

BIODIVERSITY MAPPING AND UTILIZATION OF MEDICINAL PLANTS AS DEVELOPMENT DESA TABIB CONCEPT IN TAMANSARI VILLAGE, INDONESIA

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ABSTRACT

Medicinal plants in Tamansari Village are starting to be forgotten by the people while their potential is very abundant. The people of Tamansari Village are also not familiar with the medicinal plants around them and how to use these plants. Therefore, it is necessary to empower the community to optimize the potential of medicinal plants in Tamansari Village. This is also done so that Tamansari Village is not only known as a tourist village but also a healer village. Therefore, several empowerment sub-activities were carried out, including the formation of conservation groups, mapping of medicinal plant biodiversity, cultivation, product processing, and marketing. From these activities, Tamansari Village can now develop the concept of a healer's village with the community knowing medicinal plants and having the ability to utilize their potential.

Keywords: mapping, biodiversity, herbal medicine

INTRODUCTION

Indonesian people still often use herbal plants to be used as drinks or even as an alternative treatment for a disease (Adiyasa & Meiyanti, 2021). There are still many regions in Indonesia that have a high level of need for herbal medicines (Hariyati *et al.*, 2020). However, the spread of herbal plants themselves is becoming rare due to the cultivation of herbal plants has begun to decrease (Satriawan, 2021). Herbal medicine is widely used globally; the average population around the world who use herbal medicine accounts for as much as 20-28% of the entire world population. Meanwhile, according to Basic Health Research conducted in 2010, as much as 59.12% of the Indonesian population aged over 15 years and spread across various regions have consumed herbal medicines (Adiyasa & Meiyanti, 2021). The level of need for herbal medicine is quite high; it is an opportunity for the community to cultivate herbal plants in accordance with the potential in each region. The results of cultivation can then be utilized and processed based on local culture to increase the competitiveness of each product.

In Banyuwangi, East Java there are many types of herbal plants that can be used to cure various diseases. According to research by Khotimah *et al.*, (2018), the types of plants in Banyuwangi that are used to treat various diseases include Alang-alang/Lalang, Beluntas/Luntas, Dadap Serep, and there are also many other herbal plants. However, the knowledge and use of traditional Banyuwangi herbal plants is increasingly eroded so that fewer and fewer species of herbal plants are known. The growing burden of tourist visits in Banyuwangi also has the potential to further encourage the loss of rare herbal plant species due to the transfer of land functions into tourist destinations.

Tamansari Village is one of the tourist villages, part of the Ijen Geopark in Banyuwangi Regency with an area of 693,060 Ha consisting of seven hamlets namely Ampelgading Hamlet, Jambu Hamlet, Krajan Hamlet, Blimbingsari Hamlet, Kebundadap Hamlet, Sumberwatu Hamlet and Tanahlos Hamlet (Syahputera & Sunartomo, 2023). Tamansari Village has diverse natural potentials, namely plantations, agriculture and

animal husbandry and even abundant herbal plants. This is due to the environmental conditions of Tamansari Village which is in the highlands where the weather, temperature, and soil conditions are very suitable for the growth of herbal plants (Putra, 2022).

Based on the description above, Tamansari Village has the potential of herbal plants that need to be managed properly. However, people do not know the potential of herbal plants in their environment. This is evidenced by the approach to the community, as well as discussions related to the program to be implemented; the community does not know the various types of herbal plants that can be used for herbal drinks and even have high selling value. This is necessary to carry out community empowerment activities, namely the use of herbal plants so that they can have high selling value by processing them into herbal drinks. The empowerment carried out is not only limited to teaching the community about how to cultivate but also introducing the community to the potential of herbal plants around which it was previously unaware.

This empowerment is also carried out based on the idea of the village government regarding the Tabib Village concept development plan. This is a sustainable concept that aims to brand Tamansari Village not only as a Tourism Village but also a Tabib (healing) Village with a uniqueness that lies in increasing public knowledge about herbal plants, as well as the ability of the community to process herbal plants into a new product innovation. This community empowerment ensures that sustainability can be achieved by carrying out sustainable activities with the community, starting from biodiversity mapping to determine the distribution of herbal plants, then cultivating herbal plants found by the community to be further processed until they are ready to be marketed. This community empowerment activity, which began in July 2022, can be said to have succeeded in achieving sustainability as evidenced by the following year, namely 2023, where empowerment continues by developing the potential that has been managed by the community to be more branded and the emergence of innovative marketing ideas that encompass both selling value and educational value.

