

## Ethnomedical knowledge of plants and healthcare practices among the *Kalanguya* tribe in Tinoc, Ifugao, Luzon, Philippines

Teodora D Balangcod<sup>1\*</sup> & Ashlyn Kim D Balangcod<sup>2</sup>

<sup>1</sup>Department of Biology, College of Science, University of the Philippines Baguio; <sup>2</sup>Department of Mathematics and Computer Science, College of Science, University of the Philippines Baguio  
E-mails: balangcod@yahoo.com, tdbalangcod@yahoo.com

Received 17.11.2009; revised 09.04.2010

Tinoc, Ifugao is located within the Cordillera Central Range, Northern Luzon, Philippines. It is inhabited by the *Kalanguya*, one of the indigenous societies in the Cordillera, who have a long tradition of using medicinal plants. The paper describes ethnomedicinal importance of 125 plant species, and healthcare practices as cited by 150 informers ranging between 16-90 yrs. Various ailments that are treated by the identified medicinal plants vary from common diseases such as headache, stomachache, toothache, cough and colds, and skin diseases to more serious ailments which includes urinary tract infection, dysentery, and chicken pox. There are different modes of preparation of these medicinal plants. For instance, immediate treatment for cuts was demonstrated by using crushed leaves of *Eupatorium adenophorum* L. An increased efficacy was noted by creating mixtures from combining certain plants. The medicinal plants are summarized by giving their scientific name, family, vernacular name and utilization.

**Keywords:** Ethnomedicine, *Kalanguya*, Medicinal plants, Traditional medicine, Philippines

**IPC Int. Cl.<sup>8</sup>:** A61K36/00, A61P1/10, A61P1/16, A61P9/14, A61P11/00, A61P13/00, A61P17/00, A61P19/00, A61P29/00, A61P31/02, A61P39/02

The relationship between man and plants is extremely important because plants affect every aspect of man's existence by providing a continuous and infinite source of varying materials such as food, timber, fibers, dyes, tools, and many others. In recent years, work on ethnobotanical knowledge worldwide has increased especially in some parts of Europe, Asia, and Africa<sup>1-7</sup>. India, a country with a rich culture and traditional knowledge, had contributed a major share of the world's ethnobotanical work<sup>8-13</sup>. Reverse pharmacology or experimental pharmacology and drug discovery traces its roots in India<sup>14</sup>. In the Philippines, ethnobotanical documents are relatively few, with some focusing on well known indigenous groups including the Pinatubo *Negratoes* and their use of plant resources; the *Tasadays* in Mindanao, who have been the subject of various studies; the *Itawes* of Cagayan and the *Ibaloi* of Benguet province and their utilization of forest resources<sup>15-21</sup>. Among the *Ifugao* society, of which the *Kalanguya* is a subtribe and the focus of the study, plants have long been used as

source of medicine to treat different ailments. The *Ifugaos* are well known for their magnificent and intricately patterned handmade rice terraces as well as exhibit a remarkably high degree of cultural and environmental interdependence<sup>22</sup>. The term *Ifugao* refers to both the people and the province that they occupy. The *Kalanguya* are the least known subtribes of the *Ifugaos* because of the scarcity of written materials about these people<sup>23</sup>. The study was accomplished to document the indigenous knowledge of medicinal plants and healthcare practices among the *Kalanguya* in Tinoc, Ifugao and provide insights on some possible threats to their traditional knowledge.

### Methodology

Tinoc, Ifugao, the site of the study, is one of the municipalities of Ifugao Province. It is located 16°41'N latitude and 120°79'E longitude with a total land area of 33,384 ha. Tinoc has 12 barangays namely Ahin, Ap-apid, Binablayan, Danggo, Eheb, Gumhang, Impugong, Luhong, Poblacion, Tukukan, Tulludan and Wangwang (Fig. 1). It is nestled among

\*Corresponding author

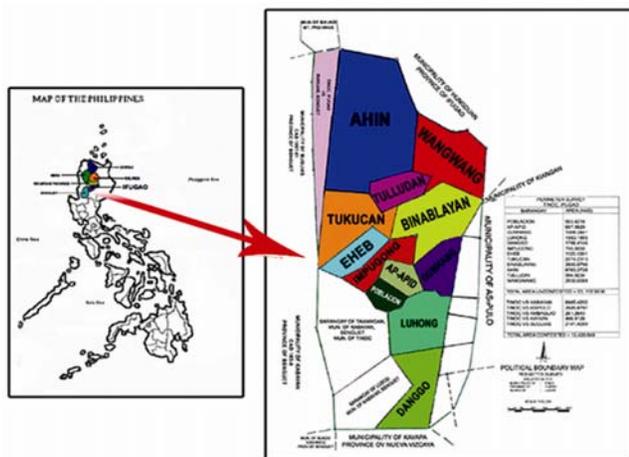


Fig. 1 – Location map of Tinoc, Ifugao and the 12 barangays

towering mountains, rugged hills and dense forests (Fig. 2). The highest mountain in Ifugao, Munhuyuhuy or Munsuyusuy, with an elevation of 2,523 m is found in here. It is inhabited by the *Kalanguyas*, one of the subtribes in Ifugao. Geographic isolation contributed greatly to the evolution of the *Kalanguya's* unique culture. There are no access roads in most of the barangays thus one can only reach the remote places by foot trails (Figs 3 & 4).

