga Sedap Malam (Polianthes Tuberosa) Jurnal Produksi Tanaman* volume 1 no 4 p 308-310
- [21] Sulong and M Faisal 2006 Extraction of Essential Oils from Jasmine Flower Using Solvent Extraction Method. Faculty of Chemical & Natural Resources Engineering, Thesis University College of Engineering & Technology Malaysia Johor Bahru Malaysia
- [22] Suryani and Mutia 1999 Research on production process of the delicate flowers essential oil (Polianthes Tuberosa Var Gracilis) with the method of Enfleuration Faculty of Agricultural Technology Bogor Institute of Agriculture, West Java Indonesia, *Kajian Proses Produksi Minyak Atsiri Bunga Sedap Malam Tunggal (Polianthes Tuberosa Var Gracilis) Dengan Metoda Enfleurasi Fakultas Teknologi Pertanian Institut Pertanian Bogor Jawa Barat Indonesia*
- [23] R Prapassorn, U Dilokkunanant, U Sukkatta, and S Vajrodanya 2009 Extraction Methods for Tuberosa Oil and Their Chemical Components Journal Kasetsart. volume 43 no 2 p 204-211

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Essential Oil from A Satisfying Evening Flower with Enfleuration Process

By Ni Ketut Sari

Essential Oil from A Satisfying Evening Flower with Enfleuration Process

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Abstract. A Satisfying evening flower (Polianthes Tuberos) is done concurrently as cut flowers, so that many flowers are rotten and wasted as garbage, the other utilization as essential oil. The influence of adsorbent and texture type Polianthes Tuberos to essential oil yield. The results showed that each adsorbent gave the yield of a mixture of vegetable and animal fat with a water content of 0.21%, the amount of water content indicates the hardness degree of the adsorbent. The essential oil obtained clear yellow, smells typical a very strong of them, does not leave spots on the filter paper and the yield obtained 4.279%. Enfleuration technique is a good technique for the intake of essential oils from flowers

1. Introduction

Polianthes tuberos originated in Mexico, this plant is known in Indonesia and scattered in the sub-district Bangil and Rembang, Pasuruan, East Java. Year 2009 Until now the productivity of 659 stalk each square meter with an area of 5,790,800 square meter, costing range between IDR 400 to IDR 1000 per stalk, occupying the third order after Rose and Jasmine [1]. Based on the arrangement of flowers, distinguished by a single-layered petal, double-glazed petals and semi-double flowers. There are the same together, so that many flowers are rotten and wasted as garbage, other than as cut flowers, other utilization can be utilized as essential oil [2]. A good refining technique for of essential oils on flowers is to use the enfleuration method. There is a technique to produce essential oils by capturing volatile essential oils from plant parts using a fat mixture as adsorbent at low temperature. Liquid triglyceride fats that have double bonds thus occur in the process of the binding of the Ester clusters in fat. The process of netting occurs due to the increasing tensile force between esters from fats with essential oils so that fats can absorb volatile essential oils [3], essential oils from tobacco leaf with batch distillation and flash distillation process [4]. The enfleuration process ends at the time fats are saturated with flower oil. The success of the enfleuration process depends on the fat used, the fat used permissible has of the right level of hardness to absorb essential oils on flowers [5] essential oils on tobacco leaf with water distillation [6]. This research aims to obtain the right type and composition of absorbent and has a high degree of hardness, and high essential oil yield with enfleuration process from Polianthes tuberos, essential oils were produced using enfleuration methods. Fats are used as adsorbent to essential oils from the luscious flower of the night. The savory flowers essential oil yield in previous studies with goat fat adsorbent amounted to 0.81%, while using a cow's fat adsorbent of 0.71%. The mixing of fatty

adsorbents (cows, goats and white butter) and a mixture of fats (cows, goats and palm oil) is expected to yield a 4% yield.

