Women, Peatland and Wellness: Knowledge on nutrients and bioactive compounds empowering the community wellness

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Presented at Women and Peatland Development side event of ASEAN COSTI-80, UPM, NICT and JASTIP, Virtual Symposium. October 14, 2021
Role of Foods

Nutrients supply

Health maintaining

Sensory satiety-flavor contribution

Fat

Carbohydrates

Protein

Water

Vitamin & Mineral
The lifestyle of modern society has changed.

Requiring different types of foods to support society’s health

Something more than just nutritious and delicious
Japan with its FoSHU is the pioneer of “Modern functional foods”

1980-1990
National Research Focus on foods which showed physiologically active capacity including their bioactive compounds

1991
FoSHU has been launched (food for specified health use)

2020
9 Categories of FoSHU
Foods..
1. to modify gastrointestinal conditions
2. related to blood cholesterol level
3. related to blood sugar levels
4. related to blood pressure
5. related to dental hygiene
6. Cholesterol plus gastrointestinal conditions, triacylglycerol plus cholesterol
7. related to mineral absorption
8. related to osteogenesis
9. related to triacylglycerol

Processed functional foods are very well developed in Japan
Functional food

The European Commission’s Concerted Action on Functional Food Science in Europe (FuFoSE), coordinated by International Life Science Institute (ILSI) Europe defined functional food as follows:

“a food product can only be considered functional if together with the basic nutritional impact it has beneficial effects on one or more functions of the human organism thus either improving the general and physical conditions or/and decreasing the risk of the evolution of diseases. The amount of intake and form of the functional food should be as it is normally expected for dietary purposes. Therefore, it could not be in the form of pill or capsule just as normal food form” (Diplock et al., 1999).
Asian Culture: Women are taking care of family food intakes

Strategic role in enhancing the community health condition

Women play a fundamental role in their children’s food supply, nutrition education for women is significant for their children’s diet and health, with consideration of the food nutrition, taste, and sanitation while making food (FAO, 2013; Guansheng Ma, 2015)
Central Kalimantan is one of the regions in Indonesia with a high diversity of vegetation, and local peoples utilize some young wild ferns as edible natural vegetables.

The Dayak people in Central Kalimantan, traditionally consumed local vegetable, either collected from the wild or traditionally cultivated.
### Plants and Availability

#### Identification of Traditional Vegetables

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Family</th>
<th>Vernacular Name</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calamus sp.</td>
<td>Arecaceae</td>
<td>Pucuk Rotan</td>
<td>Shoots</td>
</tr>
<tr>
<td>Cnesnove javanica Blume</td>
<td>Euphorbiaceae</td>
<td>Lampinak</td>
<td>Leaves</td>
</tr>
<tr>
<td>Colocasia esculenta (L.) Schott</td>
<td>Arecaceae</td>
<td>Sulfur keladi</td>
<td>Young shoots</td>
</tr>
<tr>
<td>Diplozium esculentum (Retz). SW.</td>
<td>Athyriun</td>
<td>Bajey</td>
<td>Leaves</td>
</tr>
<tr>
<td>Etingeria elatia (Jack) R. M. Smith</td>
<td>Zingiberaceae</td>
<td>Potok (Red and Green Kultivar)</td>
<td>Young shoots</td>
</tr>
<tr>
<td>Gymnopetalum cochinense Kurz</td>
<td>Cucurbitaceae</td>
<td>Kanjat</td>
<td>Fruit</td>
</tr>
<tr>
<td>Lotus ji</td>
<td></td>
<td>Pucuk teratai</td>
<td>Young shoots</td>
</tr>
<tr>
<td>Manihot esculenta Crantz</td>
<td>Euphorbiaceae</td>
<td>Daun singkong</td>
<td>Leaves</td>
</tr>
<tr>
<td>Momordica charantia L.</td>
<td>Cucurbitaceae</td>
<td>Daun paria</td>
<td>Leaves</td>
</tr>
<tr>
<td>Nauclea sp.</td>
<td>Rubiaceae</td>
<td>Daun taya</td>
<td>Leaves</td>
</tr>
<tr>
<td>Neptunia oleracea Lour</td>
<td>Mimosaceae</td>
<td>Malu-malu (uru mahamen)</td>
<td>Leaves</td>
</tr>
<tr>
<td>Passiflora foetida L.</td>
<td>Passifloraceae</td>
<td>Kemot</td>
<td>The whole plant</td>
</tr>
<tr>
<td>Solanum torvum Swartz.</td>
<td>Solanaceae</td>
<td>Segau</td>
<td>Fruit</td>
</tr>
<tr>
<td>Spondias pinnata (L. f.) Kurtz</td>
<td>Anacardiaceae</td>
<td>Daun kedondong</td>
<td>Leaves</td>
</tr>
<tr>
<td>Stenochlaena palustris (Burm.) Bedd.</td>
<td>Pteridaceae</td>
<td>Kalakai (red and white cultivar)</td>
<td>Leaves</td>
</tr>
<tr>
<td>Vigna unguiculata (L.) Wap.</td>
<td>Papilionaceae</td>
<td>Daun talak</td>
<td>Leaves</td>
</tr>
</tbody>
</table>

