Jurnal Pijar MIPA
https://jurnalfkip.unram.ac.id/index.php/JPM

ISSN 1907-1744 (Print)
ISSN 2460-1500 (Online)

Utilization of Sang Mamong Leaf Extract (*Lantana camara*) as an Anti-Head (*Pediculus humanus capitis*) Lice Shampoo

Yunita Riskayanti*, Mutia Febrianti

SMA Negeri 1 Seteluk, West Sumbawa Regency, Indonesia
*e-mail: yunitariskayanti76@guru.sma.belajar.id

Received: December 20, 2024. Accepted: January 21, 2025. Published: January 30, 2025

Abstract: Head lice (Pediculus humanus capitis) are a scalp health problem that can attack all ages, especially children aged 3–11 years. Women have a higher risk of infection than men. In Seteluk District, West Sumbawa Regency, a survey of 40 children aged 6–13 years (20 girls and 20 boys) showed that 100% of girls (20 people) had head lice, while only 20% of boys (4 people) who are infected. The high risk in girls is influenced by wearing the hijab from an early age, hot weather, and sweat, which causes hair to become wet, thereby supporting the development of head lice. Head lice cause severe itching that triggers excessive scratching, potentially causing wounds, irritation, scalp infections, and increasing the risk of fever in children. This research aims to prove the effectiveness of *sang mamong* (Lantana camara L) leaf extract as an anti-head lice (Pediculus humanus capitis) shampoo through quantitative experimental methods. Making *sang mamong* extract using 60 grams of dry and fine *sang mamong*, using 450 mL of 96% alcohol for 2 days, then heated at 70 ºC to produce *sang mamong* extract. Data analysis techniques are based on the results of pH measurement tests, foam height tests, and activity tests. The researcher's hair lice activity test results used 1 mL of anti-lice material, dropped evenly on filter paper, and placed in a petri dish. For anti-lice shampoo without using *sang mamong* leaf extract, the 3 fleas tested showed no change in active flea activity for up to 1 hour, whereas for shampoo containing *sang mamong* extract it showed different activity for each extract and the most effective flea activity test results were Anti-lice shampoo containing 4% *sang mamong* can kill 2 head lice, 1 within 4 minutes and 1 within 11 minutes, and this shows that anti-lice shampoo containing Sang mamong extract (*Lantana camara* L) is still better than the shampoo sold on the market, based on activity tests, market shampoo is only able to make 2 lice immobile in just 30 minutes, then 3 lice move again for up to 60 minutes without showing any change. The pH measurement test shows an average value of 6, and the foam height test produces an average value of 8.5. Based on these findings, *sang mamong* (Lantana camara L) leaves can produce an effective anti-head lice shampoo. Tests for pH levels, foam height, and flea activity on shampoo made from *sang mamong* (Lantana camara L) leaves meet the criteria for good quality shampoo. Shampoo trials have been conducted on 3 children and 2 teenagers, showing safe results without irritation. scalp and effectively makes hair lice fall out during use.

Keywords: Extract; Head Lice; *Sang Mamong* Leaves; Shampoo.

Introduction

Head lice (*Pediculus humanus capitis*) are a type of scalp disease that affects individuals of all ages, particularly children aged 3–11 years. Based on gender, females are at a higher risk of infestation than males [1]. Head lice are small insects that live in human hair and survive by sucking blood through the scalp. Due to their small size, head lice are difficult to see with the naked eye at a glance. Their size varies, ranging from a pinhead to a sesame seed. The incubation period for lice eggs is approximately 8–9 days to reach adulthood, with each louse typically requiring 9–12 days to mature. Once fully grown, lice can live for up to four weeks before dying [2]. Head lice take about 2 weeks to develop from egg to adult and start laying eggs again, so their rapid life cycle accelerates their reproduction on the scalp. Male head lice measure about 2 mm long, while female head lice measure approximately 3 mm. The total number of eggs laid during a female louse's lifetime is estimated to be around 140 [3], The fast life cycle and large number of eggs, causing the development of lice to occur rapidly, so efforts are needed to stop their reproduction.