The purpose of developing the concept of Tabib Village in Tamansari Village through mapping and processing herbal plant products is as a form of realization of community suggestions related to utilizing the potential of herbal plants while increasing a sustainable economy by selling processed products that

have their own uniqueness. Another goal is that the community can have new knowledge about the potential of herbal plants, their types and product processing which is shown by the increase in public knowledge in *the pre-test* and *post-test* carried out.

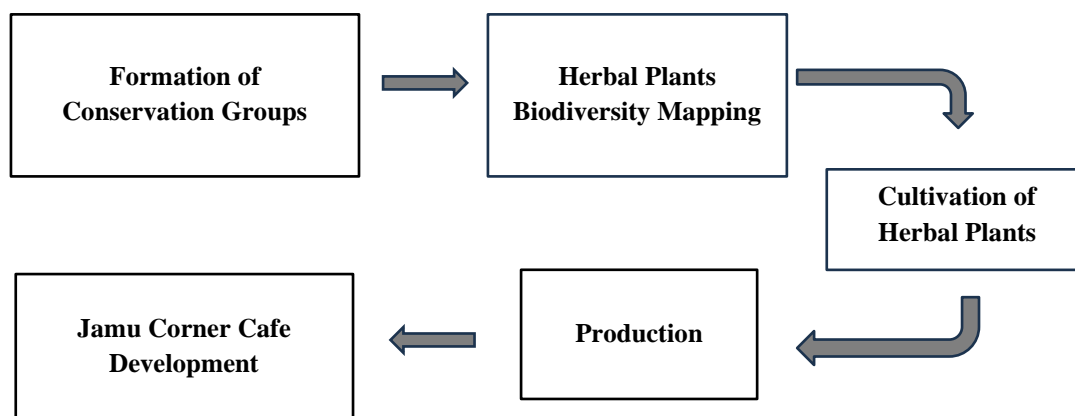


Figure 1. Stages of Tabib Village Concept Development Activities in Tamansari Village

Tabib Village development activities are long-term in nature, arranged through several stages to ensure the objectives of the activities can be achieved. The stages began with the formation of conservation groups, mapping the biodiversity of herbal plants, cultivating herbal plants, processing products to the development of Jamu Corner café.

FORMATION OF CONSERVATION GROUPS

Community empowerment consists of several sub-activities and increases along with the continuation of empowerment in the following year. The first sub-activity is the formation of conservation groups; this sub-activity was first held on August 4, 2022. The establishment of conservation groups aims to increase active participation from the community and optimize the role of the Tamansari Village Community Empowerment Institute (LPMD) which also acts as a partner. The sub-activity of forming a conservation group was successfully formed with 14 members consisting of the head of the hamlet and the surrounding community. The formation of conservation groups continues until 2023 where each hamlet in Tamansari Village now has its own conservation group. The conservation group is chaired by the Village Head, while the group of each hamlet is chaired by the Hamlet Head. Tamansari

Village consists of seven hamlets so that the total members of the conservation group in 2023 will be 35 people. The conservation group will then be directly involved with mapping activities to the cultivation of herbal plants in Tamansari Village. It is hoped that conservation groups can carry out mapping to cultivation independently. This has been successfully achieved, as evidenced by the change in the community to know the potential of herbal plants around them, and even moved to cultivate these herbs.

Monitoring continues to be carried out through WhatsApp with the formation of a group with all members of conservation groups. All members regularly inform about the development of herbal plants in Tamansari Village. As of August 2023, the group is still active and is used by conservation group members to share information related to the development of herbal plants to their cultivation.

MAPPING OF HERBAL PLANT BIODIVERSITY

The next sub-activity is mapping the distribution of herbal plants in Tamansari Village. Mapping is carried out because of the large potential of herbal plants in Tamansari Village but which is not widely known by the surrounding community, so it is necessary to

identify herbal plants. Mapping also aims to educate not only the people of Tamansari Village but also tourists who visit, both locally and internationally. Biodiversity mapping is carried out in collaboration with partners, namely Geopark Ijen to assist with permits related to mapping locations as well as some information about mapping implementation. Members of the community empowerment team were also given training on how to implement mapping by one of the lecturers of the Faculty of Health, Medicine and Natural Sciences. Software applications used in mapping are Q-GIS and GPS Essential.