Not identified

Daisy Irawan et al, 2006
- Found 19 traditional Dayak vegetables
- Most of the traditional vegetables are wild plants
- Some of these vegetables might function as auxiliary plants as well
Dayak people usually stir-fry the vegetables, or make them into a clear soup or a light coconut-milk soup (juhu)
Many of the traditional vegetables are believed to reduce the fattiness of pork or the fishy odor of fish. These are lampinak, pucuk rotan, (cooked with pork or fatty fish heads such as baung fish, patin fish and jelawat fish), taya, potok, kanjat, and bajey.
### Proximate analysis of Dayak traditional vegetables

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Moisture</th>
<th>Ash</th>
<th>Fat</th>
<th>Protein</th>
<th>Crude fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bajejy</td>
<td>90.84</td>
<td>1.38</td>
<td>0.04</td>
<td>2.23</td>
<td>4.82</td>
</tr>
<tr>
<td>Green Potok</td>
<td>91.85</td>
<td>1.21</td>
<td>0.19</td>
<td>0.80</td>
<td>4.51</td>
</tr>
<tr>
<td>Kanjat</td>
<td>91.39</td>
<td>0.90</td>
<td>0.15</td>
<td>0.77</td>
<td>3.81</td>
</tr>
<tr>
<td>Lampinak</td>
<td>81.47</td>
<td>1.65</td>
<td>1.28</td>
<td>2.72</td>
<td>4.30</td>
</tr>
<tr>
<td>Malu-malu</td>
<td>78.22</td>
<td>1.81</td>
<td>0.39</td>
<td>2.69</td>
<td>3.50</td>
</tr>
<tr>
<td><em>Malu-malu</em> Paiseoksantivatana (1994) in Siemonsma and Pilseuk (ed.)</td>
<td>89.40</td>
<td>1.20</td>
<td>0.40</td>
<td>6.40</td>
<td></td>
</tr>
<tr>
<td>Paria Leaves</td>
<td>84.38</td>
<td>2.38</td>
<td>0.29</td>
<td>3.26</td>
<td>3.21</td>
</tr>
<tr>
<td><em>Paria leaves Reyes et al. (1994) in Siemonsma and Pilseuk (ed)</em></td>
<td>82.86</td>
<td>2.30</td>
<td>0.10</td>
<td>2.30</td>
<td>0.80</td>
</tr>
<tr>
<td>Pucuk rotan</td>
<td>89.96</td>
<td>1.52</td>
<td>0.50</td>
<td>2.29</td>
<td>7.93</td>
</tr>
<tr>
<td>Pucuk teratai</td>
<td>94.37</td>
<td>0.72</td>
<td>0.05</td>
<td>0.92</td>
<td>1.54</td>
</tr>
<tr>
<td>Red Kalakai</td>
<td>89.08</td>
<td>1.19</td>
<td>0.11</td>
<td>2.36</td>
<td>4.44</td>
</tr>
<tr>
<td>Red Potok</td>
<td>93.67</td>
<td>1.29</td>
<td>0.13</td>
<td>0.56</td>
<td>4.52</td>
</tr>
<tr>
<td>Senggau</td>
<td>83.83</td>
<td>1.03</td>
<td>0.25</td>
<td>2.83</td>
<td>4.79</td>
</tr>
<tr>
<td><em>Senggau Boonkerd et al., (1994) in Siemonsma and Pilseuk (ed.)</em></td>
<td>89</td>
<td>0.1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur Keladi</td>
<td>93.54</td>
<td>0.90</td>
<td>0.05</td>
<td>1.44</td>
<td>3.52</td>
</tr>
<tr>
<td>Taya leaves</td>
<td>66.98</td>
<td>1.31</td>
<td>0.17</td>
<td>2.71</td>
<td>4.32</td>
</tr>
</tbody>
</table>

