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# Analysis of Medicinal Plant Potential in the Nglanggeran, Gunungkidul, Yogyakarta

**Hikmah Supriyati[1]*, Widodo[2]**
[1]Institute of Research and Community Engagement, UIN Sunan Kalijaga Yogyakarta, Indonesia.
[2]Department of Biology Education, Faculty of Tarbiyah and Education, UIN Sunan Kalijaga, Yogyakarta, Indonesia.

**Corresponding author***
hikmahsupriyati@gmail.com

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**Abstract**

Indonesia has abundant biodiversity with thousands of plant species traditionally used as medicine. The role of medicinal plants is increasingly recognised amid the trend of returning to nature and seeking more sustainable health solutions. Nglanggeran has a physical, chemical, and biotic environment that differs significantly from other ancient volcanoes in Indonesia. This situation is one of the reasons for Nglanggeran's unique flora. This study aimed to identify medicinal plants in Nglanggeran. The methods used in this study were surveys and exploration. The study results show that there are 21 families and 35 plant species with medicinal properties in Nglanggeran. The Euphorbiaceae family has the most medicinal plants. The most common habitus of medicinal plant species found in Nglanggeran is shrub. Leaves are the most widely used part of medicinal plants for treatment. Based on a literature review, most medicinal plants in Nglanggeran have undergone phytochemical testing. The compounds most commonly found in these plants are flavonoids and alkaloids.

**Keywords:** Potential Analysis; Medicinal Plants; Family; Habitus; Phytochemical Compounds; Nglanggeran.

## INTRODUCTION

Indonesia has abundant biodiversity with thousands of plant species traditionally used as medicine. In general, it is reported that Indonesia has more than 30,000 plant species. Of these, around 9,600 species are known to have economic value and functions, including as medicinal plants (Ministry of Health, 2025). Using plants as traditional medicine has been integral to Indonesian culture for centuries. This understanding has been handed down from elders to younger generations and is part of the community's complementary medicine approach.

The role of medicinal plants is increasingly recognised amid the trend of returning to nature and seeking more sustainable health solutions. Much research focuses on isolating bioactive compounds from plants to produce new pharmaceutical drugs. This shows that ethnobotanical wealth has significant cultural, economic, and scientific potential. One area with high plant diversity is Nglanggeran. According to Whitten (1999), Nglanggeran has a physical, chemical, and biotic environment that differs significantly from those of other ancient volcanoes in Indonesia. This is one of the reasons there is such a variety of unique flora and fauna in Nglanggeran.

Nglanggeran is located in the Batuagung area in the northern part of Gunungkidul, Special Region of Yogyakarta. Nglanggeran has an area of 800 m with an altitude of 200-700 m above sea level (Moro, 2016). Nglanggeran is a community-based ecotourism destination that has gained international recognition for its unique geological features, including a collection of ancient rocks formed by volcanic activity from an ancient volcano. Nglanggeran is a tertiary volcano that is 20-25 years old (Wartono & Hendrattno, 2010). Although Nglanggeran is famous for its geology and tourism, there is little scientific information on its flora, especially medicinal plants. Most current research focuses on socio-economic or tourism geography aspects. References regarding the distribution of medicinal plants in Nglanggeran are also minimal.

Previous research on the diversity of medicinal plants has been conducted, such as the study by Desilawati Rohmatika (2016), which showed that 18 species of medicinal plants are found in Nglanggeran. Another study by Gemilang (2025) identified 28 medicinal plant species in the Nglanggeran Ancient Volcano Ecotourism Area. The difference between this study and the previous ones is the use of survey and exploration methods, which are expected to find more medicinal plant species. In addition, this study analyzes the potential of plant parts for medicinal use. It adds information on the phytochemical compounds found in the species discovered in Nglanggeran.

Although Nglanggeran is recognised as a conservation area, increased tourism and land-use changes can threaten its flora, including medicinal plants. Without proper documentation, these species are at risk of extinction before their potential is known. Identifying and analysing the potential of medicinal plants in Nglanggeran could provide additional benefits for ecotourism. The findings from this research can serve as a basis for developing herb-based educational tourism (edutourism) that empowers local communities through the cultivation of medicinal plants.

