

# Ethno-Medicinal Plants Used for Medication of Jaundice by The Chinese, Dayak, and Malays Ethnic in West Kalimantan, Indonesia

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## ABSTRACT

Knowledge in the utilization of plants as medicine is local wisdom passed down from generation to generation. This study aims to make an inventory of plants that is efficacious in overcoming jaundice which is used by ethnic Chinese, Dayak, and Malay people in West Kalimantan. This research applies ethnobotany and medical ethnobiology approaches by using observation techniques, semi-structural interviews, also recording and documenting plant species to overcome jaundice. There were 23 types of medicinal plants used by ethnic Chinese, Dayak, and Malay people to overcome jaundice. The 23 types of plants obtained were *tebu hitam* (*Saccharum officinarum* L.), *pisang mas* (*Musa paradisiaca* L.), *kacang hijau* (*Vigna radiata* L.), *bawang dayak* (*Eleutherine palmifolia* (L.) Merr.), *temulawak* (*Curcuma xanthorrhiza* Roxb.), *lipan-lipan* (*Chrysopogon aciculatus* (Retz.) Trin), *ciplukan* (*Physalis angulata* L.), *cha chen chou/sawi* (*Plantago mayor* L.), *inai* (*Lawsonia inermis* L.), *kunyit* (*Curcuma domestica* Val.), *kelapa gading* (*Cocos eburne* Durch), *belimbing manis* (*Averrhoa carambola* L.), *ilalang* (*Imperata cylindrica* (L.) Beauv.), *sia li chi o kin/putri malu kuning* (*Neptunia oleracea* Lour.), *ketepeng* (*Senna alata* (L.) Roxb.), *putri malu bunga ungu* (*Mimosa pudica* L.), *stet ma thio kin/bunga kancing* (*Urena lobata* L.), *tebu karak* (*Saccharum officinarum* L.), *kumis kucing* (*Orthosiphon aristatus* (Blume) Miq.), *empedu tanah/sambiloto* (*Andrographis paniculata* (Burm.f.) Wall. Ex Nees), *pegage/pegagan* (*Centella asiatica* L. Urban), *kai kut chou/tulang ayam* (*Clinacanthus nutans* (Burm.f.) Lindau), and *bambu kuning* (*Bambusa vulgaris* Schrad.).

**Key words:** Jaundice, Local Wisdom, Medicinal plants.

## INTRODUCTION

The liver is a vital organ located in the anterior abdomen. The liver has an important role in secreting bile salts, storing glycogen, synthesizing phospholipids, and detoxifying.<sup>1-6</sup> As an organ that plays a role in detoxification, the liver often comes into contact with various substances or compounds that can damage the liver, that is why the liver needs to be protected to avoid damage so that it can carry out its function properly. Treating liver damage is less effective if it is done by consuming synthetic drugs, it may even cause side effects if used in the long term, besides the use of synthetic drugs is expensive.<sup>7</sup>

In general, there are four markers of liver disease, which are seen from the general description of a damaged liver, the effect of liver disease on bile formation, impaired liver function, and the occurrence of liver cirrhosis. Furthermore, it is stated that a disturbance in the formation of bile can cause retention of the bilirubin pigment which results in the appearance of yellow color on the skin and eyeballs known as jaundice.<sup>8,9</sup> A hepatoprotector is a substance that functions to protect the liver from damage while restoring damage to the liver.<sup>1-6,10</sup> Previous research results showed that various plants that have the property to maintain liver function, including *Hibiscus sabdariffa*<sup>11</sup>, *Eurycoma longifolia* Jack.<sup>1</sup>, and *Pithecellobium lobatum* Benth.<sup>3</sup>

The availability of various types of plants provides various benefits for humans, one of which is as a medicinal ingredient. Indonesia has a very high biodiversity, so it is dubbed mega biodiversity. The available biodiversity is utilized to meet the needs of the community, especially for food and medicine. The use of plants as medicine has been carried out by people in Indonesia since ancient times, where this knowledge has been obtained from generation to generation. Usually, people make use of the plants that grow around their homes.<sup>12</sup> There are many benefits of plants in medicine, including as an appetite enhancer<sup>12</sup>, improving body fitness<sup>13</sup>, hepatoprotector<sup>1,3</sup>, and antidiabetic mellitus.<sup>14</sup>