2. Methode Enflueration

The savory crops of the night or the *Polianthes tuberosa* is not a native Indonesian plant but it is derived from Mexico and scattered from Europe, Africa, Asia and up to Java Island. The savory flower of the night is a green plant derived from the family Agvaceae, the name *tuberosa* indicates if this plant has tuber, the evening flowers have their own uniqueness due to the night, this flower lives on a tropical and subtropical climate [7].



Scientific classification:
 Kingdom : Plantae
 Divisions : Magnoliophyta
 Class : Liliopsida
 Order : Asparagelas
 Family : Agvaceae
 Species : *Polianthes tuberosa*

Figure 1. *Polianthes tuberosa*

The fats used as adsorbent should be free from the dirt, color or smell of the fat itself, as it can affect the color as well as the absolute aroma of the resulting flowers [8]. Animal fat or butter has a moisture content of not more than 16%, whereas vegetable or margarine fats have a moisture content of not more than 18%. Vegetable oils that can be used as adsorbent is coconut oil, palm oil, corn oil and soy oil. Mixing fat with oil will give you the right texture on adsorbent [5]. A commonly used method for producing essential oils is the extraction using cold fat or using hot fat (maceration) and distillation. In both extraction methods occurs the process of adsorb essential oil of flowers by fat as adsorbent. The absolute yield resulting from cold fat extraction is higher than that of distillation [9]. There is a way of taking essential oils with cold fats. By pasting a night of delicate flower petals on a fat surface that has been flattered above the chassis. The fat mixture is used to absorb the essential oils that are at night. Then the fat that has absorbed the essential oil is dissolved with alcohol and continued by distillation to obtain an absolute luscious flower of the Night [10].

Fat to be used mixed (fat beef, goat fat and white butter), and a mixture (beef fat, goat fat and palm oil). The fats to be mixed are washed until clean from dirt, after washing the drain, put on the glass beaker, then stir in the presence of heating, heating is done $\pm 50^{\circ}\text{C}$, do it until homogeneous, let stand at room temperature.



Description:
 1. Glass/Chassis
 2. Adsorbent
 3. Delicious Night Interest

Figure 2. Enfleuration Tools

Adsorbent (fat mixture) weighed 100 grams and applied on 2 glass surfaces of 5 mm each to 50 grams. A fine-weighted night interest is placed to one of the fat surfaces until evenly, combine the two chassis, close the meeting using the banana leaf, store it in a place that is not exposed to the light source, the savory flowers are changed every 24 hours for 1 week. Organoleptic test or sensory test is a test using the human senses as the primary tool for the measurement of a product. Organoleptic tests conducted on this study included color testing, smell testing and spot testing. Result analysis is a comparison of the amount of oil produced and uses percent (%) units. Gas chromatography is a mixed

separation technique of several compounds based on the pace of motion of the components that are to be separated by the process of flowing a gas flow through the silent phase, the difference in motion rate is caused by the difference in weight molecules, boiling points and the pollutant of each of these compounds [11]. Then the filtrate that has been obtained was inserted into the three-neck flask, place the three neck flask over the electro coat. Install the condenser and the adaptor and then distillation at $\pm 78^{\circ}\text{C}$ to separate the alcohol and essential oils, up to the evening flower essential oil is obtained. After 7 days of taking adsorbent and insert into beaker glass, alcohol 96% added with a comparison of fat and alcohol 1:2. Then stir and melt using magnetic stir with temperature no more than 50°C , then save for 24 hours, using what man filter paper until separate fat and produce filtrate.

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6	1 LS : 1 LK : 2 MY	0,28	0,5000
7	1 LS : 2 LK : 3 MY	0,30	0,1667
8	1 LS : 3 LK : 4 MY	0,10	0,0833
9	2 LS : 1 LK : 3 MY	0,40	0,6667
10	3 LS : 1 LK : 4 MY	0,71	0,7500
11	MP	0,05	-
12	LS	2,89	-
13	LK	0,21	-
14	MY	-	-

