Potential of Medicinal Plants in Pampang Village Samarinda As A Chemistry Learning Resource

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Abstract: This research aims to identify the potential of medicinal plants in Pampang Village, Samarinda, East Kalimantan, which can be used as a source of chemistry learning at the junior and senior high school levels. This research used a descriptive method with a qualitative approach. Data collection was carried out through observation, interviews, and documentation. The research subjects, namely 11 residents of Pampang Village, were determined using purposive sampling. Data analysis used interactive model analysis, and data validity is measured using data triangulation techniques. The results of the research show that there are 20 medicinal plants that the people of Pampang Village widely used and eight medicinal plants have the potential to be used as a source of chemistry learning. These medicinal plants were sambung nyawa, meniran, bajakah, betel, seri, turmeric, coconut, and tamarind eggplant. These plants related to materials separating mixtures, reaction rates, functional groups, lipids, acid and base indicators, electrolyte and non-electrolyte solutions, acids and bases, chemical changes, and redox. Therefore, this can be used as a reference and consideration for chemistry teachers in the learning process. to help students understand chemistry lessons closely related to everyday life.

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Introduction

Currently, many learning resources are used in the learning process, including books and the internet. The use of books and the internet in the learning process makes it very easy for students to get information, especially if we use the internet, the information we get only takes a short time and the process of searching for the information is easy (Sasmita, 2020). However, this does not rule out the possibility that students need help understanding the learning even though the teacher has conveyed it through these learning resources. One subject still very difficult for students to understand is natural science (science). It causes students' understanding of the concept of learning to be poor. One of the reasons science learning is considered difficult is because of the paradigm students develop (Supriyadi & Nurvitasari, 2019). Science learning consists of several aspects: Physics, Biology, and Chemistry (Wulandari, 2017). Chemistry is a natural science that studies matter's composition, structure, properties, and changes (Suhendar, 2017). Chemistry itself is found in everyday life. Linking chemistry to everyday life in the learning process can help students create relationships and better understand learning material theoretically by applying science in everyday life (Simanjuntak et al., 2019).

East Kalimantan is one of Indonesia's provinces with cultural and biological diversity. The people of East Kalimantan greatly utilize this cultural and biological diversity in their

daily lives. The role of biodiversity and natural wealth is to stabilize the ecosystem, provide a source of germplasm, and serve as an economic resource for the people of East Kalimantan (Wahyuni & Zakaria, 2018). The people of East Kalimantan use many of these natural ingredients for medicines, kitchen spices, and household furniture. The Slow Loris plant is a natural plant commonly used by the Dayak Tunjung tribe who live in Kutai Kartanegara and West Kutai Regencies, East Kalimantan. This plant is used as a mixture for traditional cosmetics, namely sunscreen (Salusu et al., 2017). In East Kalimantan, especially in Pampang Village, natural materials are greatly utilized by the Dayak Kenyah tribe so that they can be a reference for learning. The people of this village have many positive local activities so that the cultural values in this village are not lost (Wardono & Jepriani, 2014). The people of Pampang Village use many plants that grow nearby to use as medicine. Medicinal plants themselves have chemical compounds that are beneficial for the body to help the healing process (Sagala et al., 2016). The very diverse plants in Pampang Village can be used in the learning process to help students understand chemistry lessons that directly connect to everyday life. Chemistry learning can use natural resources around us, such as natural indicators for acid-base titration material. Examples are the use of teak leaf extract (Pratama et al., 2015), karamunting (Indira, 2015), pacar air and Ruellia flower extracts (Mitarlis et al., 2018), and hibiscus flower extract (Nuryanti et al., 2010). Hibiscus flower extract can be made into pH paper as an acid-base indicator (Fatimah et al., 2018). One way to incorporate chemical concepts into everyday life is to use nature, such as plants, as content and learning media (Irmeilyana et al., 2020; Syamsuri et al., 2022).

Utilizing plants as a chemistry learning resource can increase students' understanding and help teachers explain chemical concepts. Apart from that, it can motivate students to link the concepts studied with everyday life phenomena, become more sensitive to the surrounding environment, and love and preserve the local wisdom of their area (Martilia & Priyambodo, 2017; Tangio et al., 2023). The potential of Pampang Village's medicinal plants as a source of chemistry learning based on local wisdom is described in this research.