As in Indonesia<sup>12</sup>, many other countries in the world also use plants in medicine, including Malaysia<sup>15-17</sup>, the Philippines<sup>18,19</sup>, Thailand, China<sup>20</sup>, Korea<sup>21</sup>, Iran<sup>4</sup>, and India.<sup>2,5,22</sup> Overall, it is stated that medicinal plants generally have lower side effects when compared to synthetic drugs.<sup>7,23,24</sup>

West Kalimantan is one of the provinces in Indonesia, which is located on Kalimantan Island. The area of West Kalimantan, which is mostly low lying land, is around 146,807 km<sup>2</sup>. West Kalimantan consists of 12 districts namely Kubu Raya, Kayong Utara, Ketapang, Mempawah, Landak, Sanggau, Sekadau, Sintang, Melawi, Kapuas Hulu, Bengkayang, and Sambas, as well as two cities namely Pontianak City and Singkawang City. The West Kalimantan region is inhabited by various ethnicities, based on data from the West Kalimantan Central Statistics Agency, the

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ethnic groups that dominate West Kalimantan are Dayaks, Malays, and Chinese. Each of these ethnic communities has local wisdom in utilizing plants obtained from hereditary heritage. The use of plants is not only needed to meet food needs but is also needed in various traditional ceremonies, as a food ingredient, and in medicine. This is what underlies the purpose of this research, namely to make an inventory of various types of plants that are efficacious to protect the liver, especially in overcoming jaundice which is used by the ethnic Chinese, Dayak, and Malay people in West Kalimantan.

## MATERIALS AND METHODS

### Research sites

The research location was chosen randomly from 14 districts/cities in West Kalimantan. Five districts/cities that were selected as research locations are Singkawang City, Bengkayang Regency, Sambas Regency, Sanggau Regency, and Sekadau Regency. The five districts/cities that were selected have the distribution of domicile of ethnic Chinese, Dayak, and Malay people. The research location points are presented in Figure 1.

### Research procedure

The method in this study is a qualitative analysis method using the ethnobotany approach and medical ethnobiology, namely the study of traditional medicinal plants used by the community.<sup>25</sup> Data collection techniques by applying observation techniques, semi-structural interviews, also recording and documentation plant species to overcome jaundice. For sampling using a purposive sampling technique. The sample referred to is informants from ethnic Chinese, Dayak, and Malay who understand traditional medicinal plants and have experience in using plants as medicine. Thirteen informants were selected and they played a role in traditional medicine.

## RESULTS AND DISCUSSION

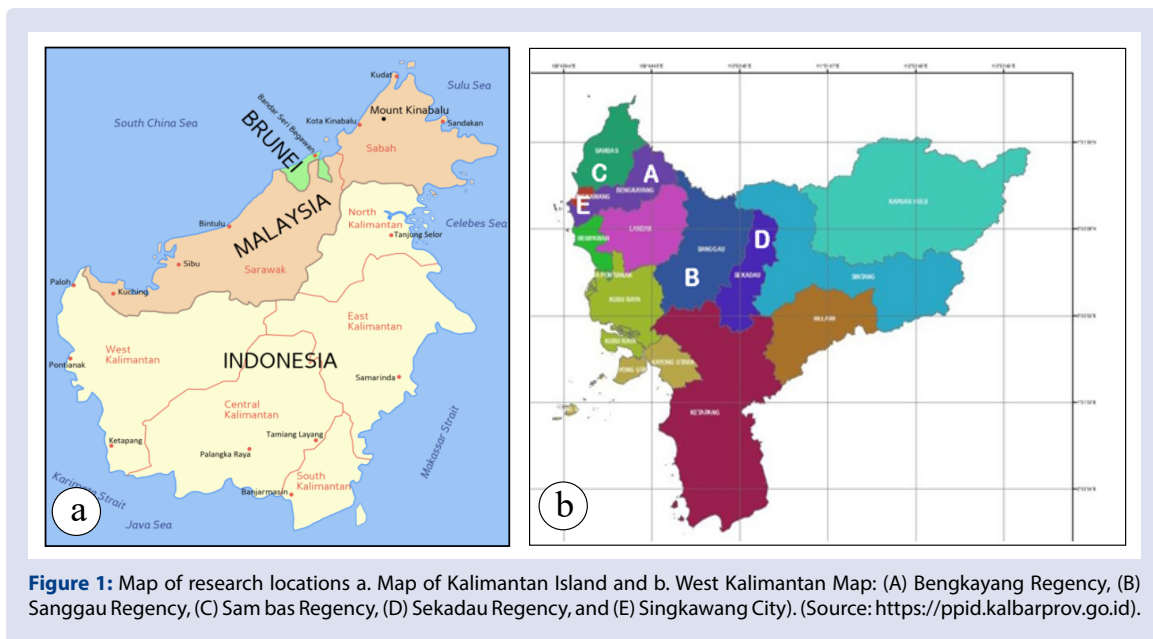
Jaundice is a disease related to the liver. One of the marker aspects of liver disease is the disruption of bile formation which results in