## MATERIALS AND METHODS

This research was conducted through a direct survey at Nglanggeran, Yogyakarta, between November 2019 and February 2023. The observation and data collection equipment included digital cameras, a plant identification guide, and a spreadsheet for data entry. The identification process began with photographic evidence. The photo session focused on the morphology of the stems, leaves, and inflorescences to facilitate identification. Identification was performed by visual inspection of the plants. Based on the collected images, the habitus, including trees, shrubs, and Herbsceous plants, was identified as similar to pictures found in Flora of Java (Backer & Bakhuizen van den Brink, 1980), Flora (Van Steenis, 1992), and on websites such as plantnet.com, natureloveyou.com, and plansystematics.org. After identification, the plants were grouped based on taxonomy and habitus. The next step is to find information about the parts of plants frequently used in medicine and the phytochemical compounds present in these plants.

## RESULTS AND DISCUSSION

### Diversity of Medicinal Plants

Based on research conducted, 35 plant species with medicinal properties have been identified in Nglanggeran, belonging to 21 families. The names of medicinal plant species in Nglanggeran are shown in Table 1.

**Table 1.** Medicinal plants found in Nglanggeran.

| No | Family | Species | Life-form Habitus |
|---|---|---|---|
| 1 | Achantaceae | *Strobilanthes crispus* | Shrubs |
| 2 | Apocynaceae | *Alstonia scholaris* | Shurbs |
| 3 | Apocynaceae | *Tabernaemontana macrocarpa* | Shrubs |
| 4 | Arecaceae | *Arenga pinnata* | Trees |
| 5 | Combretaceae | *Terminalia catappa* | Trees |
| 6 | Dioscoreaceae | *Dioscorea bulbifera* | Herbs |
| 7 | Dioscoreaceae | *Dioscorea hispida* | Herbs |
| 8 | Euphorbiaceae | *Acalypha indica* | Herbs |
| 9 | Euphorbiaceae | *Bridelia micrantha* | Trees |
| 10 | Euphorbiaceae | *Bridelia stipularis* | Shrubs |
| 11 | Euphorbiaceae | *Euphorbia pulcherrima* | Shrubs |
| 12 | Euphorbiaceae | *Jatropha curcas* | Shrubs |
| 13 | Euphorbiaceae | *Sauropus androgyum* | Shurbs |
| 14 | Fabaceae | *Mimosa pudica* | Herbs |
| 15 | Leaceae | *Lea indica* | Shurbs |
| 16 | Malvaceaea | *Hibiscus surattensis* | Shrubs |
| 17 | Melastomataceae | *Clidemia hirta* | Shrubs |
| 18 | Melastomataceae | *Memecylon caeruleum* | Shurbs |
| 19 | Moraceae | *Ficus septica* | Trees |
| 20 | Moraceae | *Poikilospermum suaveolens* | Herbs |
| 21 | Mytaceae | *Psidium guajava* | Shurbs |
| 22 | Oxalidaceae | *Averrhoa bilimbi* | Trees |
| 23 | Papilionaceae | *Abrus precatorius* | Trees |
| 24 | Poaceae | *Imperata cylindrica* | Shrubs |
| 25 | Rubiaceae | *Paedaria fotida* | Shrubs |
| 26 | Rubiaceae | *Mussaenda sp.* | Shrubs |
| 27 | Rutaceae | *Causena excavates Burm* | Trees |
| 28 | Satalanaceae | *Santalum album* | Trees |
| 29 | Solanaceae | *Physalis minima* | Herbs |
| 30 | Solanaceae | *Solanum torvum* | Shrubs |
| 31 | Verbenaceae | *Clerodendron serratum* | Shrubs |
| 32 | Verbenaceae | *Clerodendrum paniculatum* | Shurbs |
| 33 | Zingiberaceae | *Costus specious* | Herbs |
| 34 | Zingiberaceae | Curcuma longa/ domestica | Herbs |
| 35 | Zingiberaceae | *Zingiber zerumbet* | Herbs |