The community empowerment team together with conservation groups conducted mapping in Tamansari Village for the first time on August 6, 2022. The mapping was carried out for three days, where the mapping groups were divided into each hamlet, a total of 5-6 people consisting of empowerment teams and conservation groups. The mapping succeeded in producing the 2022 Tamansari Village Herbal Plant Distribution Map. Mapping in 2022 succeeded in identifying 52 types of herbal plants in Tamansari Village consisting of one protected plant on the CITES list, one rare herbal plant and 50 other herbal plants. Such protected plants are Pole Spikes or *Cyathea Contaminants*, while the plant becoming rare is the Chicken Claw or *Selaginella Deoderleinii*. The 2022 Tamansari Village Herbal Plant Distribution Map shows the location of the distribution of herbal plants. It is expected that there will be an increase in the number of findings both types and the number of herbal plants

The sustainability of mapping activities will be carried out on August 11, 2023, which will be carried out for three days. The 2023 government has been able to present an abundance of herbal plants that have previously been found. This aims to identify the increasing number of herbal plants in Tamansari Village. In addition, the mapping not only covers the area of Tamansari Village but also successfully covers the Banyuwangi Ijen Forest area. From the mapping results, the 2023 Tamansari Village Herbal Plant Distribution Map and its abundance were obtained. There are an images attachment of the mapping herbal plants results in Tamansari Village in 2022 and 2023.

CULTIVATION OF HERBAL PLANTS

Sub-activity after mapping is the cultivation of herbal plants which aims to improve the ability of the community to cultivate herbal plants, so that the knowledge that has previously been obtained, namely the types of herbal plants abundant around, can be more efficient and applicable. The cultivation of herbal plants was carried out in seedling houses that had previously been built by the empowerment team with the community. The seedling house is not only used by the community to take the harvest, but also as a place of education for visitors to Tamansari Village and as a model for people who are interested in doing similar cultivation at home.

Herbal plant cultivation activities involve partners, namely PPLH Seloliman. Partners play a role in providing socialization materials on the cultivation of herbal plants and the procurement of seeds which are then given to the community and planted in seedling houses. Plant cultivation activities in seedling houses were carried out on August 17, 2022, with partners and the community at one of the cafes, namely Sarine Kopi managed by Bumdes Tamansari. The cultivation activity was attended by 42 communities consisting of members of PKK, LPMD, Hamlet Heads, and the people of Tamansari Village. The herbal plant cultivation sub-activity succeeded in planting more than 100 plants consisting of various types of herbal plants. Cultivation carried out in a seedling house with a location near the Sarine Coffee café has a positive impact where café visitors are interested in just seeing the types of herbal plants in Tamansari Village in the seedling house.

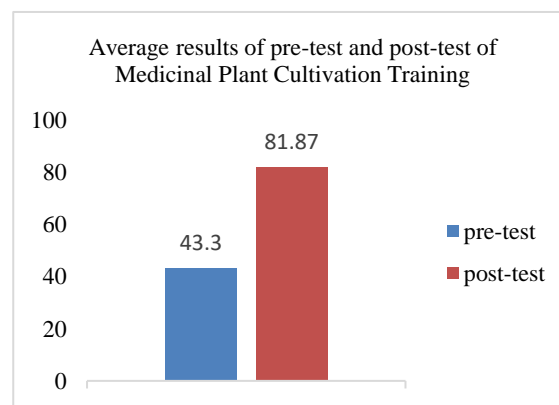


Figure 2. Average Results of *Pre-test* and *Post-test* Training on Herbal Plant Cultivation

The implementation of herbal plant cultivation, accompanied by training activities, has a very good impact on the community, especially in improving science regarding the cultivation of herbal plants. This is shown by the average pre-test result of 43.3 and the average post-test score of 81.87. This shows an increase in knowledge about the cultivation of herbal plants in the people of Tamansari Village.



Figure 3. Training in Herbal Plant Cultivation by PPLH Seloliman



Figure 4. Tamansari Village Seedling House in 2023

The community empowerment team ensures the sustainability of the seedling house by collaborating with Sky farm as a partner in 2023. The community empowerment team gained knowledge about the development of smart seedling houses using solar panels. So that seedling houses managed by the community now have an automatic watering system with solar energy sources. Herbal plants grown in seedling houses are also increasingly varied. Smart seedling houses have also become a pilot for people in Tamansari Village for similar automatic watering in their respective homes.