retention of the bilirubin pigment resulting in hyperbilirubinemia with symptoms of jaundice.<sup>8,9</sup> Based on the results of this study, 23 types of plants were used to treat jaundice. Of the 23 types, plant organs used include roots, stems, leaves, seeds, a flesh of Cocos, and tubers. However, the most commonly used plant organs are the roots (Table 1.). Furthermore, it is known that plants have the power to overcome jaundice, which is the local wisdom of the community in five districts/cities in this study which usually grows wild in the forest, but some have been cultivated in the yard, garden, or special land for medicinal plants. Regarding the knowledge about plants that can overcome jaundice, all informants said that the knowledge about the various types of plants and how to cultivate them was obtained from their ancestors and passed down from generation to generation. Besides, from the literature study, it is also known that the various types of plants used by the community have other properties, more than that, the potential and content of their chemical compounds have also been laboratory tested.

From this research, two varieties of sugarcane (*Saccharum officinarum* L.) were obtained, namely *tebu hitam* and *tebu karak*. Several previous researchers reported that *Saccharum officinarum* L. has medicinal properties including antibacterial<sup>26</sup> and anti-cancer.<sup>27</sup> Phytochemical test results show that *Saccharum officinarum* L. contains alkaloid compounds<sup>28</sup>, tannins<sup>26,28</sup>, saponins<sup>26</sup>, flavonoids<sup>26</sup>, also reducing sugars and anthracene glycosides<sup>26</sup>, carbohydrates<sup>26,28</sup>, protein<sup>28</sup>, and resin.<sup>28</sup>

Studies that have been carried out on the *Musa paradisiaca* L plant, among others, show that banana flowers are reported to have anti-cancer properties<sup>29</sup> and banana leaves can be used to treat wounds.<sup>30</sup> The various research results summarized show that this plant has been shown to have acted as a hepatoprotector, diuretic, analgesic, antiulcer, wound healing, antioxidant, allergy, antibacterial, antihypertensive, and hypoglycemic.<sup>31</sup> Moreover, banana peels are reported to contain alkaloid compounds, flavonoids, saponins, polyphenols, quinones, steroids, quinones, and triterpenoids.<sup>32</sup>

*Vigna radiata* L. is reported to have potential as antibacterial<sup>33</sup> and antioxidants.<sup>33,34</sup> The results of phytochemical testing showed that *Vigna radiata* L. seed extract contains flavonoid compounds<sup>33,34</sup>, as well





**Figure 2:** Various types of plants that can overcome jaundice used by ethnic Chinese, Dayaks, and Malays in West Kalimantan: 1. Tebu hitam (*Saccharum officinarum* L.), 2. Pisang mas (*Musa paradisiaca* L.), 3. Kacang hijau (*Vigna radiata* L.), 4. Bawang dayak (*Eleutherine palmifolia* (L.) Merr.), 5. Temulawak (*Curcuma xanthorrhiza* Roxb.), 6. Lipan-lipan (*Chrysopogon aciculatus* (Retz.) Trin), 7. Ciplukan (*Physalis angulata* L.), 8. Cha chen chou/ sawi (*Plantago mayor* L.), 9. Inai (*Lawsonia inermis* L.), 10. Kunyit (*Curcuma domestica* Val.), 11. Kelapa gading (*Cocos oburen* Durch), 12. Belimbing manis (*Averrhoa Carambola* L.), 13. Ilalang (*Imperata cylindrica* (L) Beauv.), 14. Sia li chi o kin/putri malu kuning (*Neptunia oleracea* Lour.), 15. Ketepeng (*Senna alata* (L.) Roxb.), 16. Putri malu bunga ungu (*Mimosa pudica* L.), 17. Stet ma thio kin/bunga kancing (*Urena lobata* L.), 18. Tebu karak (*Saccharum officinarum* L.), 19. Kumis kucing (*Orthosiphon aristatus* (Blume) Miq.), 20. Empedu tanah/sambiloto (*Andrographis paniculata* (Burm.f.) Wall. ex Nees), 21. Pegage/pegagan (*Centella asiatica* L. Urban), 22. Kai kut chou/tulang ayam (*Clinacanthus nutans* (Burm.f.) Lindau), and 23. Bambu kuning (*Bambusa vulgaris* Schrad.).