Description: MP = White butter, LS = Beef fat, LK = Goat fat, MY = Palm oil

In this research, the savory interest of the night used as much as 350 grams using for 7 days. The savory flower is absorption with a mixture of fat (fat cow, fat goat and white butter) and a mixture of fat (fat cow, fat goat and oil palm). The fat mixture that has been saturated with the savory flower essential oil is extracted with an alcoholic solvent. It is then distilled to separate alcohol and essential oils. The blue colored chart indicates the mixture adsorbent LS: LK: MP, from the starting point at ratio 0.0833 to a ratio of 0.6667 charts increased, ratio 0.6667 is the highest point on this blue chart, and further, the ratio of 0.75 decreases. The increase and decline caused by the texture in the mixture of adsorbennya, in the ratio of 0.0833 adsorbent mixture used has a high enough water content that is 2.89% that can be said that the tektur of the Adsorbennya is very mushy so low of 0.602%.

The chart at a ratio of 0.0833 to a ratio of 0.6667 is increased which indicates that the texture belonging to adsorbent is getting better for a good night flower essential oil. Can be seen from the size of the amount obtained at ratio 0.6667 which has a water content of 0.21% is 4.297%. While in ratio 0.75 decreased, caused by moisture content contained in the low adsorbennya mixture of 0.05% which indicates that the texture of the Adsorbennya very hard and the harsh texture will complicate the absorption good night flower essential oil because the flowers do not stick well on the surface adsorbent so that the lowland obtained is low enough 1.213%. Orange-coloured graphics indicate that the adsorbent used is a mixture of palm oil with a mixture of animal fats (fat cow and fat goat). At ratio 0.0833 until the ratio of 0.1667 trend increased. The next point experienced a penuruan at ratio 0.5 and increased slightly in ratio 0.667 then decreased again at ratio 0.75.

Table 2. Level analysis of savory flower oil night on fresh flower conditions

No	Ratio	Weight of essential oils (grams)	Essential oils levels (%)
1	0,5000	7,532	2,152
2	0,1667	7,144	2,041
3	0,0833	2,108	0,602
4	0,6667	15,040	4,297
5	0,7500	6,553	1,872
6	0,5000	4,244	1,213
7	0,1667	6,925	1,979
8	0,0833	4,182	1,195
9	0,6667	4,996	1,428
10	0,7500	4,148	1,185

The ups and downs of these graphs are caused by the moisture content contained in each adsorbent mixture, at the starting point of ratio 0.0833 has a fairly low water content of 0.10% which has a tektur quite hard so it is difficult to absorb essential oils To the low night interest of 1.195%. Ratio 0.1667 is the maximum point found on the chart with a large size of 1.979% of the water content contained at the rate of 0.30% in other words adsorbent used to have a tektur that fit not too soft and not too hard so can with maximum absorbing flowers essential oil night. And ratio 0.75 is the lowest result on this chart with a yield of 1.185%, this ratio has a fairly high water content of 0.71% when compared to the moisture content that belongs to a mixture of animal fat adsoben and coconut oil This palm so that it has a fairly mushy texture that results in low-acquired lowland. The result is high enough to be 4.279% compared to previous research conducted [8]. The adsorbent used is a mixture of cow fat and goat fat, getting a yield of 0.174%. The texture of a fat adsorbent greatly affects its adsorption power. Because if too dense fat will be difficult to absorb essential oils, because the petals of the flower can't stick to the surface of fat. So the adsorb process cannot be maximized. And conversely, if the texture of fat is

too soft then fat will stick to the flowers and will be wasted on the process of changing the flowers [12].

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The highest low-night flower essential oil at 4.297% is obtained on adsorbent with a ratio of beef fat: goat fat: white butter on fresh flower conditions. Adsorbent goat fat an oil bath of 1.434% and beef fat adsorbent get a yield of 2.169%, both have a higher yield than the previous researcher 0.81% for goat fat and 0.71% for beef fat. In the white butter adsorbent, there is a low 2.382% higher than the previous researcher was 0.7%. The best adsorbent type is the adsorbent that is white in color, odorless and has a suitable texture (not too hard and not too mushy). In this study, the best adsorbent gained with a mixture of beef fat + goat fat + white butter. In this research, obtained a comparison of the best adsorbent is a mixture of white butter with animal fat (fat cow and fat goat) by comparison (2 fat cows, 1 fat goat, and 3 butter white).