Preceding the conduct of the study, a prior informed consent was sought through several consultations with the community. Information regarding ethnobotanical knowledge among the *Kalanguya* was gathered through extensive survey (2002-2007), focused group discussions, and semi-structured interviews<sup>24-25</sup>. The information gathered through interviews was consolidated by field observations. A total of 150 individuals (16-90 yrs) were interviewed including the elderly and *mabakis* (local priests), who were identified with the assistance of local administrators and community leaders. Several visits were conducted again to gather additional information and validation. Field visits involved direct contact with the community and again including some of their *mabakis*, or local priests. Ethnobotanical surveys to the forest were accomplished with the help of some of the informers. At some occasions, plant samples were collected and brought to the communities for identification, local names and the ethnomedicinal uses. Herbarium replicates were deposited at the Northern Luzon

University Herbarium (NLUH) and the student herbarium at the Institute of Biological Sciences, University of the Philippines Los Baños.

## Results and discussion

Indigenous knowledge refers to the cumulative and complex bodies of knowledge know-how, practices and representations that are maintained and developed by local communities, who have long histories of interaction with the natural environment<sup>26</sup>. The use of plants for traditional medicine is established in all indigenous societies in the world. In the Philippines, the knowledge is intrinsic among indigenous groups and is inherited from their great ancestors by oral communication. In the study, the relationship between the *Kalanguya* and plants are demonstrated. A total of 125 medicinal species distributed to 106 genera and 67 families were cited in Tinoc to treat various kinds of diseases and ailments (Table 1). Based on the responses and personal observation, the common health problems are respiratory diseases and stomach ailments. As access to modern healthcare is limited, majority of the *Kalanguya* still resort to traditional healthcare practices although some use both traditional and modern medicine.

The common ailments in most *Kalanguya* villages that are treated using the medicinal plants are headache, stomachache (due to diarrhoea or pinworms), toothache, urinary tract infection, sore eyes, measles or chicken pox, skin diseases (such as scabies), common colds, cough and mouth sores. For immediate treatment of cuts and wounds, crushed leaves of mulah (*Eupatorium adenophorum*), and *lagpaw* (*Tithonia diversifolia*) are used. Relative to other local tribes in the Cordillera, plant mixtures were noted to be more effective. For example, the *Ibalois* of Tabaan Norte observed that a mixture of decocted leaves of *pandan* (*Pandanus amaryllifolius*) and *bangbangsit* (*Lantana camara*) is a more effective cure for cough. Similarly, in Tinoc, the efficacy of medicinal plants in the treatment of common colds is enhanced by boiling a mixture of the leaves of *Hibiscus rosa-sinensis*, *Citrus limon* and *Persea americana*. Comparatively, there are common plants that are used by various indigenous groups in the Philippines for the treatment of certain diseases. The *Tasaday* of Mindanaos, the *Itawes* of Cagayan and *Ibalois* of Tabaan Norte use *Psidium guajava* and *Eucalyptus* sp as disinfectant for wounds and other skin diseases. Various tribal societies in the

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Acorus calamus</i> L. Araceae <i>Bangaw, bangao</i>	Tea prepared from infusion of dried stem relieves headache. Part of the stem is pinned on baby's clothes to drive away evil spirits.
<i>Allium odoratum</i> L. Alliaceae <i>Danggon hapon</i>	Crushed leaves are applied as poultice on blisters caused by measles and chickenpox. It also heals hematoma and sprains.
<i>Allium sativum</i> L. Alliaceae Bawang	Bulbs were eaten raw to lower hypertension.
<i>Alstonia scholaris</i> (L.) R.Br. Apocynaceae Pallay	Decoction of the stem is given during diarrhoea.
<i>Amaranthus spinosus</i> L. Amaranthaceae	Decoction of the young stem can cure asthma, anaemia and dysentery.
<i>Allayen, alliyen, caleyyen, kulitis</i>	
<i>Ananas comosus</i> (L.) Merr. Bromeliaceae <i>Pinya</i>	Fresh fruits help eliminate pinworms.
<i>Areca catechu</i> Linn. Arecaceae <i>Buwa</i>	Fruits when chewed and kept in mouth strengthen teeth. Fruit juice can expel parasitic worm in the stomach.
<i>Artemisia vulgaris</i> L. Asteraceae Herbaka	Decoction of the leaves is given during cough. It can also cure scabies when used as a wash.
<i>Artocarpus communis</i> J.R. & G. Forst. Moraceae Pakak, dalakan	Decoction of the bark is given during diarrhoea.
<i>Artocarpus integrifolia</i> L. Moraceae <i>Langka</i>	Fruits are eaten during diarrhoea.
<i>Aster philippinensis</i> S. Moore Asteraceae	Crushed leaves are applied as poultice on chickenpox, scabies.
<i>Astilbe rivularis</i> Buch-Ham. Saxifragaceae <i>Kawan, cawad</i>	Decoction of the leaves or roots is given during diarrhoea.
<i>Bidens pilosa</i> L. Asteraceae <i>Anwad, pullet</i>	Cooked young shoots are edible; cure goiter. Juice of leaves when mixed with <i>Buddleia asiatica</i> is more effective on bleeding gums.
<i>Bidens pilosa</i> L.var. <i>minor</i> (Blume)Sherff Asteraceae <i>Anwad, pullet</i>	Cooked young shoots when eaten can cure goiter. Crushed leaves are applied on wounds to abate bleeding.
<i>Blumea balsamifera</i> (L.) DC. Asteraceae <i>Subusub</i>	Decoction of leaves is given during cough.
<i>Brugmansia suaveolens</i> Brecht et Presi. Solanaceae <i>Trumpet flower</i>	Infusion of leaves is given during cough and asthmatic attack. Crushed leaves are applied as poultice on wounds.
<i>Buddleia asiatica</i> L. Loganiaceae <i>Hah-li-do</i>	Crushed leaves are applied on wounds to abate bleeding.
<i>Canna indica</i> L. Cannaceae <i>Awing, aweng</i>	Decoction of roots is given during jaundice and hepatitis.
<i>Cannabis sativa</i> L. Cannabaceae <i>Marijuana</i>	Decoction of young shoots is used as wash to disinfect wounds.