**Table 1: Types of plants used to overcome jaundice by ethnic Chinese, Dayak, and Malay communities in West Kalimantan.**

| No  | Local Name                                  | Scientific Name  | Plant Organs Used    | Regency/City |
|-----|---|--|----------------------|--------------|
| 1.  | <i>Tebu hitam</i>                           | <i>Saccharum officinarum</i> L.                        | Stem                 | C            |
| 2.  | <i>Pisang mas</i>                           | <i>Musa paradisiaca</i> L.                             | Fruit                | E            |
| 3.  | <i>Kacang hijau</i>                         | <i>Vigna radiata</i> L.                                | Seed                 | E            |
| 4.  | <i>Bawang dayak</i>                         | <i>Eleutherine palmifolia</i> (L.) Merr.               | Tuber                | A, E         |
| 5.  | <i>Temulawak</i>                            | <i>Curcuma xanthorrhiza</i> Roxb.                      | Rhizome              | A, B, E      |
| 6.  | <i>Lipan-lipan</i>                          | <i>Chrysopogon aciculatus</i> (Retz.) Trin             | Stem and Leaf        | A            |
| 7.  | <i>Ciplukan</i>                             | <i>Physalis angulata</i> L.                            | Root and Stem        | E            |
| 8.  | <i>Cha chen chou (sawi)</i>                 | <i>Plantago major</i> L.                               | Root, Stem, and Leaf | E            |
| 9.  | <i>Inai</i>                                 | <i>Lawsonia inermis</i> L.                             | Leaf                 | C            |
| 10. | <i>Kunyit</i>                               | <i>Curcuma domestica</i> Val.                          | Rhizome              | C            |
| 11. | <i>Kelapa gading</i>                        | <i>Cocos eburne</i> Durch                              | a Flesh of Cocos     | E            |
| 12. | <i>Belimbing manis</i>                      | <i>Averrhoa carambola</i> L.                           | Root                 | A            |
| 13. | <i>Ilalang</i>                              | <i>Imperata cylindrica</i> (L.) Beauv.                 | Root                 | E            |
| 14. | <i>Sia li chi o kin (putri malu kuning)</i> | <i>Neptunia oleracea</i> Lour.                         | Root                 | E            |
| 15. | <i>Ketepeng</i>                             | <i>Senna alata</i> (L.) Roxb.                          | Root                 | D            |
| 16. | <i>Putri malu bunga ungu</i>                | <i>Mimosa pudica</i> L.                                | Root                 | B, E         |
| 17. | <i>Stet ma thio kin (bunga kancing)</i>     | <i>Urena lobata</i> L.                                 | All parts of plant   | E            |
| 18. | <i>Tebu karak</i>                           | <i>Saccharum officinarum</i> L.                        | Stem                 | E            |
| 19. | <i>Kumis kucing</i>                         | <i>Orthosiphon aristatus</i> (Blume) Miq.              | Root and Leaf        | E            |
| 20. | <i>Empedu tanah (sambiloto)</i>             | <i>Andrographis paniculata</i> (Burm.f.) Wall. Ex Nees | Root                 | C            |
| 21. | <i>Pegage (pegagan)</i>                     | <i>Centella asiatica</i> L. Urban                      | Leaf                 | C            |
| 22. | <i>Kai kut chou (tulang ayam)</i>           | <i>Clinacanthus nutans</i> (Burm.f.) Lindau            | Leaf and Stem        | C            |
| 23. | <i>Bambu kuning</i>                         | <i>Bambusa vulgaris</i> Schrad.                        | Root                 | A, E         |

Notes: (A) Bengkayang Regency, (B) Sanggau Regency, (C) Sambas Regency, (D) Sekadau Regency, and (E) Singkawang City

as alkaloids, steroids, terpenoids, amino acids, polyphenols, glycosides, and protein.<sup>33</sup>