Head lice are small parasites medically referred to as *pediculosis*. This condition is caused by lice of the species *Pediculus humanus capitis*, commonly known as head lice [4]. According to [5] *Pediculosis capitis*, *it* is a scalp condition caused by the infestation of mites or the species *Pediculus humanus capitis*. *Pediculosis capitis* infects humans worldwide and exhibits the highest prevalence, particularly among children. Head lice infestation has negative effects, including itching on the scalp. Lice bites on the scalp cause this itching. According to Rahayu, as cited in [6], severe infestations can cause scalp infections characterized by the formation of small pus-filled blisters. Another potential danger is the reduction of iron levels, which may lead to anaemia.

In Seteluk District, West Sumbawa Regency, a survey of 40 children aged 6–13 years (20 girls and 20 boys) showed that 100% of girls (20 people) had head lice, while only 20% of boys (4 people) who are infected. The high risk in girls is influenced by wearing the hijab from an early age, hot

How to Cite:
Y. Riskayanti and M. Febrianti, "Utilization of Sang Mamong Leaf Extract (Lantana camara) as an Anti-Head (Pediculus humanus capitis) Lice Shampoo", *J. Pijar.MIPA*, vol. 20, no. 1, pp. 123–128, Jan. 2025. https://doi.org/10.29303/jpm.v20i1.8366

weather, and sweat, which causes hair to become wet and damp, thereby supporting the development of head lice; this creates favorable conditions for the rapid reproduction of head lice. This observation is supported by a study conducted [5], which states that factors influencing the transmission of *Pediculus humanus capitis* include temperature, light, humidity, wind speed, and climate. The fairly hot climate in West Sumbawa district can accelerate the growth of head lice and based on the opinion of [7] pediculus capitis is an infectious disease resulting from interactions between the agent, host and environment as well as the transmission process between them. Due to the numerous negative effects caused by head lice, treatment is necessary to eliminate them. Pediculicides are one type of pesticide that can be used to kill head lice. However, the use of chemically-based pediculicides raises concerns about potential side effects, making natural pediculicides a safer alternative. According to [8] one of the chemical insecticides is lindane, which has dangerous side effects for humans, including neurotoxicity which can cause dizziness, seizures, and even death, as well as pollute the environment if used in the long term, according to Soonwera in [8] based on data from WHO, every year 44,000 to 2,000,000 people experience poisoning due to synthetic insecticides. Cases of head lice resistance to synthetic insecticides such as permethrin, lindane, malathion, and pyrethrin have been widely reported in the United States, England, Australia, and Argentina, making treatment less effective. This resistance is caused by too frequent use or excessive doses.

According to Novitasari and Putri as cited in [9] natural pediculicides can be derived from natural plants. The natural materials used can include medicinal plants, which are a type of plant with benefits and the ability to treat various diseases. Plants considered effective contain active compounds such as secondary metabolites, which are believed to be capable of curing various illnesses. Compounds that can inhibit head lice activity include saponins, flavonoids, alkaloids, and tannins [10], therefore, in this study, researchers utilized Sang Mamong leaves (*Lantana camara L*) because they contain a variety of secondary metabolites. Specifically, the leaves are rich in essential oils, flavonoids, alkaloids, tannins, and saponins, which can inhibit head lice activity [11].

Sang mamong is a type of weed that grows abundantly in mountainous areas. Research on the utilization of *sang mamong* has been widely conducted, although its use is not yet well-known. One such study was conducted in Uganda, Africa, in 2009. The *in vitro* study proved the potential of *sang mamong* extract as an antimicrobial, immunomodulator, and antitumor agent [12]. *Sang mamong* is a shrub that grows upright or slightly climbing. The leaves are used to treat itching and reduce swelling, while the flowers are effective for stopping bleeding [13]. The *sang mamong* plant is one of the plants that can be used as a natural insecticide. Based on phytochemical tests, *sang mamong* leaves contain both primary and secondary metabolites. The primary metabolites include glucose, amino acids, nucleic acids, and proteins, while the secondary metabolites consist of flavonoids, steroids/triterpenoids, tannins/polyphenols, and saponins [14]. Its leaves are rich in active compounds such as essential oils, flavonoids, alkaloids, tannins, and saponins, which possess antibacterial properties [11].