Contd

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Capsicum frutescens</i> L. Solanaceae <i>Hili, sili</i>	Crushed fruit is used as poultice or rubbed on scabies.
<i>Carex nodiflora</i> Boeck Cyperaceae Talnag, telneg	Decoction of leaves is given to cure urinary tract infection and loose bowel movement. Chewing leaves can strengthen teeth.
<i>Carica papaya</i> L. Caricaceae <i>Papaya</i>	Crushed leaves are rubbed on body parts with rheumatism.
<i>Centella asiatica</i> (L.) Urban Apiaceae Kannapa, canapa	Decoction of stems and leaves taken orally relieves cough. Crushed leaves and stems are applied on burns.
<i>Chenopodium ambrosioides</i> L. Chenopodiaceae <i>Bibbinget, babanget</i>	Decoction of leaves is used to disinfect scabies.
<i>Cibotium cumingii</i> Kuntze. Cyatheaceae <i>Alam-am, anam-am</i>	Decoction of roots can be given during diarrhoea.
<i>Cissus adnata</i> Roxb. Vitaceae <i>Iyap, eyap, eyep</i>	Leaf extract is given as mouth wash to treat mouth sores.
Citrus limon (L.) Burm. f. Rutaceae Dalayap	Decoction of leaves is given during cough and colds, usually taken in the morning and evening.
Citrus microcarpa Bunge Rutaceae Calamansi	Infusion of leaves is given during headache and hypertension.
<i>Conyza canadensis</i> (L.) Cronq. var. <i>pusilla</i> (Nutt.) Cronq. Asteraceae Bubodo	Crushed leaves are applied on wounds.
<i>Cordyline fruticosa</i> (L.) A. Cheval. Agavaceae Dangla, dongla	Decoction of roots, leaves and flowers induces abortion.
<i>Crypsinus taeniatus</i> (Sw.) Copel. Polypodiaceae Talabing, sarsarapa	Decoction of all plant parts is given during dysentery.
<i>Cymbopogon citratus</i> (DC.) Stapf. Poaceae <i>Binoy</i>	Decoction of roots and leaves is given during cough and urinary tract infection.
<i>Cyphomandra betacea</i> (Cav.) Sendtn. Solanaceae <i>Dulsi</i>	Fruits are eaten during hypertension.
<i>Cyrtandra umbellifera</i> Merr. Gesneriaceae <i>Daucus carota</i> L. ssp. <i>sativus</i> (Hoffm) Arcang.	Crushed leaves are applied on wounds.
Apiaceae <i>Carrot</i>	Decoction of leaves is given to children with difficulty in urinating.
<i>Derris elliptica</i> (Wallich) Benth. Fabaceae <i>Upey</i>	Crushed leaves are applied on scabies.
<i>Derris scandens</i> (Roxb.) Benth. Fabaceae <i>Upey</i>	Crushed leaves are applied on scabies.
<i>Desmodium sequax</i> Wall. Fabaceae <i>Pulat, pullet</i>	Crushed leaves are applied on wounds.

