

Ethnobotanical Study of Medicinal Plants Used by Ogan Tribes in Lempuing Jaya, South Sumatera-Indonesia to Treat Degenerative Diseases

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Abstract: Degenerative disease is one of the non-communicable diseases characterized by progressive loss of cell function, leading to an early organ defect and aging. Ethnobotanical study can be a promising approach to explore potential plants that have been used traditionally based on local knowledge for the treatment of degenerative disease. This study was implemented to uncover the unspooled knowledge of the Ogan tribes in utilizing medicinal plants to treat degenerative diseases. An observational descriptive study was undertaken to collect the data and information regarding the medicinal plants used for the management of several degenerative diseases. Information and data collection was carried out via questionnaires and direct interview with traditional healers and local people on the type of ingredients, ways of making, dosage and frequency of usage. The ethnobotanical survey revealed 36 different types of medicinal herbs included in 5 disease categories including uric acid (16 medicinal herbs), hypertension (17 medicinal herbs), hyper-cholesterol (13 medicinal herbs), diabetes mellitus (11 medicinal herbs), and stroke (7 medicinal herbs) with a total of 64 plant species were utilized for the treatment of each health problem. The usage of medicinal herbs is quite diverse such as direct consumption, infusion, and juicing with different frequencies of utilization (i.e., once and twice daily). The survey has shown that Ogan tribes in Lempuing Jaya, South Sumatera-Indonesia have empirically implemented the local knowledge of medicinal herbs for the treatment of several degenerative diseases. However, scientific proof should be undertaken for the medicinal herbs.

1 INTRODUCTION

Degenerative diseases are the term used for numerous disorders caused by progressive loss of cell functions that leads to an early organ damage and aging, generally occurred in elderly. Even though it does not rule out the possibility of occurring at the young age, several main risk factor can be a potential trigger for degenerative disease to be suffered by the community, including lack of activity, ultra-processed food, and oxidative stress (Richardson, 1926). Approximately 50 types of degenerative diseases have been identified in the present time, some of which are cancer, stroke, diabetes mellitus, coronary heart problem, and hypercholesterolemia (Wirasisya et al., 2020). The current managements of

various degenerative diseases implement both the non-pharmacology and pharmacology treatment by modifying the lifestyle and consuming the clinically approved synthetic drugs (Moriguchi et al., 2016). However, the use of synthetic drugs often experiences the number of adverse effects, leading to the emergence of various health problems (Helleday, 2017; Miller et al., 2010). High negative effect of the synthetic drugs increases the needs to discover new drug candidate pointed out as the degenerative diseases therapy that is more safe with low toxicity.

Ethnobotanical study of medicinal plants used by the local people in certain areas is one of the promising approaches in discovering the new drug candidates, in view of the fact that traditional herbal medicine has been extensively utilized since ancient time (Iwu, 2002). The local knowledge of medicinal

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plants can be an appropriate source of information as a basis of drug discovery and development (Mahmood et al., 2013). Numerous scientific reports have shown the fundamental role of the traditional knowledge in development of new drug candidates that have provided a real substitute in the primary healthcare of the rural communities in developing countries (Cordel et al., 2012; Hayta et al., 2014). Approximately 80% of the developing countries population rely on the herbal medicines with a total of 85% of the traditional medicinal herbs have been extensively utilized globally, making it as a global indigenous heritage (WHO, 2002; Farnsworth, 1988).

The documentation of the traditional knowledge on medicinal plants is a key aspect to conserve the global empirical heritage. It has also been implemented by the Indonesian government through the Ministry of Health by upscaling the use of Indonesian traditional herbal medicine, specifically known as Jamu, to be integrated into the primary healthcare system (The Indonesia's Ministry of Health, 2010). This study, therefore, transcribes the empirical information of the Ogan tribes living in Lempuing Jaya, Ogan Komering Ilir district, South Sumatera, Indonesia on medicinal herbs for the management of several degenerative disease. This ethnobotanical survey is the first ethnomedicinal assessment and listing of medicinal plant data, specifically for degenerative diseases in this area.