*Bawang dayak* (*Eleutherine palmifolia* (L.) Merr) are reported to be effective in treating skin diseases caused by *Staphylococcus aureus* and *Trichophyton rubrum*<sup>35</sup>, inhibiting the growth of HeLa cells<sup>36</sup>, and anti-cholesterol.<sup>37</sup> Besides, this plant is reported to contain phenolic compounds<sup>38</sup>, flavonoids<sup>35,39</sup>, alkaloids, steroids, monoterpenoids, sesquiterpenoids, quinones, and tannins.<sup>35</sup>

*Temulawak* (*Curcuma xanthorrhiza* Roxb.) has reported various medicinal properties including anticancer, antioxidant, hepatoprotective, and nephroprotective<sup>40</sup>, anti-hypercholesterolemic<sup>41</sup>, and a child's appetite enhancer.<sup>12</sup> *Temulawak* rhizome is reported to contain flavonoid compounds<sup>12,42</sup>, saponins and tannins<sup>42</sup>, alkaloids, phenols, terpenoids, and glycosides.<sup>12</sup>

*Ciplukan* (*Physalis angulata* L.) has potential as anti-diarrhea<sup>43</sup>, anti-hypercholesterolemia<sup>44</sup>, anti-inflammatory<sup>45</sup>, immunomodulator<sup>46</sup>, antioxidants.<sup>46,47</sup> The results of phytochemical tests showed that the *ciplukan* stem extract contains alkaloid, phenolic, flavonoid, terpenoid, and saponin compounds<sup>44</sup>, the fruit contains alkaloids, phenolics, flavonoids, and saponins<sup>44</sup>, while the *ciplukan* leaves contain a class of flavonoid compounds.<sup>47</sup>

*Kunyit* (*Curcuma domestica* Val.) is very familiar among people in Indonesia, especially this rhizome is often used as a spice in cooking and herbal/traditional ingredients. More than that, research results show that *kunyit* is useful as an appetite enhancer for children<sup>12</sup>, antioxidants and antimicrobial<sup>48</sup>, and anti-hepatitis C.<sup>49</sup> The rhizome of *Curcuma domestica* Val. is reported to contain the alkaloid, flavonoid, phenol, terpenoid, and glycoside compound groups.<sup>12</sup>

*Empedu tanah/sambiloto* (*Andrographis paniculata* (Burm.f.) Wall. Ex Nees) has the potential as antidiabetic<sup>50</sup>, anti-cancer<sup>51</sup>, antibacterial<sup>52</sup>, immunomodulators<sup>53</sup>, antioxidants and antimicrobial<sup>54</sup>, hepatoprotective<sup>55</sup>, and overcoming heart disease.<sup>56</sup> *Sambiloto* leaves and roots are reported to contain classes of tannins, flavonoids, saponins, phenols, and glycosides.<sup>54</sup>

For the Chinese ethnic community in West Kalimantan, traditionally, *kai kut chou* or *tulang ayam* (*Clinacanthus nutans* (Burm.f.) Lindau) has many benefits, including to treat bruises, lumbago, jaundice, antidiabetic, and kidney failure. From various studies, it is reported that this plant has potential as antimicrobial, antiproliferative, cytotoxic, antitumorogenic, anti-inflammatory, antimicrobial, and immunomodulator.<sup>57</sup> Previously, Alam et al.<sup>58</sup> reported that the *Clicanthus nutans* (Burm.f.) Lindau contains flavonoids, glycosides, glycolipids, cerebrosides, and monoacylmonogalatosylglycerol compounds.

*Bambu kuning* (*Bambusa vulgaris* Schrad.) or by the Dayak community in Bengkayang Regency, West Kalimantan, Indonesia is known as *buluh bala*. Fitri et al.<sup>59</sup> stated that the *bambu kuning* extract contains compounds that have the potential as an analgesic, antipyretic, antidiabetic, anti-inflammatory, antimicrobial, antioxidant, antiviral, hepatoprotective, and diuretic. Previously it was also proven that *bambu kuning* shoots have hepatoprotector activity and contain flavonoids and tannins.<sup>60</sup>

*Pegagan* (*Centella asiatica* L. Urban) or by the Malay community in West Kalimantan is called *pegage*. The results of the study prove that this plant has the potential to be cytotoxic against MCF-7 cells<sup>61</sup>, anti-tumor<sup>62</sup>, antimalarial,<sup>63</sup> and antidiabetic<sup>64</sup>. The methanol extract of this plant is reported contains alkaloids<sup>65</sup>, flavonoids and saponins<sup>65,66</sup>, steroids, tannins, and terpenoids<sup>66</sup>, also glycosides and phenols<sup>65</sup>.