*Contd*

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Desmodium sandwicense</i> E. Mey. Fabaceae <i>Pulet</i>	Crushed leaves are applied on wounds.
<i>Deutzia</i> sp Saxifragaceae Annatil	Crushed leaves, when mixed with <i>Miscanthus floridulus</i> . leaves, has higher efficacy when applied on wounds.
<i>Dianella javanica</i> (Blume) Kunth. Liliaceae Hapillaw	Fruit extracts are applied on cracked soles to relieve pain.
<i>Dolichos lablab</i> L. Fabaceae <i>Abal</i>	Crushed leaves are heated over flame and applied on mumps. It can also be applied on wounds to abate bleeding.
<i>Drimys piperata</i> Hook.f. Winteraceae <i>Hapal</i>	Decoction of leaves is given during cough, dysentery, and stomachache. It also relieves muscle pain when taken internally.
<i>Drymaria cordata</i> (L.) Willd. ex J.A. Schultes Caryophyllaceae Hithit	Fresh leaves are applied on boils.
<i>Elephantopus tomentosus</i> L. Asteraceae <i>Babaka, pawikan, balbalako</i>	Crushed leaves are applied on wounds to abate bleeding.
<i>Equisetum ramosissimum</i> Desf. Equisetaceae <i>Putputod</i>	Decoction of stem and leaves is taken during urinary tract infection. Crushed leaves are applied on gums to relieve toothache.
<i>Eucalyptus deglupta</i> Blume Myrtaceae Luhong	Decoction of leaves is given during cough; used as wash for wounds and scabies for faster healing.
<i>Eucalyptus terreticornis</i> Sm. Myrtaceae Kaliptus, caliptus, eukaliptus	Decoction is used as wash for wounds and scabies for faster healing.
<i>Eupatorium adenophorum</i> L. Asteraceae <i>Mulah, lahting, haldin</i>	Crushed leaves are applied on cuts to abate bleeding.
<i>Euphorbia hirta</i> L. Euphorbiaceae <i>Gatah-gatah</i>	Extract from leaves are applied on sore eyes. Leaves are burnt and smoke is inhaled to get relief from asthma.
<i>Ficus benguetensis</i> Merr. Moraceae <i>Piwi</i>	Fruits are roasted and rubbed on warts to remove it.
<i>Ficus caulocarpa</i> Miq. Moraceae Bihu-lac	Decoction of leaves is given during cough.
<i>Ficus nuda</i> Miq. Moraceae <i>Balete, balliti</i>	Plant decoction taken orally, can relieve muscle pain and stomachache; used as wash for wounds to disinfect. Decoction as a hot compress can heal hematoma.
<i>Gleichenia</i> sp Gleicheniaceae <i>Bagingay</i>	Decoction of roots is given during diarrhoea.
<i>Gleichenia longissima</i> Blume Gleicheniaceae Bagingey	Decoction of roots is given during diarrhoea.
<i>Gonostegia hirta</i> (Bl.) Miq. Urticaceae <i>Nangel, nangel, layuley</i>	Crushed leaves are applied on wounds.
<i>Hibiscus rosa-sinensis</i> L. Malvaceae Gumamela	Decoction of leaves along with leaves of citrus and avocado cures cold. Crushed leaves are applied on measles and boils.

*Contd*

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Histiopteris incisa</i> (Thunb.) J. Sw. Dennstaedtiaceae <i>Bagingey</i>	Crushed leaves are applied on burns.
<i>Hypolepis</i> sp Dennstaedtiaceae <i>Bagingay, laglagti</i>	Crushed leaves are applied on burns.
<i>Ilex crenata</i> Thunb. Aquifoliaceae <i>Pahpahtak</i>	Decoction of leaves is given during dysentery.
<i>Imperata cylindrica</i> (L.) Beauv. Poaceae <i>Golon, gulun</i>	Decoction of roots is given during urinary tract infection. It induces normal urination.
<i>Iresine herbstii</i> Hook. ex Lindl. Amaranthaceae Dara-dara	Decoction of leaves is given during fever. Extract from leaves is applied on sore eyes.
<i>Jatropha curcas</i> L. Euphorbiaceae <i>Tagumbaw, tangan</i>	Crushed leaves are applied on snakebites. Crushed stems is heated, mixed with oil and massaged on muscles to relieve pain. It is also applied on hematoma for faster healing.
<i>Kadsura philippinensis</i> Elm. Magnoliaceae Bittokaan	Decoction of leaves is given during difficulty in urination.
<i>Kalanchoe pinnata</i> (Lam.) Pers. Crassulaceae Katakataka	Crushed leaves are applied on sore eyes; rubbed on whole body during fever; relieve itchy skin from insect bites.
<i>Lagerstroemia speciosa</i> (L.) Pers. Lythraceae <i>Ganaba</i>	Decoction of stem and leaves is used as wash for scabies.
<i>Lantana camara</i> L. Verbenaceae Lantana	Decoction of leaves is given during cough.
<i>Lonicera hypoglauca</i> Miguel Caprifoliaceae <i>Baltik vine</i>	Decoction of leaves is given during stomachache and urinary tract infection.
<i>Loranthus philippinensis</i> Cham. & Schlecht Loranthaceae <i>Pukot, talaktak</i>	Decoction of stem and leaves is given to an intoxicated person as it has a sobering effect. It is used as wash or antiseptic on fungal infection.
<i>Ludwigia octovalvis</i> (Jacq.) P.H. Raven Onagraceae <i>Hi-hili</i>	Extract from leaves is applied on chickenpox.
<i>Lycopersicum esculentum</i> Mill. var. <i>cerasiforme</i> Alef. Solanaceae <i>Kamate</i>	Fruits are given during diarrhoea. Crushed fruits are wrapped with cloth and pressed; juice is wiped on all parts of a dead body to preserve it. This was used for mummification.
<i>Lygodium japonicum</i> (Thunb. ex Murr.) Swartz Schizaceae <i>Lilitit</i>	Decoction of leaves is given during rheumatic attacks and relieves muscle pain.
<i>Maesa denticulata</i> Mez. Myrsinaceae Bilaw	Leaf decoction is given during headache; leaves are chewed and kept in mouth to stop gum bleeding. Crushed leaves are applied on skin hematoma for faster healing.
<i>Malvaviscus penduliflorus</i> DC. Malvaceae Gumamela	Crushed leaves and flowers are applied on measles and boils. Decoction of leaves, along with citrus and avocado leaves cures cold.
<i>Mangifera indica</i> L. Anacardiaceae <i>Manga</i>	Decoction of leaves is given during stomachache.
<i>Maoutia setosa</i> Wedd. Urticaceae La-i	Decoction of leaves is used as antiseptic wash for wounds and cuts.

