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Extraction from Sweet Orange Peel (*Citrus Aurantium var Sinesis*), Lemongrass (*Cymbopogon Citratus*), and Jasmine (*Jasminum sambac*) as Aromatherapy Candles for Empowerment of Home Economics

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Abstract: The COVID-19 pandemic has affected the residents of Ngijo, a sub-district in Gunungpati District, Semarang. This community service activity aims to empower the Ngijo Family Welfare Development (PKK), Gunungpati, Semarang, as a solution for making aromatherapy candles from waste orange peel, jasmine flowers, and lemongrass. The methods of community service carried out include preparation, outreach, and evaluation. Preparations included signing a letter of cooperation with partners, making aromatherapy candles through six trials where the aroma smelled very good, and socializing with demonstrations where the team explained the consequences of product failure. Posters were given to residents to strengthen their understanding of this activity. The activity's success was seen in the residents' enthusiasm during the question-and-answer session regarding their understanding of making aromatherapy candles. The empowerment of PKK Ngijo, Gunungpati, and Semarang is successful because this activity is exciting and valuable, especially orange peel, which contains essential oils and has a refreshing aroma.

Keywords: aromatherapy candles; jasmine; lemongrass; orange peel; steam distillation

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INTRODUCTION

The Gunungpati District has 16 villages, including Ngijo Village, which has an area of approximately 123,914 hectares of residential and building land, with the largest occupation being farming. The vast yard space allows various plants to thrive, including sakura trees, butterfly pea flowers, durian, rambutan, lemon grass, jasmine, and sweet oranges (Semarang City Government, 2023). Various uses of these plants have been implemented, such as cherry leaves being turned into jelly candy (Damayanti et al., 2019), rambutan and durian seed chips (Damayanti et al., 2020), and butterfly

pea flowers being used for kombucha tea (Damayanti et al., 2022). Meanwhile, lemongrass, jasmine, and sweet oranges can be utilized for aromatherapy candles, which is one way to enhance resilience against the virus that has spread worldwide, namely the Corona Virus Disease 2019 (COVID-19) pandemic.

The COVID-19 pandemic began to emerge in China and spread to Indonesia in early 2020, causing concern among the public (Kurniasih, 2020). Some individuals have experienced severe impacts from the ongoing global pandemic of COVID-19, ranging from financial to social to everyday circumstances (Prasetya et al., 2021). The COVID-19 cases in Ngijo Village, Gunungpati District, Semarang City, amounted to 1 on February 6, 2021 (Adelia, 2021), and 16 on February 16, 2022 (Adelia, 2022), with the total cases increasing from 24 to 41. In September 2022, a new variant emerged, namely Omicron XBB (Arifianto, 2022). Furthermore, information from the Ministry of Health on April 21, 2023, announced the presence of the highly transmissible Arcturus variant, or XBB 1.16 (Rokom, 2023).

One of the government policies in handling COVID-19 is the Enforcement of Restrictions on Community Activities (PPKM), established through the Minister of Home Affairs Instruction Number 15 of 2021 (Inmendagri, 2021). However, this instruction was revoked following the issuance of Minister of Home Affairs Instruction Number 53 of 2022 on December 30, 2022 (Inmendagri, 2022).

Aromatherapy candles can also be used for relaxation, stress relief, and alleviating headaches due to their essential oil content derived from plant aromas (Barnawi et al., 2022; Hilmarni et al., 2021; Utami et al., 2022; Yoshiko & Purwoko, 2016). Aromatherapy candles can be obtained through essential oil technology derived from various plants, such as citrus peel waste, lemongrass, and jasmine flowers. Essential oils, in essence, can be obtained through extraction technology using steam distillation (Lestari et al., 2020).

Sweet orange (*Citrus aurantium var sinensis*) is one of the most commonly consumed oranges by the Indonesian community, and its peel is often discarded as waste (Megawati & Kurniawan, 2015). However, this peel contains essential oil, with the highest component being limonene (95%) (Megawati & Kurniawan, 2015). Therefore, the aroma of essential oil in sweet orange peel waste gives it a distinct character (Fitri & Proborini, 2018).