Based on the table above, the Euphorbiaceae family has the highest number of medicinal plant species in Nglanggeran. According to Whitmore (1995), the Euphorbiaceae family is the fourth largest of the five families of vascular plants, with more than 1,000 species, namely Orchidaceae (6,500 species), Rubiaceae (2,000 species), Myrtaceae (1,600 species), Euphorbiaceae (1,354 species), and Melastomataceae (1,000 species). Meanwhile, according to Yanti & Fitriani (2019), the Euphorbiaceae family comprises 300 genera and 7,500 species. The many species in the Euphorbiaceae family are due to their wide morphological variation, including shrubs, herbs, and trees. This is in line with research findings that medicinal plants exhibit various habits, including herbs (1 species), shrubs (4 species), and trees (1 species). Several Euphorbiaceae species can also adapt well to degraded habitats, such as areas disturbed by humans or agricultural land (Djarwaningsih, 2017).

**Habitus (Life-Form) of Medicinal Plants**

Medicinal plants found in Nglanggeran include eight tree species, eighteen shrub species, and nine herb species. The percentage distribution of medicinal plant habitus is shown in Figure 1.

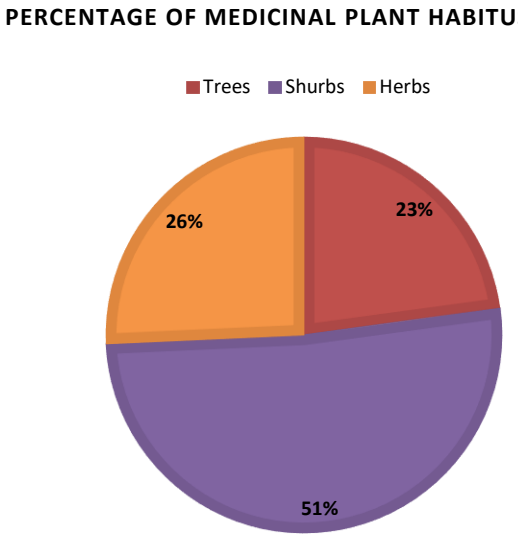


**Figure 1.** Percentage of Medicinal Plant Habitus in Nglanggeran.

The study results show that most medicinal plants are shrubs, followed by herbs. This aligns with research conducted by Akbar et al. (2019) in Nglanggeran, which focused on studying understory plants, namely shrubs and herbs. The study identified 144 species of shrubs and herbs. Shrubs and herbs are often found because, in general, these types of plants can grow well under the canopy. However, only a few understory plant species can grow in direct sunlight. They usually form shrubs in clusters (Pabst & Spies, 1998). Ecologically, understory vegetation can be classified by plant life forms (Sumardi & Widyastuti, 2004).

Research conducted by Supriyati & Ariyanti (2024) also examined undergrowth plants. This research identified 65 species of shrubs and herbs. Herbs are easy to find because they are highly competitive and adaptable to surrounding plants (e.g., lianas, bushes, shrubs, and even trees), enabling them to grow in empty spaces (Diana et al., 2021). Botanists define herbs as plants whose stems do not become woody or persistent but die down after flowering. According to Anaputra et al. (2015), Herbs are plants that can grow on land or in water and are smaller than bushes, trees, and shrubs. The trunks of herbs are wet and not woody. The presence of herbs in a forest area plays a vital role. They are an important part of the early community because they stabilize soil that is sensitive to erosion (Rahayu, 2006).