Several previous studies have reported that scientifically *Averrhoa carambola* L. has potential in medicine, including anti-inflammatory and anti-tumor properties<sup>67</sup>, antioxidants<sup>68</sup>, antimicrobial<sup>67</sup>. The root of this plant is also proven to have antidiabetic activity.<sup>69</sup> Not only that, but the fruit of this plant also contains substances that act as anti-hypercholesterolemia and antioxidants.<sup>70</sup> The ethanol extract of *belimbing manis* fruit is reported to contain flavonoids, phenols, saponins, terpenoids, and cardia glycosides.<sup>71</sup> *Belimbing manis* fruit is also reported to contain nutrients such as potassium, calcium, magnesium, iron, phosphorus, carotene, vitamin B1, vitamin B2, and vitamin C, as well as oxalic acid.<sup>72</sup>

*Ketepeng* leaves (*Senna alata* (L.) Roxb.) are reported to have antimicrobial properties<sup>73</sup> and antidiabetic<sup>74</sup>. Besides, the leaves and roots of *Senna alata* L. are also proven to be antioxidants.<sup>75</sup> *Ketepeng* leaf extract is reported to contain tannin, anthraquinone, and saponin compounds<sup>73,75,76</sup>, alkaloids, glycosides, steroids, and terpenoids<sup>75</sup>, phenols<sup>73,75</sup>, flavonoids<sup>75,76</sup>.

*Ilalang* (*Imperata cylindrica* (L.) Beauv.) has potential as an anticancer.<sup>77</sup> Not only that, but *ilalang* can also treat fever and jaundice<sup>78</sup>, antihypertensives<sup>79</sup>, and anti-inflammatory<sup>41</sup>.

*Plantago major* L. or by the Chinese in West Kalimantan is known as *cha chen chou* or *sawi*. From various studies, it is reported that this plant has various activities including antimicrobial, hepatoprotective, antidiabetic, anti-cancer, anti-diarrhea, immunomodulatory, antioxidant<sup>80</sup>, and antimicrobial<sup>80,81</sup>. Phytochemical test results of *Plantago major* L. leaf extract showed the presence of carbohydrates, flavonoids, tannins, and alkaloids<sup>82</sup>.

*Mimosa pudica* L. is reported to have acted as antidiabetic and anti-hyperlipidemia<sup>83</sup>, as well as anti-hepatitis B<sup>84</sup>. Besides, this plant is also reported to have various potentials, including antimicrobial, anti-inflammatory, hepatoprotective, and antioxidant<sup>85</sup>. Mohan et al. (2015)<sup>86</sup> stated that the ethanol extract of *Mimosa pudica* L. leaves contains compounds of the terpenoids, flavonoids, glycosides, alkaloids, phenols, tannins, quinines, saponins, and coumarins. The ethanol extract of *Mimosa pudica* L. root is reported to contain flavonoids, tannins, and steroids.<sup>87</sup>

The results of previous studies showed that the leaves of *Orthosiphon aristatus* (Blume) Miq. has antimicrobial activity<sup>88</sup>, anti-cancer<sup>89</sup>, antioxidants<sup>6,89</sup>, and hepatoprotective<sup>90</sup>. Elya et al. (2015)<sup>91</sup> stated that the leaf extract contains the alkaloid, flavonoid, glycoside, steroid, terpenoid, and saponin compound.

