PNG Traditional Knowledge System and Science Advice: PNG Perspective

Purpose: Information
Submitted by: Papua New Guinea
PNG Traditional Knowledge System and Science Advice: PNG Perspective

Teatulohi Matainaho
Chairman/ CEO and Chief Science Advisor
PNG Science and Technology Council/ Secretariat

Traditional (Indigenous) Knowledge System

“Traditional Knowledge System (TKS) is the basis upon which many indigenous communities survive on. Indigenous people value their unique knowledge systems, their languages, their agriculture, folklore, arts, medicinal knowledge, and their philosophies of life as important systems of knowledge”

Steven Winduo (2009)
• In Papua New Guinea, like many Pacific Islands societies, indigenous knowledge systems continue to remain the strength of survival, for many groups of people living within their tribal boundaries in the islands, in the valleys, in the mountains, or along rivers.

• Indigenous knowledge may not necessarily be in its original form, but transformed in a form that has incorporated aspects of the introduced knowledge together with the inherited knowledge.
PNG Traditional Medical Knowledge

- Documentation of herbs used in traditional medicine in PNG including traditional medical practices
- A systematic survey conducted throughout the country over 16 years
- Leading to establishment of Traditional Medicine Database

PNG Traditional Medicine Database

- A national repository of medicinal plants usage in PNG.
- Established in 2000 as a joint initiative between National Department of Health and University of Papua New Guinea
PNG Traditional Medicine Database

- To serve as repository of indigenous knowledge in traditional medicine.
- To identify safe and effective traditional medicine practices and promote their usage in the community.
- To select promising herbs and traditional medicines for scientific research

Traditional Medicine Database

- Total entries: 4200 + (up to 2013)
- Plants: 1000
- Families: 203
- Practitioners: 850
Five most common conditions treated by herbal medicine

- Respiratory disorders (#130 traditional preparations)
- Gastrointestinal conditions (#298 traditional preparations)
- Sores, cuts and wounds (#160 traditional preparations)
- Skin infections (85 traditional preparations)
- Body aches, pain and fever (#102 traditional preparations)
## Traditional Herbs grouped in different therapeutic categories according to their uses

- Pain, fever & inflammatory conditions (#133)
- Respiratory conditions (#89)
- Injuries and sores (#144)
- Gastrointestinal problems (#88)
- Genitourinary problems (#67)
- Anaemia, thrush, and eye infections (#48)
- Skin conditions (#95)
- Women & maternal health (#65)
- Malaria & other vector-borne infections (#37)
- Bites & stings (#44)
- Lifestyle-related diseases (#18)
- Psychological and cosmetic problems (#12)

*Note: Many herbs are used for more than one condition*

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**PNG Medicinal Plants and HIV**
- Papua New Guinea (PNG) has an established HIV epidemic.
- In PNG the infected population now is predominately rural, where access to Western medicines is limited.
- PNG also has a rich tradition of medicinal plant use, a practice endorsed by government programs that catalog, validate and promote such use.
- **Traditional healers in PNG are treating patients with HIV and AIDS symptoms, and herbal preparations are being promoted specifically for this use.**
- Concern over the possible consequences of herbal use by people living with HIV prompted the current assessment of medicinal plants commonly used in PNG.

### Plants used in treatment of HIV/AIDS-related conditions  (22 plants)

<table>
<thead>
<tr>
<th>Plant spp.</th>
<th>Family</th>
<th>Uses/Plant parts used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kleinhovia hospita</td>
<td>Sterculiaceae</td>
<td>Painful joints, productive cough, yellowing of eyes; leaves decoction</td>
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<tr>
<td>Hibiscus rosa-sinensis</td>
<td>Malvaceae</td>
<td>Hypothermia, shivering, alopecia; leaves decoction</td>
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<tr>
<td>Rhododendron spp.</td>
<td>Ericaceae</td>
<td>Chills, shivering</td>
</tr>
<tr>
<td>Ficus rhizophylloides</td>
<td>Moraceae</td>
<td>All HIV/AIDS symptoms; leaves decoction</td>
</tr>
<tr>
<td>Justica gendarusa</td>
<td>Pyrosiaceae</td>
<td>HIV, flu, fungal skin infections; bark and leaves decoction</td>
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<tr>
<td>Derris trifoliata</td>
<td>Fabaceae</td>
<td>Fever, shivering, etc.; root</td>
</tr>
<tr>
<td>Colocasia macrorhiza</td>
<td>Araceae</td>
<td>Joint pains, fever, malarial symptoms; leaves decoction</td>
</tr>
</tbody>
</table>
Plants used in treatment of HIV/AIDS-related conditions