References

- [1] Suyanti 2002 Post Harvest Technology Journal of Agricultural Research and Development volume 2 no1 p 30-35, *Teknologi Pasca Panen Jurnal Penelitian dan Pengembangan Pertanian* volume 2 no1 p 30-35
- [2] M Ardiansyah, D Noeriati, and Muhandoyo 2013 The supply and demand of savory interest (*Polianthes Tuberosa* L.) Village Rembang District Pasuruan Journal Primordial volume 9 no 2 p 54-55, *Penawaran dan Permintaan Bunga Sedap Malam (Polianthes Tuberosa L.) Desa Rembang Kabupaten Pasuruan Jurnal Primordial* volume 9 no 2 p 54-55
- [3] R Faisal, R Purwanti, and N Chotijatun 2016 Pengaruh Jenis Adsorben dalam Proses Enfleurasi Minyak Atsiri Daun Kemangi. *Jurnal Permata Indonesia* volume 7 no 1 p 1-5
- [4] N K Sari and E Dira 2018 Comparasion Production Bioethanol from Cellulose using Batch Distillation and Flash Distillation Process Journal of GEOMATE volume 15 no 50 p 76-81
- [5] S Patrisia 2017 Influence of type of fat and vegetable oil in the process of extraction system of essential oil characteristics of Cambodian flowers sandalwood (*Plumeria Alba*) Journal of Agro-Industry engineering and management volume 5 no 2 p 39-44, *Pengaruh Jenis Lemak dan Minyak Nabati Pada Proses Ekstraksi Sistem Enfleurasi Terhadap Karakteristik Minyak Atsiri Bunga Kamboja Cendana (Plumeria Alba) Jurnal Rekayasa dan Manajemen Agro Industri* volume 5 no 2 p 39-44
- [6] N K Sari, K Sumada, A A Hendrix, and Y F Winda 2018 Atsiri Oil Production of Tobacco Leaves by Water Distillation Method Internasional Journal of Scientific & Technology Research volume 7 no 2 p 100-103
- [7] R Maryan 2009 Fine oil Extraction Night Maceration Method distillation Vacuum journal Technology and Food volume 5 no 2 p 1-6, *Ekstraksi Minyak Sedap Malam Metode Maserasi Destilasi Vacuum Jurnal Teknologi dan Pangan* volume 5 no 2 p 1-6
- [8] D Yulianingsih, Amiarsil, and S Sabari 2004 Enfleuration techniques in the process of making Rose Oil Horticultural Journal volume 17 no 4 pp 39-45, *Teknik Enfleurasi dalam Proses Pembuatan Minyak Mawar Jurnal Hortikultura* volume 17 no 4 pp 39-45
- [8] M Hetik, D Maghfoer, and T Wardiyati 2013 Influence of adsorbent type on quality essential oil in two cultivars savory flower night (*Polianthes Tuberosa*) Journal of Crop Production volume 1 no 4 p 308-310, *Pengaruh Jenis Adsorben Terhadap Kualitas Minyak Atsiri Pada Dua Kultivar Bunga Sedap Malam (Polianthes Tuberosa) Jurnal Produksi Tanaman* volume 1 no 4 p 308-310
- [10] Sulong and M Faisal 2006 Extraction of Essential Oils from Jasmine Flower Using Solvent Extraction Method. Faculty of Chemical & Natural Resources Engineering, Thesis University College of Engineering & Technology Malaysia Johor Bahru Malaysia
- [11] Suryani and Mutia 1999 Research on production process of the delicate flowers essential oil (*Polianthes Tuberosa* Var *Gracilis*) with the method of Enfleuration Faculty of Agricultural Technology Bogor Institute of Agriculture, West Java Indonesia, *Kajian Proses Produksi Minyak*