In Seteluk District and Poto Tano District, almost all villages, such as Tapir Village, Seteluk Village, Senayan Village, Tebo Village, Mantar Village, Tua Nanga Village, and Ai Suning Village, are covered with the edges of the mamong plant (*Lantana camara L.*), especially in the rainy season. This wild plant, including a type of weed, grows a lot in mountainous areas and along roadsides. However, people in Seteluk and Poto Tano subdistricts have not used sang mamong leaves as medicine or for other purposes. This plant is still considered a nuisance, and usually, during the planting season, the mamong plant will be eradicated due to the public's lack of understanding about its benefits. In East Kalimantan, *sang mamong* leaf extract is used as a botanical pesticide to reduce pest insects and disease incidence in horticultural crops due to its tannin or polyphenol, saponin, and steroid content. These three phytochemical compounds make the *sang mamong* plant a potential botanical pesticide [15]. In some areas, it is also used as an ornamental plant due to its colorful flowers. The *sang mamong* plant (*Lantana camara L*) contains a high concentration of secondary metabolites, making it suitable for treatment to eliminate head lice, which can be formulated into a shampoo. *Sang mamong* leaves can also be used as a traditional medicine, particularly for treating skin infections caused by the bacterium *Staphylococcus aureus* [16] therefore, the production of shampoo using *sang mamong* leaf extract is expected to be safe for the scalp.

Shampoo is a cosmetic product commonly used to clean the scalp and hair regularly [9], Shampoo is a cleansing product used to clean hair [17] According to Surani and Putriana as cited in [9] state that making shampoo from hazardous chemical ingredients such as pesticides is considered inefficient due to its side effects. Therefore, an alternative approach is to produce anti-lice shampoo using natural ingredients, such as *sang mamong* leaf extract (*Lantana camara L*), which contains abundant secondary metabolites. Researchers hope that the use of *sang mamong* shampoo can inhibit or eliminate head lice, leading to a healthier scalp. This research aims to develop a shampoo made from *sang mamong* (Lantana camara L.) leaves as a natural pediculicide. This product is expected to be an effective alternative to eradicating head lice, using easily available ingredients, and is aimed at treating head lice infestations that often occur in children, especially girls.

Research Methods

This study used a quantitative experimental design by conducting trials on using *sang mamong* leaf extract (*Lantana camara L*) as an anti-head lice shampoo (*Pediculus humanus capitis*). The variables used in this study include control variables: 96% alcohol (6 drops), HPMC 1% (0.5 g), Sodium Lauryl Sulfate 4% (2 g), Methyl Paraben 0.15% (0.075 g), and distilled water added to make up 50 mL of shampoo. The independent variables are *sang mamong* leaf extract (*Lantana camara L*) in varying concentrations: 0 g (0%), 0.5 g (1%), 1 g (2%), 1.5 g (3%), and 2 g (4%). The test variables consist of a pH measurement test, foam height measurement test, and lice activity test.

The steps for preparing *sang mamong* (*Lantana camara L*) leaf extract follow the method described by [11] prepare the *sang mamong* leaves, weigh them, wash them until clean, then puree them using a blender. Dry the leaves

in the sun until dry, then grind them again to get a smoother texture. Once dry, weigh the leaves again to determine the resulting dry weight. Take 60 grams of dry leaves, soak them in 450 mL of 96% alcohol, then cover the container with aluminum foil. Stir the marinade 3 times a day for 5 days. After that, filter the soak (filtrate 1) and soak the residue again in 150 mL of 96% alcohol for 2 days, stirring 3 times a day. Filter the second bath (filtrate 2), mix filtrate 1 and 2, then evaporate the mixture at 70°C.

The preparation of shampoo using *sang mamong* leaf extract follows the method described [10] with the following steps: prepare ingredients and weigh them as needed. To make HPMC mucilage, heat 20 mL of distilled water until it boils, then pour it into a mortar and add HPMC. Stir the mixture until it forms a gel for 15 minutes (mixture 1). Heat 20 mL of distilled water to 60° C, then add sodium lauryl sulfate and stir until homogeneous (mixture 2). Dissolve methyl paraben in 6 drops of ethanol until completely dissolved (mixture 3). 1, 2, and 3, stir until homogeneous, then add *sang mamong* (*Lantana camara L*) leaf extract. Complete the mixture volume with distilled water up to 50 mL, then stir until evenly mixed.