2 MATERIALS AND METHOD

The ethnobotanical survey used a technique adopted from Wirasisya et al. (2020). The documentation of the local knowledge used an observational descriptive study supported by participative ethnobotany appraisal approach including scheduled and semi-structured direct interview.

2.1 Survey Location

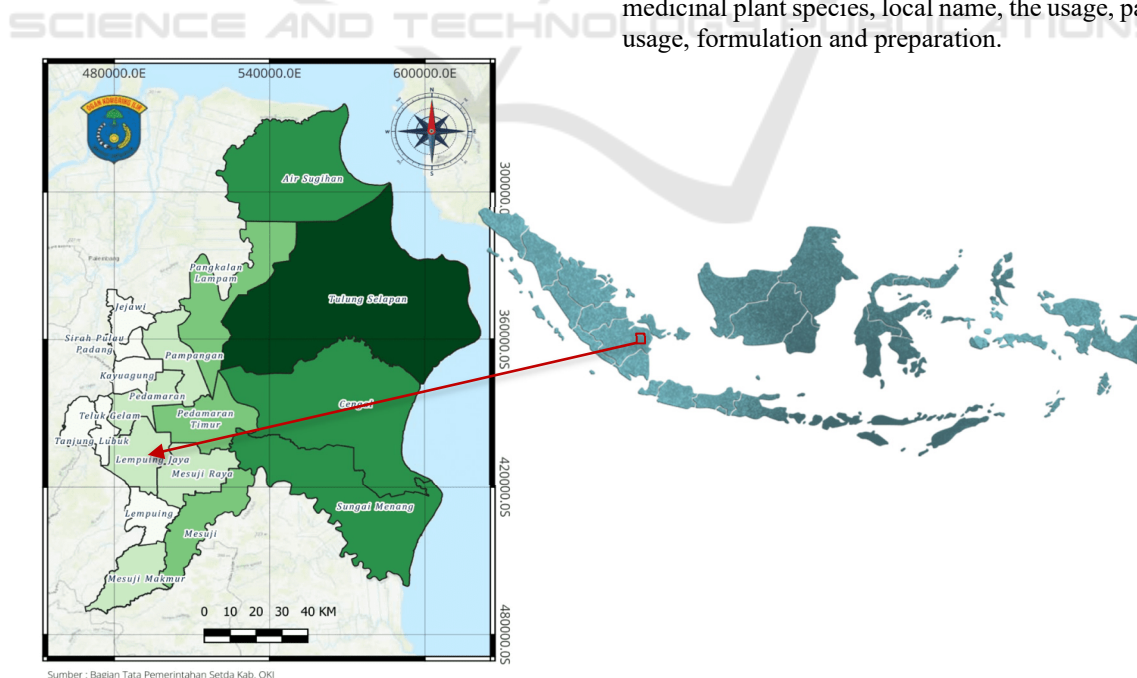
The ethnobotanical survey was conducted in January – April 2023 located in Lempuing Jaya, Ogan Kemering Ilir district, South Sumatera, Indonesia as depicted in Figure 1.

2.2 Documentation and Interview

The semi-structured direct interview was implemented to document the data and local knowledge with the informant criteria as follows:

1. Knowledgeable on the utilization of medicinal herbs/plants and medicinal plant ingredients for management of health problem.
2. The local inhabitants or enculturated person.
3. Known as knowledgeable on the utilization of medicinal herbs/plants and medicinal plant ingredients for management of health problem.

The information regarding informant biodata, medicinal plant species, local name, the usage, part of usage, formulation and preparation.



(Map was courtesy from Governance Section, Ogan Komering Ilir District)

Figure 1: Ethnobotanical survey location.

2.3 Data Analysis

Descriptive and quantitative analysis was carried out to analyse the data and information. The descriptive analysis was undertaken on the characteristics of the informant and the medicinal herbs, while the quantitative analysis was carried out to the medicinal plant data by quantified the ethnobotanical index including the use value (UV) and fidelity level (FL) as explained by Hoffman and Gallaher (2007).