Note: unit in g/100 g wb

Daisy Irawan et al, 2006
Many of the Dayak traditional vegetables are good sources of iron. Sulur keladi (49.25 ppm), bajey (44.6 ppm), and kalakai (41.53 ppm) have high amounts of Fe, Cu (4 ppm), protein (1.44%) and vitamin C (15.34 ppm). The vegetable might be suitable for overcoming iron deficiency anaemia in Indonesia.

Another potential vegetable is red kalakai. It has a high amount of Fe, Cu (4.52 ppm), vitamin C (15.41 mg/100g) (Figure 3) and protein (2.36%).
Folic acid in some of the Dayak traditional vegetable

- Sulur keladi has a high amount of folic acid (15.99 ppm). The level is even higher than spinach, which has 0.8 ppm of folic acid (Belitz and Grosch, 1999)

- In Indonesia, inborn malformation is quite prevalent especially among the low-income society

Daisy Irawan et al, 2006
Further Study by Daisy Irawan et al, (2016); Rahmawati Della et al, (2017):

Cultivating taro or sulur keladi (*Colocasia esculenta*) as a staple food would bring several benefits, i.e., beside the tuber, the leaves and flowers could also be consumed as vegetables with good nutritional qualities.

Kanjat, pucuk teratai, and potok do not have any outstanding nutrient qualities. However, they may have beneficial activities. Kanjat, as well as other cucurbitaceae, may have several bioactivities. As a water clearing plant, teratai may have significant amount of minerals.
Nutritional characteristics of leafy vegetables from peatlands and volcanic soils

Palangkaraya (Peatlands)

- Histosol (woody peat soils) in Palangkaraya is rich in organic matters while poor in minerals (Fe, Cu and Zn)

- The edible ferns would be regarded as relatively a safe and good source of Fe for the people in the peatland

Bogor (Volcanic soils)

- Soil type of Bogor area are generally immature volcanic ash soil and red soil, both of which are rich in Fe and Al

Rahmawati Della et al, 2017
Etnobotonical study and nutritive potency of local traditional vegetables in Central Kalimantan

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Abstract. The Dayak people in Central Kalimantan, traditionally consumed local vegetable, either collected from the wild or voluntarily cultivated. Unfortunately, many of the traditional vegetable are approaching extinction, even in their local market. This research is intended to conserve the traditional vegetable by collecting nutritional data and cultural information about the vegetable.

Eleven traditional Dayak vegetables were observed in local markets and in wild areas. Taxonomic identification revealed that the vegetables were Pissandala lobata A. L. (kemeli), Diplocladus clevelandii (Bats.), SW (batik form), Spodoptera pinata (LL) Kuros (krebong kebun), Pychnogastra olaceae Lou (mala-mala leaves), Manihot esculenta Crantz (kanuma leaves), Vigna unguiculata (LL) Wul. (talak leaves), Ellingera eratia (Jack) R.H. Smith (potato shoots, red and green gourds), Calamo sp. (taro leaves), Nunchus sp. (Tars leaves), Monodora chuaniana L. (gariha) and had 16.6 and 6.3 g of acidic acid respectively. The β-carotene content in basil was 74.04 ppm while tava was 77.41 ppm.