The ethnic Chinese community in Singkawang Regency, West Kalimantan, Indonesia calls it *sia li chi o kin* or *putri malu bunga kuning* (*Neptunia oleracea* Lour. is synonymous with *Neptunia prostrata* (Lamk) Baillon). The results of previous research indicated that this plant has antioxidant and antimicrobial properties.<sup>92</sup> This plant has also been shown to have antibacterial activity<sup>93</sup> and antioxidants<sup>93,94</sup>. The various solvents used in the extraction process show that this plant extract contains a class of steroid and terpenoid compounds.<sup>95</sup>

## CONCLUSION

There are 23 types of plants that can overcome jaundice which are used by ethnic Chinese, Dayak, and Malay people in West Kalimantan, namely *tebu hitam* (*Saccharum officinarum* L.), *pisang mas* (*Musa paradisiacal* L.), *kacang hijau* (*Vigna radiata* L.), *bawang dayak* (*Eleutherine palmifolia* (L.) Merr.), *temulawak* (*Curcuma xanthorrhiza* Roxb.), *lipan-lipan* (*Chrysopogon aciculatus* (Retz.) Trin), *ciplukan* (*Physalis angulata* L.), *cha chen chousawi* (*Plantago mayor* L.), *inai* (*Lawsonia inermis* L), *kunyit* (*Curcuma domestica* Val.), *kelapa gading* (*Cocos eburneum* Durck), *belimbing manis* (*Averrhoa carambola* L.), *ilalang* (*Imperata cylindrica* (L) Beauv.), *sia li chi o kin/putri malu kuning* (*Neptunia oleracea* Lour.), *ketepeng* (*Senna alata* L.), *putri malu bunga ungu* (*Mimosa pudica* L.), *stet ma thio kin/bunga kancing* (*Urena lobata* L.), *tebu karak*, *kumis kucing* (*Orthosiphon aristatus* (Blume) Miq.), *empedu tanah/sambiloto* (*Andrographis paniculata* (Burm.f.) Wall. ex Nees), *pegage/pegagan* (*Centella asiatica* L. Urban), *kai kut choul/tulang ayam* (*Clinacanthus nutans* (Burm.f.) Lindau), and *bambu kuning* (*Bambusa vulgaris* Schrad.)

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## CONFLICTS OF INTEREST

Researchers state that this research is free from conflict of interest.

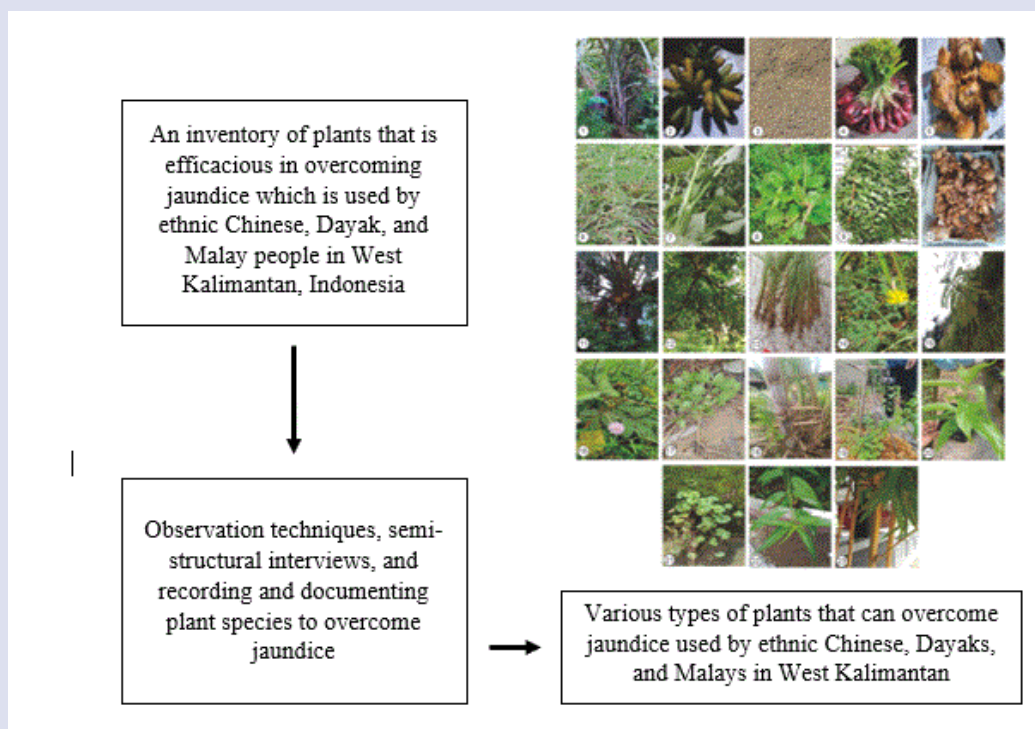
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## GRAPHICAL ABSTRACT



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