PRODUCTION

The implementation of sub-activities from mapping to cultivation has increased the knowledge and ability of the community related to herbal plants. The empowerment team together with the community then tried to take advantage of the abundant potential of herbal plants by processing them into a product that can be reached by all people, both young and old. Product processing aims to increase the knowledge and ability of PKK members and improve MSMEs in Tamansari Village.

The empowerment team together with PKK members innovated to process one of the herbal plants that was becoming rare and of which the community did not know the benefits, namely Chicken Claws or *Selaginella Deoderleinii*. This herbal plant was chosen because of its uniqueness and benefits. Chicken Claw herbal plants have uses to overcome rheumatism, urinary tract infections, broken bones, edema stomach, hepatitis, tonsillitis, and even overcome lung cancer and nasopharyngeal cancer (Taman Husada Graha Famili, 2015). Currently, a lot of research is being done on the benefits of Chicken Claw plants to overcome cancer (Putri *et al.*, 2021). In addition to the Chicken Claw plant, another plant is also used, namely Rosela, which is widely consumed in the form of drinks (Astuti, 2020). Rosela has the benefit of lowering blood pressure or hypertension (Kristiani & Yobel, 2022).

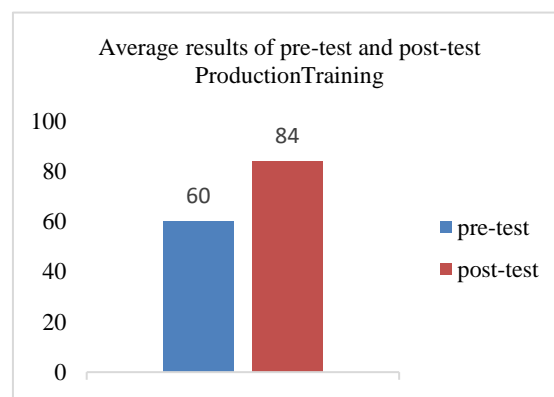


Figure 5. Average Results of Pre-test and Post-test Product Processing Training

Product processing is carried out together with the community with the empowerment team providing socialization and training on the benefits and processing of products to the PKK of Tamansari Village. Pre-test and post-test were also conducted to

determine the increase in knowledge of PKK members in Tamansari Village. Based on the pre-test and post-test results, there was an increase in knowledge of PKK members in Tamansari Village which was shown by an increase in the average test score where the pre-test has an average score of 60, and an average post-test score of 84.



Figure 6. Product Processing with PKK Tamansari Village

The first product processing was carried out on July 31, 2022, with the PKK of Tamansari Village. Trials were carried out on the taste and dosage of the mixture of Chicken Claw and Rosella which was then processed into brewed drinks. The product processing sub-activity also involves partners, namely the Banyuwangi Regency Cooperative Office, who have helped in the idea of packaging products until they are ready to be sold in the market. The resulting product is called SELALUP, which stands for Selaginella Celup.



Figure 7. Selaginella Celup Product

In addition to Selaginella Celup, the product processing sub-activity also succeeded in finding innovative processed products from

the Chicken Claw plant. This innovation aims to make processed herbal drinks more acceptable to young people by processing them into *mocktails*. *Mocktails* are processed non-alcoholic drinks from fruit juice with a mixture of soft drinks or flavorings (Saputro *et al.*, 2023). But this mocktail is made with the basic ingredients of Chicken Claw extract and drink flavorings so that it has an attractive taste and appearance. The innovation of processed Selaginella Celup products and *Selaginella Mocktails* is a business idea for the people of Tamansari Village. The PKK of Tamansari Village often brings these processed products in the National PKK competition.



Figure 8. Selaginella Mocktail

Product processing sub-activities continue as of 2023, namely with the development of Selaginella Celup packaging products managed by the Tamansari Village PKK independently and which has received a halal certificate. Selaginella Dipup products have also been introduced at various events that bring international students. This development is a very good step for the progress of Selaginella Celup products in the future.