The data analysis technique used in the production of anti-head lice shampoo from sang mamong leaf extract (*Lantana camara L*) was descriptive quantitative analysis, based on the results of pH measurement tests, foam height measurement tests, and lice activity tests [17].

Results and Discussion

This study aimed to utilize *sang mamong* leaves (*Lantana camara L*) as an anti-head lice shampoo through experimental methods. Several quality tests were conducted to evaluate the anti-lice shampoo based on the content of *sang mamong* leaf extract (*Lantana camara L*), including lice activity tests, pH measurement tests, and foam height measurement tests. The results of the laboratory analysis of the Sang Mamong leaf extract (*Lantana camara L*) are presented in Table 1 below.

Table 1. Results of phytochemical screening of sang mamong leaf extract

No.	Compound	Phytochemical Screening Result
1	Alkaloid	+
2	Flavonoid	-
3	Tannin	+
4	Saponin	+
5	Terpenoid	+

The results of the phytochemical screening of *sang mamong* leaves showed that they did not contain flavonoid compounds, while alkaloids, tannins, saponins, and terpenoids tested positive. This study was conducted in several stages. The first stage involved harvesting *sang mamong* leaves (*Lantana camara L*) from several areas, specifically along the roadside leading to Mantar village and the roadside leading to Tebo village. The researchers collected 500 grams of high-quality *sang mamong* leaves, approximately equivalent to one carton of bottled water cups. The second stage involved selecting fresh and healthy *sang mamong* leaves (*Lantana camara L*), followed by washing and drying them. Once dried, the leaves were ground using a blender to achieve a finer texture. The ground leaves were then soaked in 96% alcohol, and finally, the extract was obtained through evaporation. The evaporation process was conducted at a temperature of 70°C to preserve the compounds in the Sang Mamong leaves (*Lantana camara L*), as excessively high temperatures can cause the compounds to decompose.

The maceration process was done in two repetitions, with each maceration using 60 grams of finely ground and dried sang mamong leaves (*Lantana camara L*). The first maceration resulted in 4.06 grams of sang mamong leaf extract, which was insufficient for shampoo production. The second maceration produced 6 grams of sang mamong leaf extract. In total, 120 grams of sang mamong leaves (*Lantana camara L*) were used in this process, resulting in a total extract yield of 10.06 grams.

The maceration process was conducted four times. Initially, the first maceration used only 20 grams of dried sang mamong leaves, resulting in a very small amount of extract. The second maceration used 60 grams of sang mamong leaves, which were utilized for the first trial of shampoo production. However, the shampoo produced was unsatisfactory, as it was overly thick due to the excessive addition of HPMC. As a result, two additional macerations were performed to produce shampoo for further research on head lice. In total, four maceration processes were done.

After completing the shampoo production process, the researchers began collecting head lice, ranging from small to adult sizes. The lice were collected from children aged 7–12 years, as this age group is most vulnerable to head lice infestation. The researchers searched for lice in children from several areas, including Tapir Village and Air Suning Village. However, most of the children were unwilling to allow lice to be taken from their hair due to feelings of embarrassment, making it somewhat challenging for the researchers to collect the head lice.

In this study, 3 tests were conducted to determine the quality of the sang mamong extract shampoo produced, which included the following:

Lice Activity Test

The lice activity test was conducted using three head lice, consisting of one juvenile louse and two adult lice. The lice were placed in a Petri dish that had been treated with the anti-lice shampoo containing various concentrations of *sang mamong* leaf extract (*Lantana camara L*). The results of the lice activity test are shown in Table 2 below.