Use Value (UV)

$$UV = \frac{\text{Number of plant utilization}}{\text{Number of event}}$$

Fidelity level (FL)

$$FL = \frac{I_p}{I_u} \times 100\%$$

I_p : Informant using specific plant for certain disease

I_u : Total informant using specific plants

3 RESULT AND DISCUSSION

3.1 Location and Respondent Demographic

The survey was carried out in Lempuing Jaya, Ogan Kemering Ilir (OKI) district, South Sumatera, Indonesia specifically at three villages including SP 6 Suka Maju, SP7 Suka Jaya, and Tanjung Sari II which was selected based on the high number of traditional healing practice by the local people. A total of 100 participants were obtained that meets the criteria with the informant demographic as depicted in Figure 2.

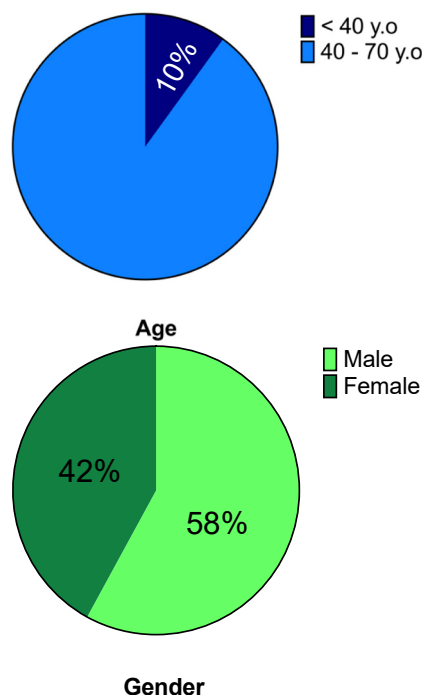


Figure 2: Informant demographic of ethnobotanical survey location

Figure 2 illustrates most of informants are male with the age ranging from 40-70 years old, and only 10% of respondents are 35-40 years old. This indicates that Lempuing Jaya inhabitants that are under 35 years old do not have any knowledge regarding the medicinal herbs. The main source of their medicinal plant's knowledge (75%) was empirically passed down from their ancestors and 25% of the rest were obtained from self-experiences of using the medicinal plants to manage their health problems.

3.2 Medicinal Plants

Ethnobotanical survey revealed 36 types of medicinal herbs included in five disease categories such as uric acid (16 medicinal herbs), hypertension (17 medicinal herbs), hyper-cholesterol (13 medicinal herbs), diabetes mellitus (11 medicinal herbs), and stroke (7 medicinal herbs). A total of 64 medicinal herbs have been documented for the medicinal herb preparations and all of the have been identified botanically. The plant species used by the Ogan tribes summarized in Table 1.

Table 1: Medicinal plants based on disease category.