Research Method

This research used a qualitative approach with descriptive methods. Qualitative research was descriptive and used analysis with an inductive approach (Rukin, 2019). The aim of using this descriptive qualitative study is to obtain information from research data that is comprehensive, broad, and deep (Nursaadah et al., 2017). This research procedure was carried out through several stages, namely the pre-field stage, fieldwork stage, and data analysis stage.

Pre-field Stage

This stage begins with a field assessment to determine the problem or research focus. At this stage, researchers prepare field plans, arrange permits, prepare research equipment, and research ethics issues.

Fieldwork stage

Researchers collect data according to the focus of the problem being studied. Data collection was carried out through observation, interviews, and documentation studies. Researchers collected data by conducting interviews with 11 people living in the Pampang Village area, East Kalimantan, obtained using purposive sampling techniques. Apart from that, researchers also documented the natural materials found around the village. Next, the data that has been obtained is then studied and categorized.

Data analysis stage

This stage is the activity of analyzing data from researchers' collected data. The data analysis used in this research is interactive model analysis, namely data collection, data presentation, data reduction, and conclusion drawing/verification (Creswell, 2012). The data obtained through interviews, participant observation, or document analysis is presented in the form of field notes. Then, each code is given, and notes are related to each research question. After going through reduction or directly verifying the data from each research question, it is interpreted by the main research question. However, before carrying out the analysis, the researcher tested the credibility of the data by triangulating the data. Data analysis in this study is presented in Table 1.

Table 1. Data Analysis

No.	Research data	Instrument	Data Analysis
1.	The ways of the people of Pampang Village Gaining knowledge	Interview guidelines	Analysis of the results of the interview description
2.	Use of medicinal plants by Pampang Village community	Field Documentation, Guidelines Interview	Analysis of results documentation and interview description
3.	Identify medicinal plants known to the Dayak people	Field Documentation, Guidelines Interview	Categorize

Results and Discussion

Pampang Village is a sub-district in Samarinda City, approximately 11 km from the city. Pampang Village is mostly inhabited by indigenous Dayak people, although there are several RTs whose people come from other tribes. The people in Pampang village still uphold their culture and nature. It can be seen from the performances usually held every holiday, such as Saturday and Sunday. Apart from that, there are still many people who use various kinds of plants around them in their daily lives and grow crops in this village. The results of interviews with respondents obtained data on plant types that the people of Pampang Village widely use. Plant data, community knowledge, and the chemical content of the plants are presented in Table 2.

Table 2. Indigenous Knowledge of the Pampang Village Community

Plant Names	Knowledge of the Pampang Village Community	Chemical Content
Cassava leaves (*Manihot Esculenta*)	Cassava leaves are used as an anti-breast cancer agent.	The contents of cassava leaves are lysine, arginine, leucine, and isoleucine which are essential amino acids. Then cassava leaves also contain antioxidants and saponins. These ingredients can help the growth of damaged cells and prevent premature aging (Muhammad et al., 2018).
Sungkai Leaves (*Peronema Canescens*)	Lots of sungkai leaves used by the community treat fever and malaria.	The chemical contents of sungkai leaves are alkaloids, flavonoids, saponins, steroids, phenolics, and tannins. This chemical compound produces antipyretic activity in sungkai plants so that it can reduce heat (Latief et al., 2021; Sigit