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Melastoma polyanthum</i> Blume Melastomataceae Bakhi, batgi	Stem is cooked with meat and consumed to treat high cholesterol level and hypertension. Decoction of roots and leaves is given during dysentery and fever.
<i>Mentha arvensis</i> L. Lamiaceae Yerba buena	Infusion of leaves is given during cough.
<i>Miscanthus floridulus</i> (Labill.) Warb. ex K. Schum. & Laut. Poaceae <i>Puhlek</i>	Crushed leaves are applied on wounds and cuts.
<i>Momordica charantia</i> L. Cucurbitaceae Parya	Extract from roots, fruits and seeds with few drops of coconut oil are applied on hemorrhoids.
<i>Mussaenda erythrophylla</i> Schum. & Thonn. Rubiaceae <i>Bungad</i>	Crushed leaves are applied on wounds. Leaf extract is rubbed lightly on body parts with rheumatism.
<i>Mussaenda macrophylla</i> Nall. Hah-li-do	Crushed leaves applied on wounds; chewed and kept in mouth during gum bleeding. Leaf extract is sprayed on dog skin to kill fleas.
<i>Mussaenda philippica</i> A. Rech. Rubiaceae Bubuwa	Leaves are chewed and kept in mouth to abate bleeding in gums after tooth extraction.
<i>Nepenthes alata</i> Blanco Nepenthaceae Kakalong	Water from the leaf pitcher is given to children for treating excessive urination during night. It has an antidiuretic property.
<i>Nepenthes</i> sp Nepenthaceae Kakalong	Water from leaf pitcher is given to children who excessively urinate during night.
<i>Nephrolepis cordifolia</i> (L.) K. Presl. Davalliaceae Uube ni otot	Decoction of fruits is given during goiter and stomachache.
<i>Ocimum basilicum</i> L. Lamiaceae <i>Biks, vicks</i>	Leaf decoction is given during cough, fever and stomach ulcer; crushed leaves are applied on forehead to relieve headache. Leaf extract stops toothache.
<i>Odontosoria chinensis</i> (L.) J. Sm. Lindsaeaceae	Decoction of whole plant is given during dysentery.
<i>Laglagting, laglagti</i> <i>Pandanus amaryllifolius</i> Roxb. Pandanaaceae Pandan	Decoction of leaves is given during cough.
<i>Passiflora foetida</i> L. Passifloraceae <i>Haploda</i>	Young shoots are cooked and eaten during anemia.
<i>Persea americana</i> Gaertn. Lauraceae Abukado	Decoction of leaves is given during cough.
<i>Physalis minima</i> L. Solanaceae	Decoction of leaves is given during cough and diarrhoea.
<i>Kamatis, kamahit, batuwang, batiwang</i> <i>Pinus kesiya</i> Royle ex Gordon Pinaceae	Decoction of young shoots is given during dysentery.
Belbel ( <i>pine lumber</i> ), <i>Budoh</i> (pine shoot) <i>Piper betle</i> L. Piperaceae	Leaves are heated, spread with coconut oil is applied on chest and back during cough and fever to loosens phlegm.
<i>Lawed, gawed, hapid</i> <i>Pittosporum resiniferum</i> Hemsley Pittosporaceae <i>Apihang</i>	Decoction of leaves is given during cough. Plant sap is applied on skin disease caused by fungus.

*Contd*

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Polygonum chinense</i> L. Polygonaceae <i>Banal</i>	Crushed leaves are applied on wounds.
<i>Psidium guajava</i> L. Myrtaceae Gayabah	Decoction of leaves and young shoots is used as antiseptic wash for wounds and scabies.
<i>Ricinus communis</i> L. Euphorbiaceae <i>Gatawa, gattao'-wa</i>	Crushed leaves and root bark are applied on scabies.
<i>Rorippa indica</i> (L.) Hiern. Brassicaceae <i>Kunday, gunday</i>	Decoction of leaves is given during bronchitis.
<i>Rubus fraxinifolius</i> Hayata Rosaceae <i>Pinit, buyot, habit</i>	Crushed leaves applied on sore eyes and wounds. Decoction of roots, stems and leaves for diarrhoea and urinary tract infection.
<i>Rubus rosaefolius</i> Sm. Rosaceae <i>Pinit, buyot</i>	Crushed leaves applied on sore eyes and wounds. Decoction of roots, stems and leaves for diarrhoea and urinary tract infection.
<i>Sarcandra glabra</i> (Thunb.) Nakai Chloranthaceae <i>Gipas</i>	Decoction and infusion of leaves is given during stomachache. Crushed leaves are applied on wounds.
<i>Scurrula</i> sp Loranthaceae <i>Pukot, talaktak</i>	Decoction of stems and leaves is used as antiseptic wash on fungal diseases. Also given to an intoxicated person.
<i>Scutellaria javanica</i> Jungh var. <i>luzonica</i> (Rolfe) Keng. Lamiaceae <i>Gilabong</i>	Crushed leaves are applied on burns and scabies. Seeds are eaten to expel round worms from the stomach.
<i>Senna alata</i> L. Fabaceae Akapulko	Crushed leaves are applied on scabies. Seeds are eaten to expel round worms from the stomach.
<i>Senna spectabilis</i> (DC.) Irwin & Barneby Fabaceae <i>Madre de cacao</i>	Crushed leaves are applied on scabies.
<i>Sida rhombifolia</i> L. Malvaceae <i>Battikel, kadmahaing</i>	Leaf decoction is given to mothers during delivery to relieve muscle pain. Crushed leaves are massaged on painful muscles.
<i>Sida acuta</i> Burm. f. Malvaceae <i>Battikel</i>	Crushed leaves are rubbed on painful muscles.
<i>Solanum nigrum</i> L. Solanaceae Nateng	Fruit juice is applied on face to remove freckles.
<i>Sonchus arvensis</i> L. Asteraceae <i>Lamlampak, gilabong</i>	Decoction of young shoots is given during diarrhoea.
<i>Sonchus oleraceus</i> L. Asteraceae <i>Bayongyong, gilabong</i>	Decoction of leaves is used as antiseptic wash for hemorrhoids.
<i>Spilanthes acmella</i> (L.) L. Asteraceae <i>Tohpil</i>	Decoction of roots and leaves is used as gargle for toothache relief.
<i>Symphytum officinale</i> L. Boraginaceae <i>Camprey, comfrey</i>	Decoction of leaves is given during cough and diarrhoea.
<i>Symplocos</i> sp Symplocaceae <i>Hana</i>	Decoction of leaves is given during stomachache.