Lemongrass (*Cymbopogon citratus*) belongs to the grass family (Gramineae) and is known as "Citronella oil of Java" among essential oil farmers (Setiawan et al., 2019). It is a spice plant that is resilient to various weather conditions, easy to grow, and is commonly used for body care and as a complementary kitchen spice (Basuki et al., 2020; Nurdianti et al., 2019). This plant contains eugenol, which has a refreshing aroma (Fatina et al., 2021).

Jasmine (*Jasminum sambac*) is one of the types of flowers widely cultivated in Indonesia, used for decoration and as a sprinkler of flowers during traditional ceremonies, as well as a tea fragrance and aromatherapy material due to its distinctive and calming aroma (Nurjanah et al., 2016). The essential oil from jasmine flowers is brownish-yellow (Ketaren, 1986).

A simple method called steam distillation is employed to extract essential oils from orange peel waste, lemongrass, and jasmine flowers. The time required for this method depends on the raw material. For instance, lemongrass takes about 6 hours (Conde-Hernández et al., 2017), jasmine takes about 1 hour (Khammee et al., 2021), and orange peel takes about 8 hours (Ma'sum et al., 2021).

Therefore, the community service activities of the Faculty of Engineering at Semarang State University aim to empower plants around the households in Ngijo Village, Gunungpati District, Semarang, such as lemongrass and jasmine and sweet orange peel waste, to produce aromatherapy candles using simple steam distillation extraction technology. This initiative targets around 30 participants in the community engagement program.

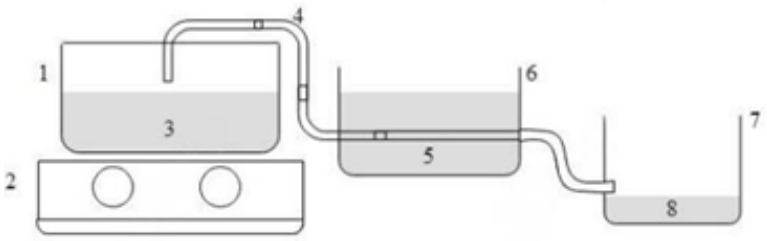
METHODS

This activity will be held on July 8, 2023, at one of the residents' houses in Ngijo Village, Gunungpati District, Semarang Regency. The reason for choosing Ngijo Village is because the economic sector in this area only consists of 4 shopping groups and two convenience stores.

This event's target audience consists of community members, particularly mothers involved in the PKK (Family Welfare Empowerment) program, who reside in Ngijo Village, Gunungpati District, Semarang. This group comprises 31 PKK mothers.

Community Service Method: The implementation of this community service activity is planned to utilize the methods of socialization and evaluation, as the delivery of information and interaction with participants is more efficient and effective (Freitas et al., 2023; Manalu et al., 2023). The work procedure includes:

1. Preparation involves gathering equipment and materials and arranging the training venue.
2. Socialization, through simple steam distillation equipment, including demonstrations and distributing posters on making aromatherapy candles from orange peel waste, lemongrass, and jasmine.
3. Practice making aromatherapy candles from orange peel waste with the addition of lemongrass and jasmine on a scale of 4 kg using a steam distillation apparatus setup (Figure 1), following these steps:



Note: 1 (covered water pot), 2 (stove), 3 (ingredient solution), 4 (hose), 5 (cold water), 6 (cold water container), 7 (essential oil container), and 8 (essential oil product)

Figure 1 Steam distillation apparatus

- 4 kg of orange peel and jasmine flowers and 3 kg of lemongrass are thoroughly washed. Then, the orange peel, jasmine flowers, and lemongrass are sliced into small pieces.
- Each ingredient is boiled separately in a pot (1) with a ratio of 6 litres per 4 kg of material (orange peel), 8 litres per 4 kg of material (jasmine flowers), and 3 litres per 3 kg of material (lemongrass). The distillate is stored in a closed container and left to settle for 3 to 24 hours.
- When boiling, steam begins to escape through the hose (4) and is passed through the pot (6) containing ice cubes (5).
- A small hose is attached to the pot (7), prepared to collect the mixture of water and essential oil. The water is below, and the oil is above. The mixture is then separated.

Subsequently, the three essential oils are combined.