Atsiri Bunga Sedap Malam Tunggal (Polianthes Tuberosa Var Gracilis) Dengan Metoda Enfleurasi Fakultas Teknologi Pertanian Institut Pertanian Bogor Jawa Barat Indonesia

- [12] R Prapassorn U Dilokkunanant, U Sukkatta, and S Vajrodaya 2009 Extraction Methods for Tuberosa Oil and Their Chemical Components Journal Kasetsart. volume 43 no 2 p 204-211

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Essential Oil from A Satisfying Evening Flower with Enfleuration Process

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Abstract. A Satisfying evening flower (Polianthes Tuberos) is done concurrently as cut flowers, so that many flowers are rotten and wasted as garbage, the other utilization as essential oil. The influence of adsorbent and texture type Polianthes Tuberos to essential oil yield. The results showed that each adsorbent gave the yield of a mixture of vegetable and animal fat with a water content of 0.21%, the amount of water content indicates the hardness degree of the adsorbent. The essential oil obtained clear yellow, smells typical a very strong of them, does not leave spots on the filter paper and the yield obtained 4.279%. Enfleuration technique is a good technique for the intake of essential oils from flowers

1. Introduction

Polianthes tuberos originated in Mexico, this plant is known in Indonesia and scattered in the sub-district Bangil and Rembang, Pasuruan, East Java. Year 2009 Until now the productivity of 659 stalk each square meter with an area of 5,790,800 square meter, costing range between IDR 400 to IDR 1000 per stalk, occupying the third order after Rose and Jasmine [1]. Based on the arrangement of flowers, distinguished by a single-layered petal, double-glazed petals and semi-double flowers. There are the same together, so that many flowers are rotten and wasted as garbage, other than as cut flowers, other utilization can be utilized as essential oil [2, 3, 4, 5, 6, 7]. A good refining technique for of essential oils on flowers is to use the enfleuration method. There is a technique to produce essential oils by capturing volatile essential oils from plant parts using a fat mixture as adsorbent at low temperature. Liquid triglyceride fats that have double bonds thus occur in the process of the binding of the Ester clusters in fat. The process of netting occurs due to the increasing tensile force between esters from fats with essential oils so that fats can absorb volatile essential oils [8,9], essential oils from tobacco leaf with batch distillation and flash distillation process [10, 11]. The enfleuration process ends at the time fats are saturated with flower oil. The success of the enfleuration process depends on the fat used, the fat used permissible has of the right level of hardness to absorb essential oils on flowers [12] essential oils on tobacco leaf with water distillation [13, 14], essential oils with hydrolysis process [15, 16, 17]. This research aims to obtain the right type and composition of adsorbent and has a high degree of hardness, and high essential oil yield with enfleuration process from Polianthes tuberos, essential oils were produced using enfleuration methods. Fats are used as adsorbent to essential oils from the luscious flower of the night. The savory flowers essential oil yield in previous studies with goat fat adsorbent amounted to 0.81%, while using a cow's fat adsorbent of 0.71%. The mixing of fatty



adsorbents (cows, goats and white butter) and a mixture of fats (cows, goats and palm oil) is expected to yield a 4% yield.

2. Methode Enflueration

The savory crops of the night or the *Polianthes tuberosa* is not a native Indonesian plant but it is derived from Mexico and scattered from Europe, Africa, Asia and up to Java Island. The savory flower of the night is a green plant derived from the family Agvaceae, the name *tuberosa* indicates if this plant has tuber, the evening flowers have their own uniqueness due to the night, this flower lives on a tropical and subtropical climate [18].