Disease categories	Local name	The used part	Species
Uric acid	Salam	Leaf	<i>Syzygium polianthum</i>
	Sirsak	Leaf	<i>Annona muricata</i>
	Sirih	Leaf	<i>Piper betel</i>
	Bawang putih	Tuber	<i>Allium sativum</i>
	Alang-alang	Herbs	<i>Imperata cylindrica</i>
	Kumis Kucing	Leaf	<i>Orthosiphon aristatus</i>
	Putri malu	Leaf	<i>Mimosa pudica</i>
	Sirih cina	Leaf	<i>Peperomia pellucida</i>
	Jahe merah	Rhizome	<i>Zingiber officinale</i>
	Sambiloto	Herbs	<i>Andrographis paniculata</i>
	Kelor	Leaf	<i>Moringa oleifera</i>
	Binahong	Herbs	<i>Anredera cordifolia</i>
	Ciplukan	Leaf	<i>Physalis angulata</i>
	Kunyit	Rhizome	<i>Curcuma longa</i>
	Pinah	Fruit	<i>Areca catechu</i>
	Brotowali	Herbs	<i>Tinospora cordifolia</i>
Hypertension	Sirsak	Leaf	<i>Annona muricata</i>
	Sirih Cina	Leaf	<i>Peperomia pellucida</i>
	Tumulawak	Rhizome	<i>Curcuma xanthorrhiza</i>
	Kumis Kucing	Leaf	<i>Orthosiphon aristatus</i>
	Belimbing Wuluh	Fruit	<i>Averrhoa bilimbi</i>
	Bawang Putih	Tuber	<i>Allium sativum linn</i>
	Seledri	Leaf	<i>Apium graveolens</i>
	Jahe	Rhizome	<i>Zingiber officinale</i>
	Salam	Leaf	<i>Syzygium polyanthum</i>
	Nangka	Leaf	<i>Artocarpus heterophyllus</i>
	Sambiloto	Herbs	<i>Andrographis paniculata</i>
	Kelor	Leaf	<i>Moringa oleifera</i>
	Timun	Fruit	<i>Cucumis sativus</i>
	Asam Jawa	Fruit	<i>Tamarindus indica</i>
	Kayu Manis	Lignum	<i>Cinnamomum burmani</i>
	Alang – alang	Herbs	<i>Imperata cylindrica</i>
	Bawang merah	Tuber	<i>Allium cepa</i>
Hyper-cholesterol	Seledri	Herbs	<i>Apium graveolens</i>
	Mengkudu	Fruit	<i>Morinda citrifolia</i>
	Sambiloto	Herbs	<i>Andrographis paniculata</i>
	Kelor	Leaf	<i>Moringa oleifera</i>
	Ketumbar	Leaf and Seed	<i>Coriandrum sativum</i>
	Sirih	Leaf	<i>Piper betel</i>
	Seri	Fruit	<i>Muntingia calabura</i>
	Belimbing manis	Fruit	<i>Averrhoa carambola</i>
	Salam	Leaf	<i>Syzygium polyanthum</i>
	Bawang Putih	Tuber	<i>Allium sativum</i>
	Wortel	Roots	<i>Daucus carota</i>
	Tumulawak	Rhizome	<i>Curcuma xanthorrhiza</i>
Diabetes mellitus	Buncis	Seed	<i>Phaseolus vulgaris</i>
	Sirih Cina	Leaf	<i>Peperomia pellucida</i>
	Seri	Fruit	<i>Muntingia calabura</i>
	Nanas	Fruit	<i>Ananas comosus</i>
	Jahe	Rhizome	<i>Zingiber officinale</i>
	Kayu Manis	Lignum	<i>Cinnamomum verum</i>
	Pare	Fruit	<i>Momordica charantia</i>

Disease categories	Local name	The used part	Species
	Salam	Leaf	<i>Syzygium polyanthum</i>
	Sirsak	Leaf	<i>Annona muricata</i>
	Manggis	Fruit peel	<i>Garcinia mangostana</i>
	Sambiloto	Herbs	<i>Andrographis paniculata</i>
	Gingseng	Radix	<i>Panax ginseng</i>
Stroke	Sirih Cina	Leaf	<i>Peperomia pellucida</i>
	Serai	Leaf	<i>Cymbopogon nardus</i>
	Kelor	Leaf	<i>Moringa oleifera</i>
	Ciplukan	Leaf	<i>Physalis angulata</i>
	Sambiloto	Herbs	<i>Andrographis paniculata</i>
	Seledri	Herbs	<i>Apium graveolens</i>
	Bawang Putih	Tuber	<i>Allium sativum</i>

3.3 Dosage and Preparation

The most common way of use of the medicinal plant/herbs at the ethnobotanical study location is by infusion the plants. However, several methods were also found including juicing and direct consumption. The simple preparation and convenience of the infusion methods makes this herbal preparation technique highly used by the local people. The used of medicinal plant in Lempuing Jaya sometimes combined with other ingredients i.e., sugar, salt, and honey to increase a good savour.

The frequency and duration of usage was also diverse depending on the medicinal herbs and the severity level of diseases. The use of medicinal herbs indicated for curative purposes shows an intense use (three times a day) than palliative and preventive

purposes which only use once and twice daily for seven days or more. In addition, the local inhabitants of Lempuing Jaya have a unique dosage for preparation of medicinal herbs. They apply the odd number in every dosage of the medicinal plant ingredients.