		Cahyo Hardiansyah & Pheby Oktriani, 2021).
Sambung Nyawa Leaves (*Gynura Procumbens*)	Used by society to treat diseases like cholesterol.	The chemical contents of sambung nyawa leaves are saponins, tannins, flavonoids, and essential oils. These compounds can help reduce cholesterol in the blood (Oktaviani et al., 2019).
Meniran (*Phyllanthus Urinaria*)	Meniran is trusted by society and can treat kidney stones and maintain endurance. Apart from that, society also uses this plant to treat coughs and jaundice	The chemical compounds contained in the meniran plant are saponins, flavonoids, polyphenols, phyllanthin, hypophyllanthin, and potassium salts. These compounds will increase antioxidant activity in the plant (Tambunan et al., 2019).
Kumis Kucing (*Orthosiphon aristatus*)	Kumis kucing is utilized by the community to heal various kinds of diseases such as hypertension and diabetes.	The chemical content in kumis kucing is phenol, such as isopimaran diterpenoids, flavonoids, benzochromene, and organic acid derivatives. These ingredients are diuretic and antioxidant so they can reduce hypertension and diabetes (Hasbi et al., 2019).
Soursop (*Annona muricata*)	Soursop itself believes society has benefits to launch digestion. Soursop too can be trusted to cure disease gout.	The chemical contents of soursop are calories, carbohydrates, protein, fat, calcium, iron, phosphorus, vitamin A, vitamin B1, and vitamin C. These compounds are antioxidants that can increase the body's endurance and slow down the aging process, then can also prevent osteoporosis. The content in soursop leaves called Annocaeous Acetogenin can kill cancer cells (Elidar, 2017).
Galangal (*Kaempferia galangal*)	Many people use galangal for herbal medicine and consumption.	The chemical ingredients in galangal are essential oils, saponins, flavonoids, and polyphenols. These ingredients are beneficial for the body, one of which is to reduce sore throats (Mudaningrat & Nada, 2021).
Ginger (*Zingiber officinale*)	Ginger is used for treatments like cough and to warm the body.	The chemical ingredients in ginger are essential oils, gingerol, beta-carotene, capsaicin, caffeic acid, curcumin, and salicylates. These compounds can treat various minor illnesses such as coughs (Redi Aryata, 2019).
Bajakah (*Spatholobus Littoralis hassk*)	The public uses it to treat various diseases one of them being cancer.	The chemical content in bajakah is phenolic compounds. This compound can have antioxidant activity which is very necessary for curing cancer (Ayuchecaria et al., 2020).

Betel (*Piper betle*)	Many people use betel leaves to lower cholesterol and pressure.	The chemical constituents of betel leaves are essential oil, hydroxycavicol, chavicol, cavibetol, allylpyrocatekol, cineole, caryophyllene, cadinene, estragol, terpene, sesquiterpene, phenyl propane, tannin, diastase, sugar, and starch. These compounds can help lower cholesterol and pressure (Anggeriani & Lamdayani, 2018).
Sweet potatoes (*Ipomoea batatas)*	Sweet potatoes can be used to control pressure	The chemical content of sweet potatoes is flavonoids in the form of anthocyanins, with the presence of these compounds sweet potatoes can be used as healthy food to reduce cell damage in the body (Salim et al., 2017).
Benalu (*Loranthus*)	Benalu is used by society to treat cancer and malignant tumors.	The chemical contents of mistletoe are alkaloids, flavonoids, saponins, tannins, and steroids. In the body of this benalu there is high antioxidant activity so that it can cure cancer and malignant tumors (Tarbiyah & Aceh, 2018).
Seri (*Muntingia calabura*)	Seri is usually utilized by society for consumed as food.	The chemical constituents of the seri are esters, alcohols, phenolic compounds, sesquiterpenoids, and furan derivatives. Not only is it consumed, but this plant can be used to treat jaundice and gout (Handayani, 2020).
Putri Malu (*Mimosa pudica)*	Usually, Putri Malu is consumed for treating diabetes.	The chemical contents of Putri Malu are tannins, steroids, alkaloids (mimosine), triterpenes, flavonoids, glycosides, C glycosylflavones, and flavonoid compounds from Putri Malu leaves which are anti-inflammatory, antioxidant, free radical scavenger, anti-allergic and phenolic compounds is hepatoprotective. The ingredients in this Putri Malu can help treat diabetes wounds (Lengkong et al., 2021).
Ciplukan leaves (*Physalis*)	Ciplukan leaves are used in society to treat stress. Apart from pressure, this plant is believed to be able to treat diabetes.	The chemical contents of ciplukan leaves are tannins, saponins, glycosides, flavonoids, terpenoids, and steroids. The saponin content in ciplukan leaves can reduce blood sugar (Julianti et al., 2019).
Turmeric (*Curcuma Longa*)	People take advantage turmeric to treat colds, heartburn, and sore throat.	The chemical ingredients found in turmeric are essential oils and curcuminoids. This compound has antibiotic properties so it can suppress or stop biochemical processes in an organism (Nobiola et al., 2020).
Coconut (*Cocos nucifera*)	Coconut can improve body endurance	The chemical contents of coconut are auxin and cytokinin and vitamins. The