Table 1 — Medicinal plants used by the *Kalanguya* of Tinoc, Ifugao, Luzon, Philippines—*Contd*

Plant name/Family/ <i>Kalanguya</i> name	Uses
<i>Tagetes erecta</i> L. Asteraceae <i>Marigold, amarillo</i>	Decoction of leaves is given during dysmenorrhoea and upper respiratory tract infection.
<i>Taraxacum officinale</i> G.H. Weber ex Wiggers Asteraceae <i>Gagattang</i>	Decoction of leaves is given during painful urination.
<i>Tithonia diversifolia</i> (Hemsl.) Gray Asteraceae <i>Lagpaw, lapaw</i>	Crushed leaves are applied on wounds and cuts to abate bleeding.
<i>Vaccinium bracteatum</i> Thunb. Ericaceae <i>Palokih</i>	Fresh fruits are eaten during stomachache.
<i>Vaccinium whitfordii</i> Merr. Ericaceae <i>Gatmo, ayohip, agohip</i>	Decoction of stem is used as wash or antiseptic during fever.
<i>Viburnum odoratissimum</i> Kerr. Caprifoliaceae I-illug, iilog	Leaves are applied on sore eyes to relieve pain.
<i>Vitex negundo</i> L. Verbenaceae <i>Lagundi</i>	Decoction of leaves is given during cough, asthma and colds.
<i>Youngia japonica</i> (L.) DC. Asteraceae <i>Gagattang</i>	Decoction of leaves is given during painful urination.
<i>Zea mays</i> L. Poaceae <i>Gahilang</i>	Decoction of young hairs is given during kidney infections as it induces normal urination.
<i>Zingiber officinale</i> Roscoe Zingiberaceae Laya	Decoction of rhizomes is given during cough. Rhizomes can also be chewed and kept in mouth during sore throat.

Philippines exhibit similar utilization patterns of medicinal plants. In Tinoc, roots of *gulon* (*Imperata cylindrica*) are used to treat kidney problems such as difficulty in urinating and urinary tract infection. Other medicinal plants can also be utilized to treat two or more diseases, such as *gatah-gatah* (*Euphorbia hirta*) which are used to treat asthma and sore eyes while hapal (*Drimys piperata*), is used to treat stomachache, dysentery, cough and muscle cramps during menstruation. Several species can also be used to treat the same ailment or disease, for example, *kaliptus* (*Eucalytus* sp), *gayabah* (*Psidium guajaba*), *ganaba* (*Lagerstroemia speciosa*) and *gatawa* (*Ricinus communis*) are used to treatment of scabies.

Leaves are the most widely used plant parts. Most of the remedies are taken from leaves and stems by pounding or crushing to extract the juice. Infusion or decoction of leaves is also a common practice. Leaves of some plants such as *Piper betle*, can be heated over flame, spread with coconut oil and then applied on the chest and back is used to treat whooping cough.

Conversely, leaves of *Tithonia diversifolia* and *Eupatorium adenophorum* are crushed or pounded and applied directly on cuts and wounds to abate bleeding. Some preparations especially for stomachache and stomach related ailments are made by boiling leaves or stems or both in water and the decoction is taken as tea. Few remedies for some ailments are prepared from underground plant parts such as *Zingiber officinale* roots. The modes of preparation for the medicinal plants are similar for both *Negrato* and *Kalanguya* societies. Pounding, crushing, boiling, heating and used as poultice, infusion and decoction are common preparations, while some plant parts are made into necklace or just pinned on clothes to treat certain ailments. In the *Negrato* society, bark of *Pittosporum pentandrum* is tied around the neck or woven into a necklace and worn on the neck for treating cough and headache. Likewise, among the *Kalanguyas*, stem of *Acorus calamus* is pinned on baby's clothes to cure colds and protect the baby from illnesses caused by bad spirits. Mostly aromatic plants are claimed to drive away these evil spirits.