3.4 Ethnobotanical Index

3.4.1 Use Value (UV)

UV is an index that can describes the level of use value of species for treating diseases based on predetermined categories (Silalahi, 2016). The UV value indicate how frequent the medicinal plants species were utilized by the community. The UV value of medicinal plant used by the local inhabitant of Lempuing Jaya is described in table 2.

Table 2: The use value index of medicinal plants

Local Name	Species	UV Index
Salam	<i>Syzygium polyanthum</i>	0,2
Sirsak	<i>Annona muricata</i>	0,18
Sirih	<i>Piper betle</i>	0,04
Alang-alang	<i>Imperata cylindrica</i>	0,06
Bawang putih	<i>Allium sativum</i>	0,09
Kumis kucing	<i>Orthosiphon aristatus</i>	0,17
Putri malu	<i>Mimosa pudica</i>	0,01
Sirih cina	<i>Peperomia pellucida</i>	0,17
Jahe merah	<i>Zingiber officinale</i>	0,04
Sambiloto	<i>Andrographis paniculata</i>	0,10
Kelor	<i>Moringa oleifera</i>	0,09
Binahong	<i>Anredera cordifolia</i>	0,03
Ciplukan	<i>Physalis angulate</i>	0,03
Kunyit	<i>Curcuma longa</i>	0,01
Pinang	<i>Areca catechu</i>	0,01
Brotowali	<i>Tinospora cordifolia</i>	0,01
Tumulawak	<i>Curcuma xanthorrhiza</i>	0,07
Belimbing wuluh	<i>Averrhoa bilimbi</i>	0,03
Seledri	<i>Apium graveolens</i>	0,15

Local Name	Species	UV Index
Jahe	<i>Zingiber officinale</i>	0,04
Nangka	<i>Artocarpus heterophyllus</i>	0,03
Timun	<i>Cucumis sativus</i>	0,01
Asam jawa	<i>Tamarindus indica</i>	0,01
Kayu manis	<i>Cinnamomum burmani</i>	0,01
Bawang merah	<i>Alium cepa</i>	0,01
Mengkudu	<i>Morinda citrifolia</i>	0,03
Ketumbar	<i>Coriandrum sativum</i>	0,01
Seri	<i>Muntingia calabura</i>	0,04
Belimbing manis	<i>Averrhoa carambola l</i>	0,03
Wortel	<i>Daucus carota</i>	0,03
Buncis	<i>Phaseolus vulgaris</i>	0,04
Serai	<i>Cymbopogon nardus</i>	0,01
Nanas	<i>Ananas comosus</i>	0,01
Pare	<i>Momordica charantia</i>	0,01
Manggis	<i>Garcinia mangostana</i>	0,01
Gingseng	<i>Panax ginseng</i>	0,01

The UV index calculation showed that *Syzygium polianthum* provide the highest UV index indicating this plant species is the most commonly used by the local inhabitants of Lempuing Jaya in their daily purposes, not only for the management of their health problem, but also for other purposes including daily consumption. The traditional healers and local inhabitants claim that *Syzygium polianthum* can be used for the treatment of several diseases including

uric acid, hypertension, hyper-cholesterol, diabetes mellitus, and stroke.

3.4.2 Fidelity Level (FL)

FL was used to quantify the importance of the plant species for treatment of certain diseases in which the higher the FL of the medicinal plant species, the more trusted the plant species to be used for the treatment of a disease category (Hoffman & Gallaher, 2007).