- Moulds are prepared, and the candle wick is placed upright in the centre. 5 ml of essential oil from the three are mixed. Twenty grams of solid paraffin are melted, mixed with 15 ml of essential oil, and poured into the wick container. Once the paraffin solidifies, the aromatherapy candle is ready for use (Figure 2).

Figure 2 Aromatherapy candle ready for use

4. Evaluation is conducted by distributing questionnaires to participants before and after the activity, which indicates the success of socialization.

RESULT AND DISCUSSION

This community service program was conducted from April to July 2023 at one of the residents' houses and attended by 31 individuals. The aromatherapy candles, which have been socialized to the community, are made from orange peel (Melviani et al., 2021), used cooking oil (Martha et al., 2022), and soy wax (Nining & Yeni, 2021).

Socialization and community engagement

Socialization and community engagement (Figure 3) about how to make aromatherapy candles from sweet orange peel waste (Citrus aurantium var sinesis) with the addition of lemongrass (Cymbopogon citratus) and jasmine (Jasminum sambac), which are beneficial for relieving headaches and have a refreshing aroma. At this stage, we expect increased knowledge among the community, with the PKK group in Ngijo Village, Gunungpati District, Semarang, serving as the representative.

Figure 3 Opening of community engagement socialization

The production of aromatherapy candles containing essential oils

This stage involves the experimental production of aromatherapy candles from sweet orange peel waste (Citrus aurantium var sinesis) with the addition of lemongrass (Cymbopogon citratus) and jasmine (Jasminum sambac). The experiment is conducted six times, with three trials for producing essential oils and three trials for making aromatherapy candles. The experimental results are presented in Table 1.

Socialization of aromatherapy candle making using essential oils

In this stage, the Head of the Community Service Team provides a brief narrative about aromatherapy candles (Figure 4), followed by an explanation of the production process by team members.

Table 1 Aromatherapy Candle Experiment with Orange Peel Waste, Jasmine Flowers, and Lemongrass

Experiment	Variable	Treatment	Result
I	Orange peel waste, jasmine flowers, and lemongrass, each 1 kg	Washing, slicing, boiling with a ratio of 1:1 for orange peel waste, jasmine flowers, and lemongrass, and storing the distillate from orange peel waste, jasmine flowers, and lemongrass for 3x24 hours	Lemongrass distillate yields 5 ml of essential oil. Orange peel and jasmine distillates do not yield essential oils. The resulting distillate has no aroma, either before or after 3 days.
II	Orange peel waste 1 kg, jasmine flowers 1 kg, and lemongrass 2 kg	Washing, slicing, boiling with a ratio of 2:1 for jasmine flowers, 3:2 for orange peel waste, and 1:1 for lemongrass, and storing the distillate from orange peel waste, jasmine flowers, and lemongrass for 3x24 hours	Orange peel distillate yields 5 ml of essential oil. Jasmine distillate yields 5 ml of essential oil. Lemongrass distillate yields 10 ml of essential oil. The resulting distillate has an aroma after three days. However, after three days, no aroma was detected.
III	Orange peel waste (4 kg), jasmine flowers (4 kg), and lemongrass (3 kg)	Washing, slicing, and boiling with a ratio of 3:2 for orange peel waste, 4:1 for jasmine flowers, and 1:1 for lemongrass, and storing the distillate from orange peel waste, jasmine flowers and lemongrass for 3x24 hours	Orange peel distillate yields 20 ml of essential oil. Jasmine distillate yields 20 ml of essential oil. Lemongrass distillate yields 15 ml of essential oil. The resulting distillate has an aroma both before and after three days.
IV	Paraffin 100 mL, essential oil of orange peel, jasmine flowers, and lemongrass each 15 mL	Melting and mixing 100 g of paraffin and 15 mL of essential oil of orange peel, jasmine flowers, and lemongrass into candle molds and waiting for them to solidify	Aromatherapy candles are formed with a weak aroma when burned.
V	Paraffin 100 mL, essential oil of orange peel, jasmine flowers, and lemongrass each 15 mL	Melting and mixing 100 g of paraffin and 15 mL of essential oil of orange peel, jasmine flowers, and lemongrass into candle moulds and waiting for them to solidify	Aromatherapy candles are formed with a stronger aroma when burned. However, the candle wick results in a large flame.
VI	Paraffin 20 mL, essential oil of orange peel, jasmine flowers, and lemongrass each 5 mL	Melting and mixing 20 g of paraffin and 5 mL of essential oil of orange peel, jasmine flowers, and lemongrass into candle moulds and waiting for them to solidify	Aromatherapy candles are formed with a stronger aroma.