**Potential Use of Medicinal Plants**

Based on the analysis of the found plants, several variations of plant parts are used for medicinal purposes. The following is a list of plant parts that are frequently used for medicinal purposes:

**Table 2.** Use of Medicinal Plant Parts.

| No | Scientific name | Part Used | Uses |
|---|---|---|---|
| 1 | *Strobilanthes crispus* | Leaves | Antidiabetic, Diuretic, Antimicrobial, and Anticancer |
| 2 | *Alstonia scholaris* | Stem | Malaria, Fever |
| 3 | *Tabernaemontana macrocarpa* | Sap | Tumors |
| 4 | *Arenga pinnata* | Roots | Diuretic |
| 5 | *Terminalia catappa* | Leaves | Anticancer, High Blood Pressure, and Antidiabetic |
| 6 | *Dioscorea bulbifera* | Tubers | Tumors |
| 7 | *Dioscorea hispida* | Tubers | Leprosy, Diabetes |
| 8 | *Acalypha indica* | Leaves | Diarrhea and Dysentery |
| 9 | *Bridelia micrantha* | Stem | Diabetes |
| 10 | *Bridelia stipularis* | Stem | Dysentery |
| 11 | *Euphorbia pulcherrima* | Leaves | External Wounds |
| 12 | *Jatropha curcas* | Sap | Toothache |
| 13 | *Sauropus androgyum* | Leaves | Increase Breast Milk Supply |
| 14 | *Mimosa pudica* | Whole Plant | Diabetes Mellitus |
| 15 | *Lea indica* | Roots | Antifungal, Malaria |
| 16 | *Hibiscus surattensis* | Leaves | Blood Glucose Lowering Agent |
| 17 | *Clidemia hirta* | Leaves | Stomach Ache |
| 18 | *Memecylon caeruleum* | Roots | Lowering Blood Sugar Levels |
| 19 | *Ficus septica* | Stem | Coughs |
| 20 | *Poikilospermum suaveolens* | Roots | Boosting Immune Function |
| 21 | *Psidium guajava* | Leaves | Diarrhea |
| 22 | *Averrhoa bilimbi* | Leaves | Diabetes |
| 23 | *Abrus precatorius* | Leaves | Thrush |
| 24 | *Imperata cylindrica* | Roots | High Blood Pressure |
| 25 | *Paedaria fotida* | Leaves | Cough, Detoxification, Deworming, Antispasmodic |
| 26 | *Mussaenda sp.* | Leaves | Rheumatism, Diuretic, Colds, Muscle Aches |
| 27 | *Causena excavates Burm* | Leaves | Diarrhea and Fever |
| 28 | *Santalum album* | Stem | Insomnia and Asthma |
| 29 | *Physalis minima* | Roots | Chickenpox |
| 30 | *Solanum torvum* | Roots | Back pain |
| 31 | *Clerodendron serratum* | Roots | Respiratory Diseases |
| 32 | *Clerodendrum paniculatum* | Roots | Diuretics and Dysentery |
| 33 | *Costus specious* | Leaves | Preventing Pregnancy |
| 34 | *Curcuma longa/ domestica* | Roots | Cancer |
| 35 | *Zingiber zerumbet* | Roots | Diarrhea, Dysentery, and Stomach Disorders. |

The analysis shows that most medicinal plants in Nglanggeran are used for their leaves. This is because leaves are the primary site of photosynthesis. During this process, leaves synthesise various pharmacologically active secondary metabolites and produce nutrients necessary for plant growth. Naturally, these compounds protect plants from pests and diseases. This aligns with various studies that found that *Abrus precatorius* leaf extract at a concentration of 5% can serve as an active ingredient in treating thrush (Pertiwi et al., 2016). In addition, according to research conducted by Handayani et al. (2008), *anting-anting* leaves (Acalypha indica L.) positively contain flavonoids, alkaloids, steroids, saponins, and aleuron. Various medicinal plants, such as *Paederia foetida* leaves, contain antibiotics and anti-inflammatory compounds to help treat diseases such as worms, phlegm, and spasms (Pratama et al., 2015).