Table 3: The fidelity level index of medicinal plant species

Disease categories	Local name	Species	FL
Uric acid	Salam	<i>Syzygium polianthum</i>	18,75
	Sirsak	<i>Annona muricata</i>	62,5
	Sirih	<i>Piper betel</i>	6,25
	Bawang putih	<i>Allium sativum</i>	6,25
	Alang-alang	<i>Imperata cylindrica</i>	18,75
	Kumis Kucing	<i>Orthosiphon aristatus</i>	13,5
	Putri malu	<i>Mimosa pudica</i>	6,25
	Sirih cina	<i>Peperomia pellucida</i>	18,75
	Jahe merah	<i>Zingiber officinale</i>	18,75
	Sambiloto	<i>Andrographis paniculata</i>	12,5
	Kelor	<i>Moringa oleifera</i>	12,5
	Binahong	<i>Anredera cordifolia</i>	12,5
	Ciplukan	<i>Physalis angulata</i>	6,25
	Kunyit	<i>Curcuma longa</i>	6,25
	Pinah	<i>Areca catechu</i>	6,25
	Brotowali	<i>Tinospora cordifolia</i>	6,25
Hypertension	Sirsak	<i>Annona muricata</i>	11,76
	Sirih Cina	<i>Peperomia pellucida</i>	23,52
	Tumulawak	<i>Curcuma xanthorrhiza</i>	5,88
	Kumis Kucing	<i>Orthosiphon aristatus</i>	35,29
	Belimbing Wuluh	<i>Averrhoa bilimbi</i>	11,76
	Bawang Putih	<i>Allium sativum linn</i>	5,88

Disease categories	Local name	Species	FL
	Seledri	<i>Apium graveolens</i>	35,29
	Jahe	<i>Zingiber officinale</i>	5,88
	Salam	<i>Syzygium polyanthum</i>	58,82
	Nangka	<i>Artocarpus heterophyllus</i>	11,76
	Sambiloto	<i>Andrographis paniculata</i>	5,88
	Kelor	<i>Moringa oleifera</i>	11,76
	Timun	<i>Cucumis sativus</i>	5,88
	Asam Jawa	<i>Tamarindus indica</i>	5,88
	Kayu Manis	<i>Cinnamomum burmani</i>	5,88
	Alang – alang	<i>Imperata cylindrica</i>	5,88
	Bawang merah	<i>Allium cepa</i>	5,88
Hyper-cholesterol	Seledri	<i>Apium graveolens</i>	7,69
	Mengkudu	<i>Morinda citrifolia</i>	15,38
	Sambiloto	<i>Andrographis paniculata</i>	23
	Kelor	<i>Moringa oleifera</i>	7,69
	Ketumbar	<i>Coriandrum sativum</i>	7,69
	Sirih	<i>Piper betle</i>	7,69
	Seri	<i>Muntingia calabura</i>	15,38
	Belimbing manis	<i>Averrhoa carambola l.</i>	7,69
	Salam	<i>Syzygium polyanthum</i>	15,38
	Bawang Putih	<i>Allium sativum</i>	23
	Wortel	<i>Daucus carota</i>	15,38
	Tumulawak	<i>Curcuma xanthorrhiza</i>	30,76
	Buncis	<i>Phaseolus vulgaris</i>	23
Diabetes mellitus	Sirih Cina	<i>Peperomia pellucida</i>	9
	Seri	<i>Muntingia calabura</i>	9
	Nanas	<i>Ananas comosus</i>	9
	Jahe	<i>Zingiber officinale</i>	18,18
	Kayu Manis	<i>Cinnamomum verum</i>	9
	Pare	<i>Momordica charantia</i>	9
	Salam	<i>Syzygium polyanthum</i>	27,27
	Sirsak	<i>Annona muricata</i>	9
	Manggis	<i>Garcinia mangostana</i>	9
	Sambiloto	<i>Andrographis paniculata</i>	9
Stroke	Gingseng	<i>Panax ginseng</i>	9
	Sirih Cina	<i>Peperomia pellucida</i>	14,28
	Serai	<i>Cymbopogon nardus</i>	14,28
	Kelor	<i>Moringa oleifera</i>	14,28
	Ciplukan	<i>Physalis angulata</i>	14,28
	Sambiloto	<i>Andrographis paniculata</i>	14,28
	Seledri	<i>Apium graveolens</i>	14,28
	Bawang Putih	<i>Allium sativum</i>	14,28