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<thead>
<tr>
<th>Plant spp.</th>
<th>Family</th>
<th>Uses/Plant parts used</th>
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</thead>
<tbody>
<tr>
<td><em>Calendula officinalis</em></td>
<td>Compositae</td>
<td>Weight loss in HIV patients; fresh petals or dried leaves eaten</td>
</tr>
<tr>
<td><em>Dictamus albus</em></td>
<td>Orchidaceae</td>
<td>All HIV/AIDS conditions; roots and leaves smashed and boiled in water</td>
</tr>
<tr>
<td><em>Polyporandra scandens</em></td>
<td>Lacinaceae</td>
<td>HIV/AIDS, TB, gonorrhoea; decoction prepared with wild ginger known as ‘golgol’</td>
</tr>
<tr>
<td><em>Exocaria agallocha</em></td>
<td>Euphorbiaceae</td>
<td>Sores, ulcers; leaves and stem sap</td>
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<tr>
<td><em>Angiopteris evecta</em></td>
<td>Marattiaceae</td>
<td>Fern leaves used to treat cough</td>
</tr>
</tbody>
</table>

Plants used in treatment of HIV/AIDS related conditions

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<tr>
<th>Plant spp.</th>
<th>Family</th>
<th>Uses</th>
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<tbody>
<tr>
<td><em>Morinda citrifolia</em></td>
<td>Rubiaceae</td>
<td>HIV/AIDS symptoms; seeds decoction</td>
</tr>
<tr>
<td><em>Albizia carrii</em></td>
<td>Moringaceae</td>
<td>Supplement in HIV/AIDS; young leaves</td>
</tr>
<tr>
<td><em>Clerodendron lindawianum</em></td>
<td>Verbanaceae</td>
<td>HIV/AIDS symptoms; decoction prepared from young leaves taken with salt</td>
</tr>
<tr>
<td><em>Carica papaya</em></td>
<td>Caricaceae</td>
<td>HIV/AIDS symptoms; digestive disorders, seeds eaten; fruit pulp used to treat sores</td>
</tr>
<tr>
<td><em>Ageratum conyzoides</em></td>
<td>Asteraceae</td>
<td>Diarrhoea, dysentery (leaf decoction); fresh leaves juice poured on the sores</td>
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</tbody>
</table>
Plants used in treatment of HIV/AIDS-related conditions

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<th>Family</th>
<th>Uses</th>
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<tr>
<td>Cymbopogan citratus</td>
<td>Poaceae</td>
<td>Cough</td>
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<tr>
<td>Metroxylum sagu</td>
<td>Arecaceae</td>
<td>Sores</td>
</tr>
<tr>
<td>Cycas circinalis</td>
<td>Cycadaceae</td>
<td>Sores, cuts, wounds, ulcers</td>
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<tr>
<td>Plectranthus scutellariodes</td>
<td>Lamiaceae</td>
<td>Sores, cuts, bruises; leaves smashed and placed on the sores</td>
</tr>
<tr>
<td>Acalypha wilkensiana</td>
<td>Euphorbiaceae</td>
<td>Young leaves squeezed in water, and solution drunk</td>
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</tbody>
</table>

HIV/AIDS and Medicinal Plants

**Preparation/Administration**: Oral drink prepared from the aqueous extract of a mixture of leaves from the three plants.
**Ageratum conyzoides**

(for diarrhoea and dysentery; used in form of decoction)

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**Dictamus albus**

Used to alleviate several conditions in PLHIV

Parts used: roots, rhizome and leaves boiled together, cooled and solution drunk
Plants used in treatment of fever in PLHIV

*Cordyline terminalis*  
*Pedilanthus tithymaloides*

Plants used in treatment of fever in PLHIV

*Pisonia* spp.
Anti- HIV/AIDS plants
(boosts immunity?)
*Carica papaya*
seeds cooked and eaten or
Seeds boiled in water and solution drunk

*Ipomoea pes-caprae*
a known anti-inflammatory plant

Beach vine
Some commonly used medicinal plants in PNG have dramatic activity in models of **drug interaction, HIV suppression** and/or in models of **activation of latent HIV**

**Medicinal Plants Tested for Ability to:**

1) inhibit HIV production  
2) induce latent HIV  
3) kill T cells

Medicinal plants identified by querying the Traditional Medicines Database
100 Most Commonly Used Medicinal Plants in PNG With Anti-HIV Activity that Induce Latent HIV (those in red)