The root is another part of plants that is widely used in herbal medicine. This is because plant roots store various bioactive compounds that are good for health. These compounds are absorbed from the soil, processed by plants, and stored at high concentrations in the roots. Roots in herbal medicine have been widely practised and passed down from generation to generation. Several modern studies on plants found in Nglanggeran have begun to confirm the traditionally believed benefits. For example, research conducted by (Deva Arshinta Anggraeni Putri and Raden Roro Nanik Setyowati, 2013) Setyowati (2010) states that *Physalis minima* roots have been used as a traditional medicine to cure chickenpox. In addition, medicinal plant roots contain many anti-inflammatory and analgesic compounds that can be used as herbal medicines to treat pain or reduce discomfort. The chemical content of medicinal plants in Nglanggeran has also been studied previously. Research conducted by Hidayat and Hutapea (1991) states that the roots of *Arenga pinnata* contain saponins, flavonoids, and polyphenols. These compounds can be used as diuretics and menstrual regulators.

The medicinal part of plants that is rarely used is the sap. The analysis shows that two plant species in Nglanggeran utilise sap for herbal medicine. These plants are *Jatropha curcas* and *Tabernaemontana macrocarpa*. Although *Jatropha curcas* contains flavonoids and saponins that have antibacterial and antiseptic properties, several articles mention that using sap in herbal medicine with inaccurate doses is not recommended. According to research conducted by Multti Rahayu et al. (2006), people on Wawonii Island, Southeast Sulawesi, have been using the *Jatropha curcas* plant to treat toothache and earache. The part of the plant used is the sap, which is dripped, squeezed, or drunk. Unlike modern medicine, sap is rarely used due to its high toxicity risk and potential for unwanted side effects. Additionally, rigorous clinical trials on sap for medicinal purposes are still scarce.

Medicinal plants found in Nglanggeran exhibit varying secondary metabolite profiles and pharmacological activities. The search results for each medicinal plant species in Nglanggeran have mostly identified chemical compounds or metabolic activity. Phytochemical testing of the species proves these plants have potential for herbal medicine. Knowing a plant's content is hoped to be used to predict its pharmacological potential. Based on the literature search, two compounds are commonly found in medicinal plants in Nglanggeran. These compounds are alkaloids and flavonoids.

Alkaloids are generally basic, bitter compounds that contain nitrogen atoms (E. Fattorousso, 2008). Medicinal plants found in Nglanggeran that contain alkaloids are *Abrus precatorius, Acalypha indica, Causena excavata Burm, Clerodendrum paniculatum, Euphorbia pulcherrima, Ficus septica, Hibiscus surattensis, Mimosa pudica, Mussaenda sp., Physalis minima, Poikilospermum suaveolens, Sauropus androgyum, Solanum torvum, Tabernaemontana macrocarpa, and Terminalia catappa*. The following compound is a flavonoid, a group of polyphenolic compounds that act as natural pigments in plants. Plants use flavonoids to protect themselves from disease and their surrounding environment. These aromatic compounds act as antioxidants (Ekawati et al., 2017). Some species that contain these compounds are *Abrus precatorius, Acalypha indica, Alstonia scholaris, Arenga pinnata, Averrhoa bilimbi, Bridelia micrantha, Bridelia stipularis, Clerodendrum paniculatum, Euphorbia pulcherrima, Ficus septica, Hibiscus surattensis, Imperata cylindrica, Lea indica, Mimosa pudica, Mussaenda sp., Paedaria fotida, Physalis minima, Poikilospermum suaveolens, Psidium guajava, Sauropus androgyum, Strobilanthes crispus, Tabernaemontana macrocarpa, and Terminalia catappa.*

## CONCLUSIONS

Based on the research, it can be concluded that medicinal plants comprise 35 species across 21 families. The family with the most species of medicinal plants is Euphorbiaceae. The medicinal plant habitus in Nglanggeran consists of eight tree species, eighteen shrub species, and nine herb species. The part of the plant that is widely used for medicinal purposes is the leaves. This part ynthesizes various pharmacologically active secondary metabolites and produces the nutrients necessary for plant growth. Previous research has found that pharmacological tests have been widely conducted on medicinal plant species found in Nglanggeran. The compounds commonly found in medicinal plants in Nglanggeran are alkaloids and flavonoids.

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