During the lice activity test, the researchers used 1 mL of anti-lice shampoo, which was evenly dropped onto a filter paper and placed into a Petri dish. The lice used in this study were freshly collected from the scalp. For the anti-lice shampoo without *sang mamong* leaf extract (*Lantana camara L*), the 3 lice tested did not show any change in activity for up to 1 hour. In contrast, the shampoo containing *sang mamong* extract showed different activity levels depending on the concentration of *Lantana camara L* extract. The most effective result was observed with the shampoo containing 4% *sang mamong* extract, which killed 2 lice, one in 4 minutes and the other in 11 minutes. This indicates that the anti-lice shampoo containing *Lantana camara L* extract is more effective than commercially available shampoos. Based on the activity test, the commercial shampoo was only

able to immobilize 2 lice within 30 minutes, after which the lice resumed movement. After 60 minutes, no further changes were observed in the lice activity.

Table 2. Lice Activity Test Results

No	Amount of Sang Mamong (gr)	% Sang Mamong	Lice Size (cm)	Lice Immobile (min)	Lice Resumed Movement (min)	Lice Remained Immobile	Lice Resumed Movement	Lice Dead
1	0	0%	3			√		-
			3			√		-
			2			√		-
2	0,5	1%	3			√		-
			3	13	30		√	-
			2	6	30		√	-
3	1	2%	3	5				√
			3			√		-
			2	10	53		√	-
4	1,5	3%	3	5	36		√	-
			3	5	36		√	-
			2	5	36		√	-
5	2	4%	3	11				√
			3	4	50		√	-
			2	4				√
6	Commercial Shampoo	0%	3			√		-
			3	5	30		√	-
			2	5	30		√	-

pH Measurement Test

The pH measurement test was conducted by weighing 1 gram of each anti-lice shampoo and dissolving it in 100 mL of distilled water. The pH was then measured using a universal indicator. The results of the pH measurement test are shown in Table 3 below.

Table 3. pH Measurement Test Results

No.	Amount of Sang Mamong (g)	% Sang Mamong	pH
1	0	0%	5
2	0.5	1%	6
3	1	2%	6
4	1.5	3%	6
5	2	4%	5
6	Commercial Shampoo	0%	6

Based on the pH measurement test results, the shampoo made from *sang mamong* leaf extract (*Lantana camara L*) meets the criteria for a good-quality shampoo suitable for use and is safe for the scalp, with a pH ranging from 5 to 6. The researcher also tested the anti-lice shampoo directly. The results showed that the hair became soft and fresher, with some lice falling out during combing, and no irritation happened on the scalp.

Foam Height Measurement Test

The foam height measurement test was conducted by weighing 0.1 gram of each anti-lice shampoo and dissolving it in 10 mL of distilled water in a test tube. The mixture was shaken for 20 seconds, after which the foam height was measured using a ruler. The results of the foam height measurement test are shown in Table 4 below.

Table 4. Foam Height Measurement Test Results

No.	Amount of Sang Mamong (g)	% Sang Mamong	Foam Height (cm)
1	0	0%	8.5
2	0.5	1%	9.5
3	1	2%	9.5
4	1.5	3%	7.5
5	2	4%	7.5
6	Commercial Shampoo	0%	9.5

Based on the foam height measurement test results, the anti-lice shampoo made from *sang mamong* leaf extract (*Lantana camara L*) meets the criteria for a good-quality shampoo suitable for use and safe for the scalp. The researcher also tested the shampoo directly, and the results showed that the hair became soft and fresher, with some lice falling out during combing, and no irritation happened on the scalp.

According to [18] good surfactant for shampoo is considered effective if it produces a foam height of around

1.3 cm to 22 cm. Based on Table 3.4 above, the foam height measurement of the anti-lice shampoo meets the standard for good foam height, which ranges from 7.5 cm to 9.5 cm. Previous studies have also utilized *sang mamong* leaves as an ingredient in liquid feminine hygiene soap, demonstrating antimicrobial activity against the fungus *C. albicans* and the bacterium *S. aureus*. The research results showed that it effectively inhibited the growth of *C. albicans* and *S. aureus* with a strong category of inhibition [19], Additionally, a study by [20]. indicated that *Lantana camara L* leaf extract is an important source of botanical insecticides. The natural insecticide derived from *Lantana camara L* leaf extract appears to have promising results in controlling *S. litura*. In previous research, no one has developed an anti-head lice shampoo made from sang mamong leaves. However, several previous studies have succeeded in producing various antimicrobial products from this plant. This research indicates that the anti-head lice shampoo developed has met the expected criteria based on the tests carried out. This shampoo's advantage lies in using natural ingredients that are easily obtained from the surrounding environment.