Scientific classification:

Kingdom : Plantae

Divisions : Magnoliophyta

Class : Liliopsida

Order : Asparagelas

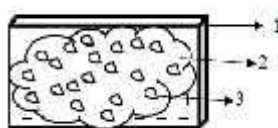
Family : Agvaceae

Species : *Polianthes tuberosa*

Figure 1. *Polianthes tuberos*

The fats used as adsorbent should be free from the dirt, color or smell of the fat itself, as it can affect the color as well as the absolute aroma of the resulting flowers [19]. Animal fat or butter has a moisture content of not more than 16%, whereas vegetable or margarine fats have a moisture content of not more than 18%. Vegetable oils that can be used as adsorbent is coconut oil, palm oil, corn oil and soy oil. Mixing fat with oil will give you the right texture on adsorbent [12]. A commonly used method for producing essential oils is the extraction using cold fat or using hot fat (maceration) and distillation. In both extraction methods occurs the process of adsorb essential oil of flowers by fat as adsorbent. The absolute yield resulting from cold fat extraction is higher than that of distillation [20]. There is a way of taking essential oils with cold fats. By pasting a night of delicate flower petals on a fat surface that has been flattered above the chassis. The fat mixture is used to absorb the essential oils that are at night. Then the fat that has absorbed the essential oil is dissolved with alcohol and continued by distillation to obtain an absolute luscious flower of the Night [21].

Fat to be used mixed (fat beef, goat fat and white butter), and a mixture (beef fat, goat fat and palm oil). The fats to be mixed are washed until clean from dirt, after washing the drain, put on the glass beaker, then stir in the presence of heating, heating is done $\pm 50^{\circ}\text{C}$, do it until homogeneous, let stand at room temperature.



Description:

1. Glass/Chassis

2. Adsorbent

3. Delicious Night Interest

Figure 2. Enflueration Tools

Adsorbent (fat mixture) weighed 100 grams and applied on 2 glass surfaces of 5 mm each to 50 grams. A fine-weighted night interest is placed to one of the fat surfaces until evenly, combine the two chassis, close the meeting using the banana leaf, store it in a place that is not exposed to the light source, the savory flowers are changed every 24 hours for 1 week. Organoleptic test or sensory test is a test using the human senses as the primary tool for the measurement of a product. Organoleptic tests conducted on this study included color testing, smell testing and spot testing. Result analysis is a comparison of the amount of oil produced and uses percent (%) units. Gas chromatography is a mixed

separation technique of several compounds based on the pace of motion of the components that are to be separated by the process of flowing a gas flow through the silent phase, the difference in motion rate is caused by the difference in weight molecules, boiling points and the pollutant of each of these compounds [22]. Then the filtrate that has been obtained was inserted into the three-neck flask, place the three neck flask over the electro coat. Install the condenser and the adaptor and then distillation at $\pm 78^{\circ}\text{C}$ to separate the alcohol and essential oils, up to the evening flower essential oil is obtained. After 7 days of taking adsorbent and insert into beaker glass, alcohol 96% added with a comparison of fat and alcohol 1:2. Then stir and melt using magnetic stir with temperature no more than 50°C , then save for 24 hours, using what man filter paper until separate fat and produce filtrate.

3. Results and Discussion

Essential oils from the luscious flowers use adsorbent mix of animal and vegetable fats at room temperature with of them. The separation of essential oils from alcohol uses the distillation process. Goat fat and fat mixture with a ratio of 0.0833 have a high moisture content compared to other fats. If the fats used as adsorbents have a sufficiently high moisture content, low oil yield is obtained. This is due to the fat that the high water content tends to be softened and will be easily attached to the flowers and will be wasted at the time of interest turnover.

Organoleptic tests carried out include color testing, appearance, smell and spotting. There are three different colors: yellow, brownish yellow, and brown. Yellow color, much resulting from a fresh night flower condition. While the color of brownish yellow and brown color is produced from the condition of the savory flower dry night. In the smell test, there are three criteria that are the distinctive fragrance of the savory flower of the night is very smelled (+ +), fragrant typical night flowers that are vaguely smell (+), and smell fat (-). In the sighting test there are two criteria i.e. oil appears clear or oil appears cloudy. If the essential oil obtained is cloudy, then the essential oil obtained still contains oil or grease from adsorbent. It is also supported with spotting test. Spotting test is a common form identification in essential oils that are done with the essential oil in a hard strain. If the essential oil obtained does not leave stains on the filter paper because it evaporates, it indicates that the sample obtained is true essential oil, whereas if the essential oil leaves the stain spots on the filter paper, it signifies That which is acquired is not an essential oil but an oil or fat derived from adsorbent.