Figure 4 Explanation by the team leader about the production of aromatherapy candles from orange peel waste, lemongrass, and jasmine

The Head of the Community Service Team briefly explains aromatherapy candles, their definition, process, and the tools and materials used (Figure 4). Then, the team leader hands over the floor entirely to the students as team members to explain the process of making aromatherapy candles, including both failures and successes in product formation (Figure 5).

Figure 5 Implementation of community service

The candle containers used are made of gypsum (Figure 2) because they are more heat-resistant (Kho, 2014) compared to glass material (Mirella et al., 2019) when the wax melts. Additionally, the beautiful shape of the candle containers adds aesthetic value to a room (Pinandita et al., 2023). The team also provides posters using A3+-sized paper measuring 48.3 x 32.9 cm (Figure 6) to participants so they can practice at home. Publication media such as posters use words, pictures, or a combination of both to convey information to readers, making it easy to understand (Sucipto & Samidi, 2022).

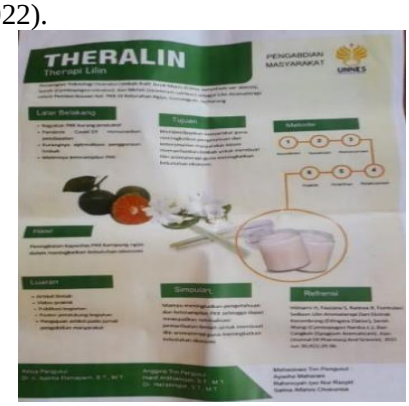


Figure 6 Aromatherapy candle-making poster

Evaluation

The success of this activity is assessed based on understanding before and after socialization using a questionnaire (Figure 7).

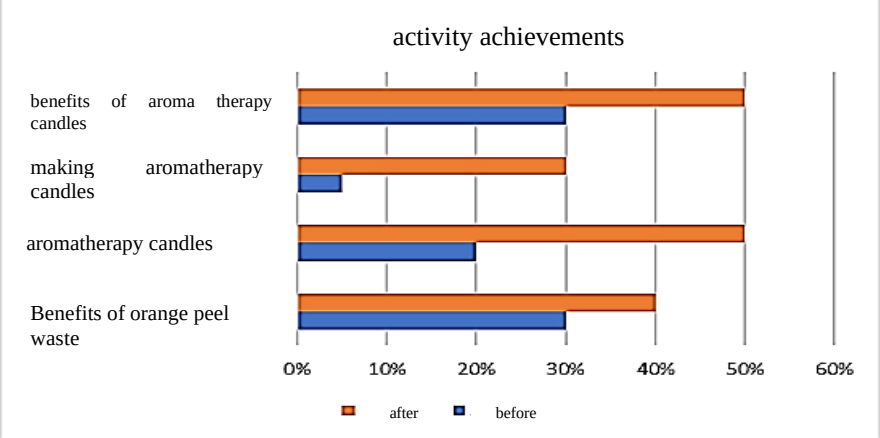


Figure 7 Understanding before and after socialization using a questionnaire

Figure 7 shows that after participating in this socialization, most participants have understood the benefits of orange peel waste, which is usually discarded, and the concept of aromatherapy candles, including their production and benefits. It is evident that before understanding the benefits, production, and concept of aromatherapy candles and the benefits of orange peel waste, the percentages were 30%, 5%, 20%, and 30%, respectively. After socialization, the percentages became 50%, 30%, 50%, and 40%, respectively.

CONCLUSION

The community service activity was conducted using a method that involved preparation through signing a cooperation agreement with partners, making aromatherapy candles through several experiments until the scent became very fragrant, and socialization through demonstrations and poster distribution. The activity's success was evident from the question-and-answer session, where many residents asked questions about their knowledge and understanding of making aromatherapy candles.

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