In addition, in 2023, herbal plant processing innovations are also found which now utilize family herbal plants. Family herbal plants that are processed include ginger and temulawak. Both of these herbs can be found easily in Tamansari Village, almost every house has these herbs. The benefits of ginger itself are as antioxidants and can increase body immunity (Wirasti *et al.*, 2021). Temulawak also has benefits to increase endurance (Ulfa *et al.*, 2021).

In addition to ginger and temulawak, other plants are also used, namely red chili,

tomato, combrang flower, and lemongrass. Red chili itself has used to increase appetite to influenza. Then tomatoes are beneficial for growth, mainly bones and teeth and can reduce high blood pressure (Arman *et al.*, 2023), while combrang flowers have uses as antioxidants (Hermawan & Ferdinal, 2023). Lemongrass is beneficial for lowering blood pressure or the risk of hypertension (Kabuhung & Mariana, 2023).



Figure 9. Innovation of Family Herbal Plant Preparations

These herbal plants are then processed into drinks, namely Jamu Tempong, this name is taken from the typical food of Banyuwangi, namely Sego Tempong. The innovation of Jamu Tempong drinks is made from red chili and tomato with the addition of rice soaking water. Then another variant is Jamu Kesrut which is also taken from the name of a typical Banyuwangi food, namely Ayam Kesrut. Jamu Kesrut has the basic ingredients of Kecombrang leaves, temulawak and lemongrass with the addition of red chili. The existence of this beverage processed innovation increases public knowledge of the use of herbal plants around so that it can have economic value.

JAMU CORNER CAFE

The innovation of processed products is then marketed through Cafe Jamu Corner, in collaboration with Bumdes Desa Tamansari. Cafe Jamu Corner was established on September 23, 2022, in one of the MSMEs managed by Bumdes, namely Warung Osing. Cafe Jamu Corner continues until 2023, where the café not only focuses on selling products but also includes education in it. The cafe now also presents Education Trip which offers

visitors a trip around Tamansari Village while learning about the herbal plants. Cafe Jamu Corner also provides a reading corner for visitors.

CONCLUSION

Community empowerment carried out by developing the Tabib Village Concept in Tamansari Village has been realized as evidenced by the running of all sub activities where the potential of herbal plants around the community has been utilized to be processed into products with higher selling value. The product has been brought as a superior product by the PKK of Tamansari Village at the National PKK competition.

In biodiversity mapping activities carried out in the period 2022 to 2023, it has produced a Map of the Distribution of Herbal Plants in Tamansari Village. From the map, it can be known the type, distribution and abundance of herbal plants in Tamansari Village. The mapping results also present a classification of herbal plant findings which are categorized into four, namely lost plants, protected plants, rare plants and abundant plants. The distribution of herbal plants is also widely found in residential areas so that the use of herbal plants independently by the community is easy to do. Based on the training conducted, it is also known that public knowledge about the types and ways of cultivation of herbal plants has increased.

Herbal plants that previously did not have a high selling price can now increase because people have been trained to utilize them into products with high sales value. The use of selected herbal plants, based on the mapping category, means that plants and abundant plants can be cultivated easily. In addition, public knowledge about the processing of herbal plant products has also increased, indicated by an increase in the average pre-test and post-test results.

SUGGESTION

This community empowerment activity must continue to be ensured, especially in developing the concept of Tabib Village in Tamansari Village by monitoring. Further activities can also utilize technology to optimize the potential of Tamansari Village so

that it is more efficient and can be a model for other villages in Indonesia.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest with any party.

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AUTHOR CONTRIBUTION

Shinta Tri Ananda Putri Septaningrum as a manuscript writer, problem analysis, supporting data collection, carrying out activities and processing the results of activities. Syahrul Ramadhan carried out activities as well as data collection and processing. Sarda Ika Devi carried out activities as well as data collection and processing. Asroful Waro'faid Sukamto carried out activities as well as data collection and processing. Husnul Hotijah, Presti Dewi Intan, Farhad Ulil Absor, Farhaiza Ramadhania, Salsabila Amalia Sakinah, Refaldi Saptiansyah, Mochamad Zulfikar, Ahmad Danang Sagita, Rahmat Hakim, Mohammad Fikriansyah, Amin Nur Asdiyanta, Azizah Puspaningtyas, Gilang Avrilio Akbari, Ryo Al Fandi, M. Fahmi Dimas Prayogi, Gusti Ayu Illiyin Putri Santosa, Achmad Julian Andris, and Anta Dzaky Muhammad carried out activities as well as data collection and processing. Susy Katikana Sebayang provided directions for the implementation of activities and revisions to the manuscript.