Table 1. Moisture content on cow fat, goat fat, white butter and palm oil

No.	Adsorbent type	Moisture content (%)	Ratio
1	1 LS : 1 LK : 2 MP	0,17	0,5000
2	1 LS : 2 LK : 3 MP	0,58	0,1667
3	1 LS : 3 LK : 4 MP	2,89	0,0833
4	2 LS : 1 LK : 3 MP	0,21	0,6667
5	3 LS : 1 LK : 4 MP	0,05	0,7500
6	1 LS : 1 LK : 2 MY	0,28	0,5000
7	1 LS : 2 LK : 3 MY	0,30	0,1667
8	1 LS : 3 LK : 4 MY	0,10	0,0833
9	2 LS : 1 LK : 3 MY	0,40	0,6667
10	3 LS : 1 LK : 4 MY	0,71	0,7500
11	MP	0,05	-
12	LS	2,89	-
13	LK	0,21	-
14	MY	-	-

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References

- [1] Suyanti 2002 Post Harvest Technology Journal of Agricultural Research and Development volume 2 no1 p 30-35, *Teknologi Pasca Panen Jurnal Penelitian dan Pengembangan Pertanian* volume 2 no1 p 30-35
- [2] M Ardiansyah, D Noeriati, and Muhandoyo 2013 The supply and demand of savory interest (*Polianthes Tuberosa* L.) Village Rembang District Pasuruan Journal Primordial volume 9 no 2 p 54-55, *Penawaran dan Permintaan Bunga Sedap Malam (Polianthes Tuberosa L.) Desa Rembang Kabupaten Pasuruan Jurnal Primordial* volume 9 no 2 p 54-55
- [3] M Tutt, T Kikas, and J Olt 2012 Influence of different pretreatment methods on bioethanol production from wheat straw Agronomy Research Biosystem Engineering volume 1 p 269-276
- [4] E C Bensah, and M Mensah 2013 Chemical Pretreatment Methods for the Production of Cellulose Ethanol: Technologies and Innovations Research Article Article ID 719607, 21 pages, <http://dx.doi.org/10.1155/2013/719607>
- [5] F Battista, G Mancini, B Ruggeri, and D Fino 2016 Selection of the best pretreatment for hydrogen and bioethanol production from olive oil waste products Renewable Energy, volume 88 p 401-407
- [6] Y Liu, H Zhou, S Wang, K Wang, and S Xiaojun 2015 Comparison of γ -irradiation with other pretreatments followed with simultaneous saccharification and fermentation on bioconversion of microcrystalline cellulose for bioethanol production Bioresource Technology volume 182 p 289-295
- [7] R C Kuhad, R Gupta, Y P Khasa, and A Singh 2010 Bioethanol Production from Lantana Camara (Red Sage): Pretreatment, Saccharification, and Fermentation Bioresource Technology, volume 101 p 8348-8354
- [8] R Faisal, R Purwanti, and N Chotijatun 2016 Pengaruh Jenis Adsorben dalam Proses Enfleurasi Minyak Atsiri Daun Kemangi. Jurnal Permata Indonesia volume 7 no 1 p 1-5
- [9] N Brosse, M N M Ibrahim, and A A Rahim 2011 Biomass to Bioethanol: Initiatives of the Future for Lignin Review Article, Article ID 461482, page 10, doi:105402/2011/461482
- [10] N K Sari and E Dira 2018 Comparasion Production Bioethanol from Cellulose using Batch Distillation and Flash Distillation Process Journal of GEOMATE volume 15 no 50 p 76-81
- [11] N K Sari, S Sutiyono, E Luluk, E Dira, W Putu, and S H Tatik 2016 Bioethanol Production from Liquid Waste of Rise Flour with Batch Process Proceeding MATEC Web of Conference. volume 58 no 01003 p 1-5
- [12] S Patrisia 2017 Influence of type of fat and vegetable oil in the process of extraction system of essential oil characteristics of Cambodian flowers sandalwood (*Plumeria Alba*) Journal of Agro-Industry engineering and management volume 5 no 2 p 39-44, *Pengaruh Jenis Lemak dan Minyak Nabati Pada Proses Ekstraksi Sistem Enfleurasi Terhadap Karakteristik Minyak Atsiri Bunga*