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Plant Names		Uses	Chemical Content
			content of coconut is antioxidant so it can help increase the body's endurance (Nurman et al., 2017).
Moringa (***Moringa oleifera***)	**Leaves**	People believe that Moringa leaves can be used in the health sector, namely to treat diabetes.	The chemical content of Moringa leaves is phytosterol, a source of beta carotene, vitamin C, iron, and potassium (Hamzah & Yusuf, 2019).
Curcuma (***Curcuma zanthorrhiza***)		Many people use this material to treat the throat is starting uncomfortable.	The chemical ingredients in curcuma are xanthorrizol, curcuminoids which contain yellow substances (curcumin), and desmetoxy curcumin, essential oils, proteins, fats, cellulose, and minerals. These compounds can help treat coughs (Anggraini et al., 2019)
Sour Eggplant (***Solanum Ferox***)		According to the community, sour eggplant can help maintain the body's immune system. Apart from that, this plant can be used to treat coughs, sore throats, asthma, fever, and vomiting.	The chemical contents of sour eggplant are flavonoids, soladin, and alkaloids. The soladin compound from Solanum species functions as an anti-inflammatory antioxidant, a steroid extracted from the roots and leaves (Arief et al., 2019).

Table 3 presents the reduction results of medicinal plants that can be used in chemistry learning. This reduction is based on literature studies and the results of interviews obtained by researchers with resource persons who are residents of Pampang Village.

Table 3. Reduction Results of Medicinal Plants

Plant Names	Chemical Materials	Things Learned
Sambung Nyawa Leaves (***Gynura procumbens***)	Separation of mixtures	The process of processing these plants is mostly by boiling them and then taking the boiled water. The filtration or filtration method is used in the process.
Meniran (***Phyllanthus urinaria***)		
Bajakah (***Spatholobus littoralis hassk***)		
Betel (***Piper betle***)		
Turmeric (***Curcuma longa***)		
Meniran (***Phyllanthus urinaria***)	Reaction rate	Meniran preparations are very diverse. Some preparations (capsules and the plant itself) can be used as an example of studying chemistry, namely reaction rates by comparing reaction rates in the body.
Sambung Nyawa Leaves (***Gynura procumbens***)	Functional groups	These plants have chemical compounds that can be studied by the functional groups contained in their contents.
Meniran (***Phyllanthus urinaria***)		
Bajakah (***Spatholobus littoralis hassk***)		
Betel (***Piper betle***)		

Seri (*Muntingia calabura*)		
Turmeric (*Curcuma longa*)		
Coconut (*Cocos nucifera*)		
Sour Eggplant (*Solanum ferox*)		
Betel (*Piper betle*) **Seri (*Muntingia calabura*)**	Lipid	The use of betel leaves and seri in people's lives can be used as a reference for learning chemistry, namely to lower cholesterol. The compounds contained in betel leaves and seri can help reduce bad fats in the body.
Turmeric (*Curcuma longa*)	Acid and base indicators	Turmeric contains anthocyanins which can act as natural acid and base indicators.
Coconut (*Cocos nucifera*)	Electrolyte and non-electrolyte solutions	Coconut water contains ions which are electrolyte solutions so it can be used as a reference in the chemistry learning process.
Sour Eggplant (*Solanum ferox*)	Acid and Base	Sour eggplant has a characteristic sour taste so it can be used as an example in the topic of acids and bases.
Seri (*Muntingia calabura*)	Chemical changes	Series that are left in the open air will experience rot which is a chemical change. So that students can find out examples of natural ingredients that affect fat in the body.
Sambung Nyawa Leaves (*Gynura procumbens*) **Meniran (*Phyllanthus urinaria*)** **Bajakah (*Spatholobus littoralis hassk*)** **Betel (*Piper betle*)** **Seri (*Muntingia calabura*)** **Kunyit (*Curcuma longa*)** **Coconut (*Cocos nucifera*)** **Sour Eggplant (*Solanum ferox*)**	Oxidation-reduction reactions	Each of these medicinal plants has antioxidants in its content. Antioxidants themselves are related to redox materials because oxidation reactions occur when they enter the body. So that we can study the redox reactions that occur in these contents.

There are many chemical materials at both junior high school (SMP) and senior high school (SMA) levels that can be combined with medicinal plants known to the people of Pampang Village. These chemical materials are acids and bases, mixture separation, functional groups, acid and base indicators, electrolyte and non-electrolyte solutions, chemical changes, reaction rates, and redox reactions (Table 3). Material on the properties of acids and bases in solutions can be used in junior high school science learning through science investigation activities (Hidayat, 2023). Oxidation-reduction concept material in high school can be studied by utilizing natural materials in the environment (Tangio et al., 2023).

The first material is acids and bases and acid and base indicators. Natural ingredients that can be used in this lesson are sour eggplant and turmeric. Tamarind eggplant has a sour fruit taste and is widely used as a traditional medicine and even as a flavoring in cooking.