Key words: Central Kalimantan, Dayak, nutritional value, traditional vegetables.

Conserving the world’s biodiversity is very important to support sustainable living. Each plant has already developed its own environmental preferences and resistance to pests and diseases, and each plays an important role in supporting the lives of other organisms. If one were to become extinct, the environmental balance, and perhaps the balance of nature, would be disturbed.

Unfortunately, due to improper modernization and globalization, the extinction of the world’s biodiversity is proceeding both physically and culturally in many areas of the world. The Nature Conservancy Council (1984) in Danell (1984) reported that between 1941 and 1984, 95% of the world’s forests had been destroyed.

Physico-Chemical Properties, Sensory Characteristics and Glycemic Index of Tidal Peat Swamp Rice Grown in South Kalimantan

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Rice is a staple food to most Indonesians.

Concentration of Some Trace Elements in Two Wild Edible Ferns, Dipsaciocaulon and Stonochlaena palustris, Inhibiting Tropical Peatlands under Different Environments in Central Kalimantan

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Abstract. Young leaves of two wild ferns (Dipsaciocaulon and Stonochlaena palustris) are uniquely among local peoples in Central Kalimantan. These edible ferns are among important sources of Fe and other trace elements essential for human body. In order to investigate the effect of soil environments on the metal content, we analyzed eight samples of fern from the different sites (streams of Sukabumi River near lake lake, forest area in Talangai, forest near Keroana, and two peat sites at campus of The University of Padang and residential area in Pusnirangan city) in Central Kalimantan with distinguishable soil conditions. At the site sampling locations, we also collected an alburnum accumulation that these municipalities altogether as a reference plant. The underlying part of S. palustris and D. esculentum accumulated higher concentration of Al and Fe than their leaf parts, whereas Mn accumulation was rich in Al and Fe in the leaves rather than the roots. Although Fe contents in the adult parts of S. palustris (3.1–6.9 mg g−1 dry weight of young leaves) and D. esculentum (9.9–15.4 mg g−1 dry weight from the samples collected in the riverine and the forest area were not as high. Al contents in their adult parts (1.0–6.9 and 7.3–11.7 mg g−1 dry weight, respectively) were not conclusive. Other trace elements, including Mn, Mo, and Cu in the leaves to be concerned. Thus, utilizing young leaves and shoots of the ferns as wild vegetables seemed to lower chromium deficiency of trace elements recovery for human nutrition, without any excessive intake of Al and other toxic metals, urban polluted or other areas. We further found relatively high Cu-accessible crops in this study.

Key words: ferns, tropical peatland, wild vegetable, heavy metals contents, iron and mineral supply.
Challenges

How to preserve the local wisdom and proof the local knowledge scientifically?

A lot of indigenous potential vegetative are still untouchable – need urgent assessment before vanishing

How to compromise the healthiness of local traditional diets into a modern life style?
Conclusions

The recent role of food intakes, particularly as functional foods, has a big impact on community wellness.

The previous limited study showed that some vegetative in peatland have great potential to overcome nutritional insufficiency.

Some plants were not only nutritionally but also physiologically outstanding. Furthermore, they might support sustainable environment development.

The nutrient and bioactivity potency should be the subject of further investigation since proper knowledge might avoid miss-utilization.
Future Perspectives

• Mapping the on-site potential food nutrients and bioactive ingredients sources

• Potential plants assessment and conducting a SWOT analysis

• Further study on the potential sources by women researchers to develop women-friendly practical guidance

• Implementation of the study findings in the Sustainable Bio-village concept and monitoring the compatibility with the field condition might directly impact community wellness.

• How to use ICT to save the valuable local ingredients and the local wisdom from vanishing?
Women’s Potency
Let's begin........

hand in hand with the male researchers

Gambarimasho
Kokoro kara kansha itashimasu. "Thank you"