- Kamboja Cendana (Plumeria Alba) Jurnal Rekayasa dan Manajemen Agro Industri* volume 5 no 2 p 39-44
- [13] N K Sari, K Sumada, A A Hendrix, and Y F Winda 2018 Atsiri Oil Production of Tobacco Leaves by Water Distillation Method Internasional Journal of Scientific & Technology Research volume 7 no 2 p 100-103
 - [14] N K Sari, Y Nico, LTika, and E Dira 2017 Hydrolysis of Cellulose from Bamboo with Biology Process Using Enzyme Journal Advanced Science Letters volume 23 no12 p 12235-12238
 - [15] S K Thangavelu, A S Ahmed, and F N Ani 2014 Bioethanol Production from Sago Pith Waste Using Microwave Hydrothermal Hydrolysis Accelerated by Carbon Dioxide Applied Energy, volume 128 p 277-283
 - [16] G S Geetha, and A N Gopalakrishnan 2011 Bioethanol production from Paper Fibre Residue Using Diluted Alkali Hydrolysis and the Fermentation Process E-Journal of Chemistry, volume 8 no 4 p 1951-1957
 - [17] F Teymouri, L L Peres, Alizadeh, and B E Dale 2005 Optimization of the Ammonia Fiber Explosion (AFEX) Treatment Parameters for Enzymatic Hydrolysis of Corn Stover Biores. Tech. volume 96 p 2014-2018
 - [18] R Maryan 2009 Fine oil Extraction Night Maceration Method distillation Vacuum journal Technology and Food volume 5 no 2 p 1-6, *Ekstraksi Minyak Sedap Malam Metode Maserasi Destilasi Vacuum Jurnal Teknologi dan Pangan* volume 5 no 2 p 1-6
 - [19] D Yulianingsih, Amiarsi1, and S Sabari 2004 Enfleuration techniques in the process of making Rose Oil Horticultural Journal volume 17 no 4 pp 39-45, *Teknik Enfleurasi dalam Proses Pembuatan Minyak Mawar Jurnal Hortikultura* volume 17 no 4 pp 39-45
 - [20] M Hetik, D Maghfoer, and T Wardiyati 2013 Influence of adsorbent type on quality essential oil in two cultivars savory flower night (Polianthes Tuberosa) Journal of Crop Production volume 1 no 4 p 308-310, *Pengaruh Jenis Adsorben Terhadap Kualitas Minyak Atsiri Pada Dua Kultivar Bunga Sedap Malam (Polianthes Tuberosa) Jurnal Produksi Tanaman* volume 1 no 4 p 308-310
 - [21] Sulong and M Faisal 2006 Extraction of Essential Oils from Jasmine Flower Using Solvent Extraction Method. Faculty of Chemical & Natural Resources Engineering, Thesis University College of Engineering & Technology Malaysia Johor Bahru Malaysia
 - [22] Suryani and Mutia 1999 Research on production process of the delicate flowers essential oil (Polianthes Tuberosa Var Gracilis) with the method of Enfleuration Faculty of Agricultural Technology Bogor Institute of Agriculture, West Java Indonesia, *Kajian Proses Produksi Minyak Atsiri Bunga Sedap Malam Tunggal (Polianthes Tuberosa Var Gracilis) Dengan Metoda Enfleurasi Fakultas Teknologi Pertanian Institut Pertanian Bogor Jawa Barat Indonesia*
 - [23] R Prapassorn, U Dilokkunanant, U Sukkatta, and S Vajrodya 2009 Extraction Methods for Tuberosa Oil and Their Chemical Components Journal Kasetsart. volume 43 no 2 p 204-211

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