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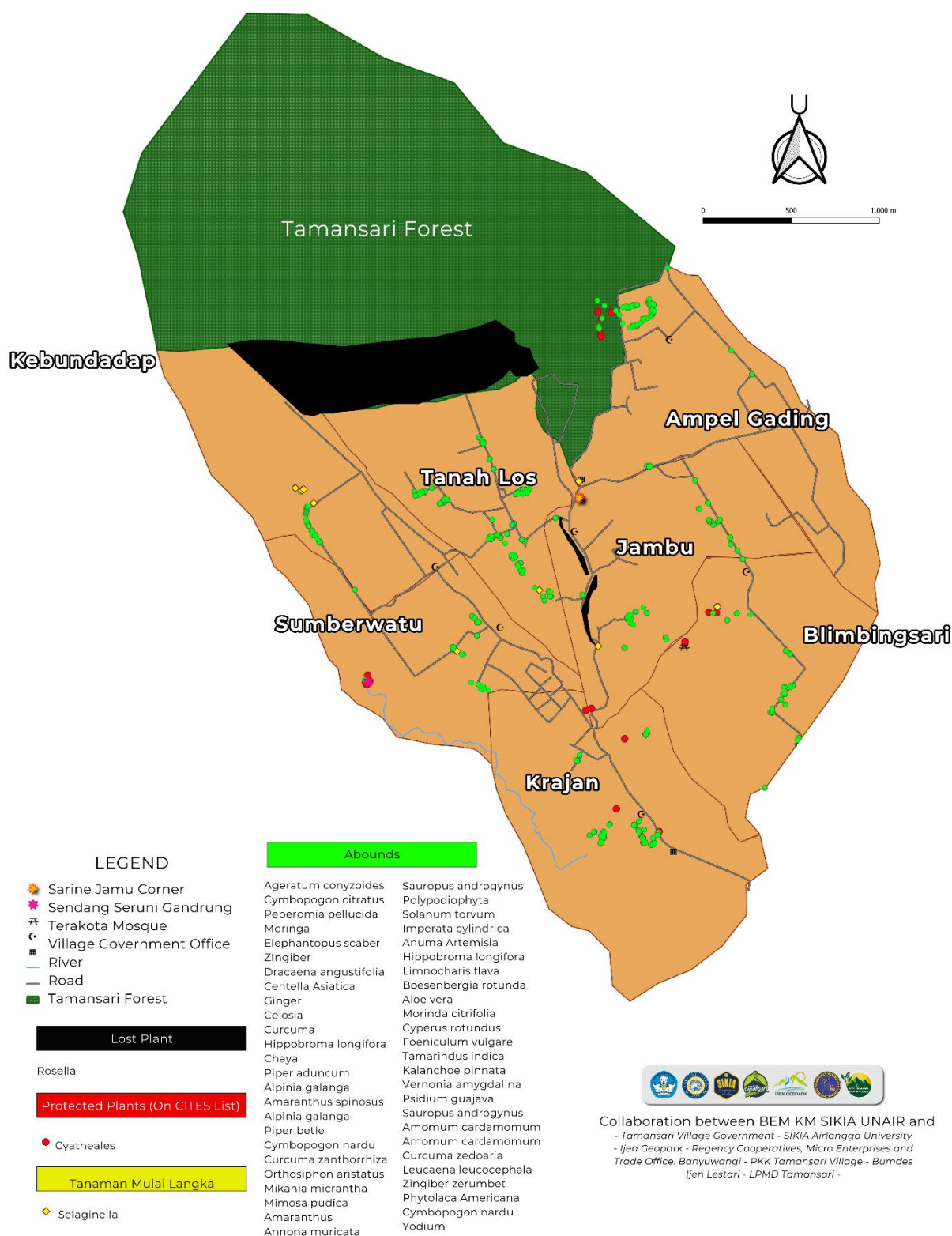
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ATTACHMENT

Attachment 1. Map of Medical Herbal Plants Distribution in Tamansari Village 2022

MAP OF MEDICAL HERBAL PLANTS DISTRIBUTION IN TAMANSARI VILLAGE 2022



Attachment 2. Map of Medical Herbal Plants Distribution in Tamansari Village 2023