Generally, traditional medicine among indigenous societies is closely tied with the world of spirits. The majority of cultural societies believe that certain diseases are caused by supernatural beings. Traditional healers serve as medium in communicating with the spirits to effect the healing of various ailments. These healers are named variously in different societies, for instance, a local priest in *Tinoc* is called a *mabaki*, in *Ibaloi* and *Kankanai* villages, *mambunong*, *mananambal* in Siquijor, and *herbolario* or *albularyo* in other societies. Knowledge of traditional and modern medicine is also strong among *Ilongos* and *Negrenses*. The main reason for the belief in the powers of traditional healers is that most cultural societies are strongly bound with their cultural traditions. Interestingly, the *Negritos*, *Ibaloi* and *Kalanguya* exhibit close similarities in their use of plants in treating various ailments and diseases. This is because these societies have similar theories of disease. These societies, believe that all serious sickness is caused by malign spirits. Among

*Negritos*, the spirits cause illness because they have been provoked or antagonized by the actions of an individual<sup>17</sup>. In *Ibaloi* and *Kalanguya* societies, the main cause of illness is claimed to be caused by dissatisfied spirits or a dead relative. Thus, the efficacy of medicinal plants in treating some ailments is enhanced by a series of rituals and ceremonies. This is a common practice which is shared by most indigenous groups in the Philippines and perhaps other countries too. These series of ceremonies are continually performed by traditional healers in an effort to cure sickness and illnesses (Fig. 5). The use of traditional medicine by traditional healers in local societies has been practiced several decades or even centuries ago. Not all indigenous societies, however, stick to their traditional belief because among the *Badeo*, another indigenous society in the Cordillera, there is already a practice of mixing traditional practices and modern medicine in influencing health management<sup>27</sup>.



Fig. 2 – The pine and mossy forests of Tinoc, Ifugao province; Fig. 3 – The rice terraces of Tinoc, Ifugao; Fig. 4 – A *kalanguya* village surrounded by the *Payew* or rice fields; Fig. 5 – (a) The *mabaki* (local priest) performing a ritual for the spirit of the dead to heal the sick child by offering food and wine; (b) The ritual can be succeeded by a ritual dance accompanied by music created with *gongs* and Fig. 6 – *Yerba Buena*, a medicinal plant endorsed by the Philippine Department of Health and are used by local communities as muscle pain reliever.

Today, modern medicine and healthcare services are very expensive and most local communities cannot afford these services. The use of indigenous knowledge in curing illnesses is slowly being globally recognized and accepted. There is a continued quest for new clinical effects of traditionally used medicinal plants; numerous studies have been conducted especially on the pharmacological aspects of the medicinal plants that are used by local communities<sup>28-30</sup>. Currently, some of these herbal drugs are marketed globally, some in the form of herbal supplements. In the Philippines, the Department of Health had endorsed 10 herbal plants which are used by indigenous communities as cure for various ailments. The plants, which are traditionally used in Tinoc, Ifugao have been thoroughly tested and proven clinically for their medicinal values (Fig. 6). Generally, in the *Kalanguya* society, most of the ethnobotanical knowledge is owned by the older generation and has not been completely passed on to the younger generations because most of the youth have left their provinces for greener pastures. Moreover, field observations showed that there is little practice of cultivating or domesticating medicinal plants among *Kalanguya* except for some crops and few ornamental plants that are also used as medicine such as *Lycopersicum esculentum*, *Zea mays*, *Zingiber officinale*, *Momordica charantia*, *Daucus carota*, and *Tagetes erecta*. Most of the medicinal plants are gathered from the wild; some plants are collected in the deeper parts of the forests. Conversely, there is continued deforestation and land conversion in the area. If the knowledge that is trapped in the older generation is not documented, and the problems on deforestation and land conversion persist, plants and the associated knowledge with it will be irretrievably lost. The study is a living document of the ingenuity of the *Kalanguya* on the use of plants for medicinal purposes as well as their indigenous knowledge on health management.

### Conclusion

The close association of the *Kalanguya* with their environment and their awareness of the usefulness of plant resources around them are admirable as revealed in the scheduled interviews, focused group discussions and *in-situ* observations. Like in any other local communities in the Philippines, there exists a pattern of utilization of plant based medicines. The traditional uses of plants as medicine are still practiced in Tinoc, *Ifugao*, however, there is a need to

determine the active components of the medicinal plants and perform bioassays as is done in reverse pharmacology. Some of these plants that need further study are *Scurrula* sp, *Tithonia diversifolia*, *Eupatorium adenophorum* etc. which were identified to have sobering effect.

### Acknowledgement

Authors are forever grateful to the informers in the study, the *Kalanguya* villagers, the *mabakis*, and the officials of Tinoc, Ifugao; for the valuable information on the medicinal plants and their uses; the University of the Philippines Center for Integrative and Development Studies for the financial assistance; University of the Philippines Baguio, Jun Buot Jr, Bino, Brenilyn, Kryssa, Orlan, Arlene and a number of colleagues and friends.