This sour taste can be integrated with chemistry learning on acid and base material (Arief et al., 2019). Then turmeric can be used as an indicator of natural acids and bases. Turmeric contains curcumin which can provide clear and fast color changes. If it is alkaline, it will be brownish red; if it is acidic, it will be light yellow (Sundari, 2016).

The next material is the separation of mixtures. Some examples of plants used in this lesson are sambung nyawa leaves, bajakah, seri, and turmeric. These natural ingredients are mostly used by boiling them, so the plant juices come out. If you want to drink the water, you can use one of the mixture separation techniques in chemistry subjects. The mixture separation method is filtration (Mashadi et al., 2018). Finally, the boiled water with the plant will separate, so it can be consumed. This is what can be taught to students to understand the concept of learning better because they can see or apply the method directly.

Functional groups can be studied using natural materials. Each natural ingredient has its ingredients which have functional groups. One example is turmeric which contains curcumin (Nobiola et al., 2020). Other plant ingredients are presented in Table 2. These ingredients have functional groups that can be studied at school as examples of these functional groups in everyday life. In chemistry studies, there are alkanes, alkenes, and alkynes, as well as other functional groups studied in high school. These natural materials can make it easier for students to absorb chemical material taught by schools because there are examples in everyday life.

Next is the subject of chemical changes. Plants that can be used in this lesson include the series. People usually consume seri fruit directly. If this fruit is left in the open air, rot will occur. This rotting means that the fruit undergoes chemical changes, the properties of the fruit cannot be returned to their original properties, and new substances are produced (Iskandar & Kusmayanti, 2018). The people of Pampang Village also consume many coconuts in their daily lives. The electrolyte content in coconut water can make coconut an example of electrolyte and non-electrolyte solutions in everyday life (Rokana & Khusbana, 2018).

Next is macromolecular material, namely lipid. Many people use betel leaves for treatment. Apart from betel leaves, there is also seri fruit with similar benefits, namely lowering cholesterol. According to research by Rangkuti et al. (2018) and Tulung et al. (2017), betel leaves and seri can affect reducing cholesterol levels. Cholesterol is related to fat in the macromolecule material taught in school. Therefore, betel leaves and series, which are used to reduce cholesterol levels in the body, can be a link between natural ingredients and fat or lipid materials. So that students can find out examples of natural ingredients that affect fat in the body.

The following chemical material is the reaction rate. Reaction rates are also one of the chemistry subjects that can use the natural materials mentioned above. One of them is the meniran plant. Usually, people dry this plant and then consume it as tea. However, meniran plants have also been processed in the capsule dosage form. The application of this reaction rate material is that drugs in powder or tea dosage form can react more quickly than in capsule form due to their larger surface area (Fajriati et al., 2017). These medicinal plants contain antioxidants in the plant. Antioxidants themselves are substances that protect cells from damage caused by free radicals. Antioxidants are related to redox materials because oxidation reactions occur when they enter the body.

From the explanation above, the potential of Pampang Village's medicinal plants can be used as content and media for chemistry learning based on local wisdom. For example, sour eggplant and turmeric plants can be used as learning resources in junior high school

science lessons on acid-base and additive materials. Meanwhile, sambung nyawa leaves, meniran plants, bajakah, betel leaves, seri, turmeric, coconut, and tamarind eggplant contain antioxidants related to oxidation-reduction materials in SMA. Learning resources based on local wisdom can be used as a form of implementing learning that integrates local wisdom values and fosters love for the local wisdom of each region (Andriana et al., 2017). Therefore, in the future, other potential areas must also be considered as learning resources by paying attention to the relevance of the materials and methods used.

Conclusion
The conclusion obtained from the results of this research is that the medicinal plants in Pampang Village that can be used as a source of chemistry learning are life-giving leaves, meniran plants, bajakah, betel leaves, seri, turmeric, coconut, and tamarind eggplant. These plants can be used as learning materials regarding mixture separation, reaction rates, functional groups, lipids, acid and base indicators, electrolyte and non-electrolyte solutions, acids and bases, and chemical and redox changes.

Recommendation
Researchers and educators can carry out further research to develop chemistry learning tools such as teaching materials and LKPD that are integrated with the local wisdom of East Kalimantan, especially the local wisdom of Samarinda's Pampang Village.

Acknowledgment

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