Based on the tests conducted, the quality ranking of the anti-lice shampoo made from *sang mamong* leaf extract (*Lantana camara L*) based on the lice activity test is shown in Table 5 below.

Table 5. Quality Ranking of Anti-Lice Shampoo

Quality Ranking of Anti-Lice Agent	% Content of sang mamong Extract
1	4%
2	2%
3	3%
4	1%
4	Commercial Shampoo
5	0

Some of the challenges faced in this study include the following: First, during the collection of *sang mamong* leaves (*Lantana camara L*), the researchers required a large quantity of leaves. Since the researchers had to conduct several trial runs before obtaining satisfactory results, it took a long time to collect the leaves. The second challenge was when searching for head lice; most of the children had small lice, so the researchers had to travel to multiple locations to find adult lice. This was necessary because the shampoo test was repeated twice, requiring a large number of adult lice. The third challenge was during the evaporation process, as the researchers still used a manual method due to the unavailability of the proper equipment, such as an electric stove. The evaporation process was done at a temperature of 70°C. When the mixture reached 70°C, the alcohol burner was turned off and relit when the temperature dropped to 40°C. This process was repeated until a thick extract was obtained. One round of evaporation used 60 grams of *sang mamong* (*Lantana camara L*). Each evaporation cycle took approximately 8 hours, thus the total evaporation time for 120 grams of *sang mamong* leaves was 16 hours, and this was done on different days.

Conclusion

Based on this study, the following conclusions can be drawn the pH test results ranged between 5-6, and the foam height ranged from 7.5–9.5 cm. Based on the pH and foam height tests, the anti-lice shampoo made from *sang mamong* leaf extract (*Lantana camara L*) meets the criteria for a good-quality shampoo and is safe for use on the scalp, In the lice activity test, the anti-lice shampoo containing 2 grams (4%) of *sang mamong* leaf extract (*Lantana camara L*) was more effective as an anti-head lice shampoo (*Pediculus humanus capitis*), and Based on the results of the three tests conducted, *sang mamong* leaf extract (*Lantana camara L*) can be used as an effective anti-head lice shampoo (*Pediculus humanus capitis*). Head lice research uses mamong because this plant is abundant, grows wild, and is easy to obtain in the surrounding environment. In addition, this research provides new information to the public. Further research and laboratory tests are recommended to ensure shampoo safety.

Author's Contribution

Yunita Riskayanti: as a supervisor, providing direction and ideas to produce research with interesting ideas. Mutia Febrianti: as a student researcher at SMA Negeri 1 Seteluk, she actively donates time, energy and thoughts to produce useful research for many parties.

Acknowledgement

Praise be to the presence of Allah SWT, because with His mercy and grace this research can be completed well. This research was also able to be completed thanks to the help of various parties, therefore the researcher humbly thanks:

1. Mrs. Warli Fatriani S.Pt. as head of Seteluk 1 Public High School
2. Mrs. Yunita Riskayanti S.Pd. as research supervisor.
3. Levi Saputra and Auliya Dwi Kartika
4. Mr and Mrs are teachers at SMA Negeri 1 Seteluk
5. Both parents.
6. Students of Seteluk 1 Public High School
7. All parties who cannot be mentioned one by one who have provided assistance in completing this research.

References

[1] E. Maryanti dan S. D. Lesmana, "Hubungan Faktor Risiko dengan Infestasi Pediculus humanus capitis," *Jurnal Kesehatan Melayu*, pp. 73-80, 2018. doi: https://doi.org/10.26891/jkm.v1i2.2018.73-80

[2] A. Endris, Ensiklopedi Macam-Macam Penyakit Flek Hitam hingga Kutu Rambut, Jogja: Hikam Pustaka, 2021, p. 28.

[3] D. Wahyuni, Makomulamin dan N. P. sari, Buku Ajar Entomologi dan Pengendalian Vektor, Yogyakarta: Grup Penerbitan CV BUDI UTAMA, 2021, p. 115.

[4] R. Fadli, "Kutu Rambut," 24 Mei 2022. [Online]. Available: https://www.halodoc.com/kesehatan/kutu-rambut. [Diakses 15 Januari 2024].