### References

- 1 Chazdon R L & Coe F G, Ethnobotany of woody species in second-growth, old growth, and selectively logged forests of Northeastern Costa Rica, *Conserv Biol*, 13 (6) (1999) 312-322.
- 2 Pieroni A, Giusti M E, Mun H, Lenarini C, Turcovic G & Turcovic A, Ethnobotanical knowledge of the Istro-Romanians of Zejane in Croatia, *Fitoterapia*, 74 (2003) 710-719.
- 3 Rodriguez J C, Ascensao L, Bonet M A & Valles J, An ethnobotanical study of medicinal and aromatic plants in the Natural Park of Serra de Sao Mamede (Portugal), *J Ethnopharmacol*, 89 (2003) 199-209.
- 4 Van On T, Quyen D, Bich L D, Jones B, Wunder J & Smith J R, A survey of medicinal plants in BaVi National Park, Vietnam: methodology and implications for conservation and sustainable use, *Biol Conserv*, 97 (2001) 295-304.
- 5 Long Chun-Lin & Li Rong, Ethnobotanical studies on medicinal plants by the red headed Yao people in Jinping, Yunnan province, China, *J Ethnopharmacol*, 90 (2003) 389-395.
- 6 Matavele J & Habib M, Ethnobotany in Cabo Delgado, Mozambique: Use of medicinal plants, *Environ Dev Sus*, 2 (3-4) (2000) 227-234.
- 7 Giday M, Asfaw Z, Elmqvist T & Woldu Z, An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia, *J Ethnopharmacol*, 85 (1) (2003) 43-52.
- 8 Harsha V H, Hebbar S S, Hegde G R & Shripathi V, Ethnomedical knowledge of plants used by *Kunabi* tribe of Karnataka, India, *Fitoterapia*, 73 (2002) 281-287.
- 9 Saikia B, Borthakur S K & Saikia N, Medico-ethnobotany of *Bodo* tribals in Gohpur of Sonitpur district, Assam, *Indian J Tradit Knowle*, 9 (1) (2010) 52-54.
- 10 Pushpangadan P & George V, Ethnomedical practices of rural and tribal populations of India with special reference to the mother and childcare, *Indian J Tradit Knowle*, 9 (1) (2010) 9-17.
- 11 Sajem A L & Gosai K, Ethnobotanical investigations among the *Lushai* tribes in 12 North Cachar Hills district of Assam,

- Northeast India, *Indian J Tradit Knowle*, 9 (1) (2010) 108-113.
- 12 Dahanukar S A, Kulkarni R A & Rege N N, Pharmacology of medicinal plants and natural products, *Indian J Pharmacol*, 32 (2000) S81-S118.
  - 13 Patwardhan B, Vaidya Ashok D B & Chorgade M, Ayurveda and natural products discovery, *Curr Sci*, 86 (6) (2004) 789-799.
  - 14 Vaidya Ashok D B, Reverse pharmacological correlates of Ayurvedic drug actions, *Indian J Pharmacol*, 38 (5) (2004) 311-315.
  - 15 Quisumbing E, *Medicinal Plants of the Philippines*, (Katha Publishing Co, Philippines), 1978, 1262.
  - 16 Co L, *Common Medicinal Plants of the Cordillera Region*, (CHESTCORE, Philippines), 1989, 487.
  - 17 Fox R B, The *Pinatubo negritos*: their useful plants and material culture, *Philippine J Sci*, 81 (3-4) (1952) 173-391.
  - 18 Yen D H & Guttierrez H G, The ethnobotany of the Tasaday: the useful plants, *Philippine J Sci*, 103 (2) (1974) 97-140.
  - 19 Yen D E & Nance J, *Further studies on the Tasadays*, Panamin Foundation Research Series No 2, Makati, (Panamin Foundation, Philippines), 1976, 191.
  - 20 Rocero M Sr, *Ethnobotany of the Itawes of Cagayan province*, Philippines, Anthropological Papers No 14, (National Museum, Manila, Philippines), 1982, 146.
  - 21 Balangcod T D, The useful flora of Tabaan Norte, Tuba, Benguet Province, In: *Towards Understanding Peoples of the Cordillera: A Review of Research on History, Governance, Resources, Institutions and Living Traditions*, Vol 3 (Cordillera Studies Center, UP Baguio), 2001, 82-83.
  - 22 Conklin H C, Ifugao ethnobotany: the 1911 Beyer-Merrill report in perspective, *Econ Bot*, 21 (3) (1967) 243-272.
  - 23 Gaspili A M, *Mga kaugalian at paniniwala ng mga Kalanguya sa Tinoc, Ifugao at ang mga implikasyon nito sa edukasyon*, MS Thesis, (Baguio Central University, Baguio City), 1987.
  - 24 Cotton C M, *Ethnobotany Principles and Applications*, (John Wiley and Sons Ltd, England), 1996, 424.
  - 25 Martin G J, *Ethnobotany: A Methods Manual*, (Chapman & Hall, London), 1995, 268.
  - 26 Anonymous, Convention for the safeguarding of the intangible cultural heritage as a step towards safeguarding non-material cultural heritage, (United Nations Educational, Scientific and Cultural Organization), 2003.
  - 27 Palaganas E C, Bagamaspad A, Cardenas M, Josef J & Tolentino L, *Mainstreaming Indigenous Health Knowledge and Practices, Philippines*, (University of the Philippines Center for Integrative and Development Studies, Philippines), 2001, 146.
  - 28 Vaidya Ashok D B & Devasagayam PA, Current status of herbal drugs in India: An overview, *J Clin Biochem Nutr*, 41 (1) (2007) 1-11.
  - 29 Gupta SS, Prospects and perspectives of natural products in medicine, *Indian J Pharmacol*, 26 (1994) 1-12.
  - 30 Sharma A, Shanker C, Tyagi L K, Singh M & Rao ChV, Herbal medicine for market potential in India: An overview, *Acad J Pl Sci*, 1 (2) (2008) 26-36.