By considering the UV and FL for each disease categories, several medicinal plant species have been pointed out as the priority to be used including uric acid (*Annona muricata*, *Syzygium polyanthum*, *Peperomia pellucida*, *Zingiber officinale*), hypertension (*Syzygium polianthum*, *Orthosiphon aristatus*, *Apium graveolens*), hyper-cholesterol (*Curcuma xanthorrhiza*, *Morinda citrifolia*, *Phaseolus vulgaris*, *Syzygium polyanthum*), diabetes mellitus (*Syzygium polyanthum*, *Zingiber officinale*), and

stroke (*Andrographis paniculate*, *Apium graveolens*, *Moringa oleifera*). Several pictures of selected medicinal plant species are depicted in Figure 3.

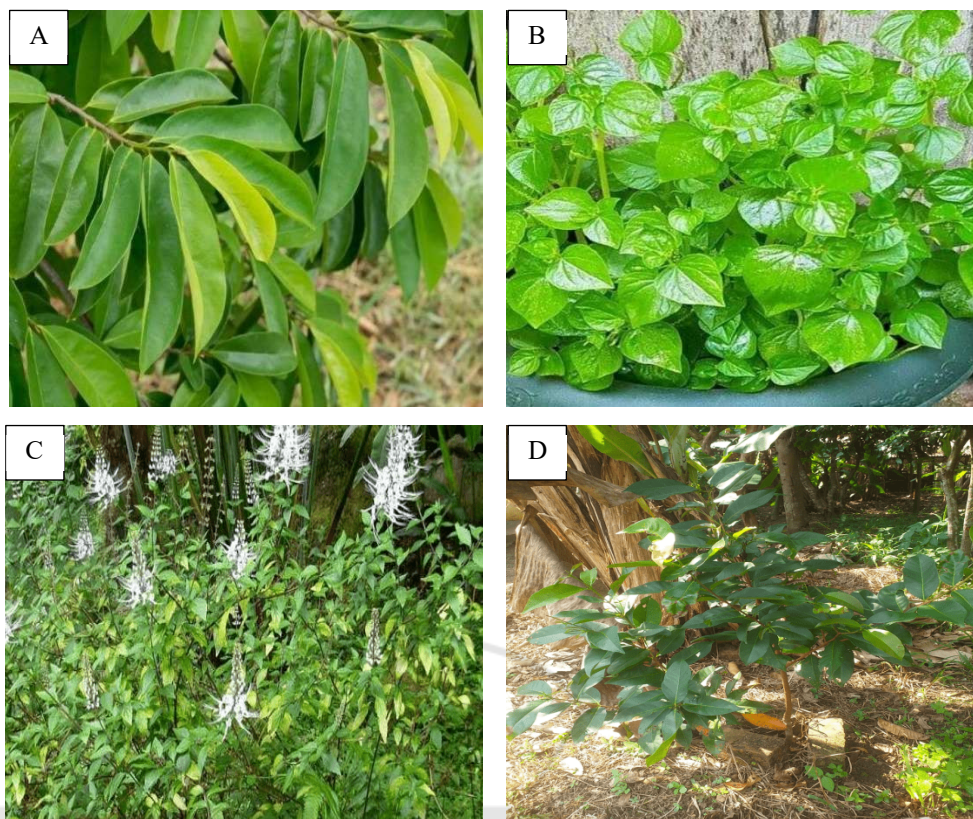


Figure 3: Several selected medicinal plant species. (A) *Annona muricata*, (B) *Peperomia pellucida*, (C) *Orthosiphon aristatus*, and (D) *Syzygium polyanthum*.

4 CONCLUSIONS

A total of 64 medicinal herbs have been successfully documented along with 36 plant species have been identified. This shows Ogan tribes in Lempuing Jaya, Specifically in SP 6 Suka Maju, SP7 Suka Jaya, and Tanjung Sari II have empirically implemented the local knowledge of medicinal herbs for the treatment of several degenerative diseases. The documentation of the local knowledge regarding the traditional medicinal herbs is necessary to be implemented to avoid the loss of the local knowledge. Furthermore, the scientific proof of the use of the traditional herbal medicine should be undertaken.

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