<table>
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<tr>
<th>No.</th>
<th>Plant Name</th>
<th>Scientific Name</th>
<th>Active Anti-HIV Plants</th>
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<tr>
<td>1</td>
<td>Premna obtusifolia</td>
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<td>Solanum torvum</td>
<td>Solanum torvum</td>
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<td>3</td>
<td>Manihot esculenta</td>
<td>Manihot esculenta</td>
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<td>4</td>
<td>Acalypha wilkesiana</td>
<td>Acalypha wilkesiana</td>
<td>Psidium guajava</td>
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<tr>
<td>5</td>
<td>Cassia alata</td>
<td>Cassia alata</td>
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<td>6</td>
<td>Ficus copiosa</td>
<td>Ficus copiosa</td>
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<td>7</td>
<td>Eleusine indica</td>
<td>Eleusine indica</td>
<td>Ficus copiosa</td>
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<td>8</td>
<td>Syzygium malaccense</td>
<td>Syzygium malaccense</td>
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<td>9</td>
<td>Syzygium myrtifolium</td>
<td>Syzygium myrtifolium</td>
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<td>10</td>
<td>Ficus adensperma</td>
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<td>11</td>
<td>Curcuma longa</td>
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<td>Psidium guajava</td>
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<td>Solanum torvum</td>
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</table>
Common Names of Very Toxic Plants

- **Alstonia scholaris** (dita-bark tree, devil’s tree in English; sipuel in Manus Island; herina in Hisiu, Central Province; budo in Darubia, Normanby Island and Rigo, Central Province; kambu in Kanganaman, Sepik; watsil in Kokopo, East New Britain; puto in Alotau, Milne Bay.

- **Psidium guajava** (guava in English and Pidgin; tuava in Central Province; kuava in Rigo, Central Province; koava in Buka, Bougainville)

- **Ficus septica** (mamanu in Malasang, Buka, North Solomons Province; gipilapala in Kriwina Island, Milne Bay; bahuerueru in Vanapa, Central Province; anda in Mundala, Morobe; matabahi in Tawala, Milne Bay)

- **Mikania micrantha** (mile-a-minute, chinese creeper, bitter vine in English; gepakuri in Kabiufa, Eastern Highlands; vaikana in Todura, Central Province; matapa in Siwai, Bougainville)

Other Herbal Activity

1. **Lichens of Milne Bay**
   - *Parmotrema saccatibulum* (Taylor) Hale (Fam: Parmeliaceae)
   - *Pyxine cocoes* (Swartz) Nyl.
   - 2 atranorin compounds isolated and identified

2. **Alstonia scholaris**
   - antinflammatory and antipyretic properties.

3. **Evodia Elleryna**
   - ant-TB activity
Standardization of Herbal Medicines & Cosmetics

- Extraction of an analgesic/anti-inflammatory lichen preparation with hexanes atranorin and chloroatranorin as suitable marker compounds that accounted for >90% of the extract (NMR and HRMS)
- Atranorin has been shown to block lipid peroxidation while exhibiting little cytotoxicity and have COX 1 inhibitory activity at high concentrations
- Based on the published findings, Ms. Bate empirically adjusted the strength of her preparations to improve efficacy and reformulated her products using more cosmetically attractive ingredients including coconut oil
- Ms. Bate won first place at a new entrepreneur fair and has used data to support her marketing, she now distributes her product to outlets in Japan


Alstonia scholaris
Anti TB plant: *Evodia (Melicope) elleryana*

- Used traditionally in Kurti region of Manus Island
- Locally called Sehit
- Water extract of bark used for cough and fever
- Anti-TB activity documented activity


Thanks E. Powan

PNG NATIONAL POLICY ON TRADITIONAL MEDICINE

- Traditional Medicine Programme was included in the National Health Plan since 2001
- Policy approved in 2007
- The policy aims to incorporate traditional medicine in the primary health care system.
Traditional Medicine Policy

- Traditional medical knowledge has been largely oral, and one of the early tasks was to undertake a systematic and comprehensive documentation of medicinal plants used in traditional medicine practiced in communities across the nation.
- This work has lead to establishment of traditional medicine database, with detailed account of over 4500 traditional preparations from approximately 850 plant species.
- The database is first of its kind in the South Pacific Region

Medicinal Plants in Papua New Guinea

WHO Commissioned work (compiled and written by Prem P Rai and others)

Published in 2009