[5] C. Anwar, J. Riswanda dan A. Ghiffari, Determinan Pediculosis Capitis, Jawa Tengah: PT Nasya Expanding Manajement, 2022.

[6] E. Amalia, "Pengaruh Perasaan Daun Sirih Merah (Piper ornatum) terhadap Respon Gerak Kutu Rambut (Pediculus humanus capitis)," Universitas Muhammadiyah Surabaya, Surabaya, 2019.

[7] J. Riswanda, Potensi Tanaman Herbal Untuk Mortalitas Kutu Rambut (Pediculosis Humanus Capitis), Pekalongan, Jawa Tengah: PT Nasya Expanding Managament, 2023.

[8] N. A. N. Ningsih, "Efektivitas Ekstrak Biji Jarak Pagar (Jatropha Curcas L.) Sebagai Insektisida Alami Pembasmi Kutu Rambut (Pediculus Humanus Capitis)," Universitas Islam Negeri Raden Intan, Lampung, 2022.

[9] N. M. Warahmah, "Pembuatan Sampo Anti kutu Rambut dari Ekstrak Daun Jeruk Nipis (Citrus Aurantifolia)," Universitas Islam Negeri Alaludin, Makassar, 2020.

[10] S. A. Tee dan E. Badia, "Uji Efektivitas Shampo Antikutu Rambut Ektrak Daun Sirsak (Annonna muricata L.) Secara In Vitro," *Jurnal Warta Farmasi,* pp. 1-10, 2019.

[11] M. Sari, A. Chan, N. G. Septiani dan D. K. Mendrofa, "Uji Antiseptik Sabun Cair Eksta Daun Lantana camara L. Terhadap Pertumbuhan Staphylococcus Sp," *Majalah farmasetika,* pp. 227-240, 2022. doi: https://doi.org/10.24198/mfarmasetika.v7i3.37876

[12] F. Indrayani dan R. Y. Wirastuty, "Saliara Rival Tuberkulosis," dalam *Jurus Maksimal Laba Cabai*, Jawa Barat, PT Trubus Swadaya, 2022, p. 78.

[13] B. T. n. G. Ciremai, "Saliara Si Liar Obat Memar," Jakarta, 2019.

[14] S. V. T. Lumowa dan S. Purwati, Entomologi, Malang: Media Nusa Creative, 2021.

[15] A. P. Pritacindy, S. Supriyadi dan A. Kurniawan, "Uji Efektifitas Ekstrak Bawang Putih (Allium Sativum)Sebagai Insektisidaterhadap Kutu Rambut (Pediculus Capitis)," Universitas Negeri Malang, Malang, 2017. doi: https://doi.org/10.17977/um044v2i1p1-9

[16] E. R. Imania, "Uji Daya Hambat Ekstrak Etanol 70% Daun Saliara (Lantana Camara Linn) Terhadap Pertumbuhan Bakteri Staphylococcus Aureus," Sekolah Tinggi Ilmu Kesehatan Bakti Tunas Husada, Tasikmalaya, 2021.

[17] D. B. R. A. Putera, Kimia Di Rumah Tangga, Madiun: CV. Bayfa Cendikia Indonesia, 2021.

[18] W. D. Andini, "Uji Daya Anti Kutu Rambut (Pediculus huamanus capitis) Perasan Buah Jeruk Purut (Citrus hystrix)," Universitas Muhammadiyah Surabaya, Surabaya, 2016.

[19] M. Sari dan B. G. Triski, "Uji Aktivitas Antimikroba Sediaan Sabun Cair Kewanitaan dari Ekstrak Daun Lantana camara L," *Majalah Farmasetika Artikel Penelitian,* pp. 36-55, 2023. doi: https://doi.org/10.24198/mfarmasetika.v9i1.49701

[20] R. Hasibuan, S. A. Wirojati, A. Hariri, Purnomo, Favorisen dan Lumbanraja, "Aktivitas insektisida ekstrak Lantana camara terhadap Spodoptera litura (F.) (Lepidoptera: Noctuidae)," *AIP Conference Proceedings,* 2024. doi: https://doi.org/10.1063/5.0208147