Understanding Traditional Plant Use and Management : The Dani-Baliem Perceptions of the Plant Diversity

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ABSTRACT

This paper report on the utilization of plants and the indigenous environmental knowledge of the Dani people in Baliem Valley, Irian Jaya. More than 550 plant species utilized by Dani people within the Baliem Valley were recorded; 24 were cultivated species, while 526 were wild species. These species provide material for plant medicine, foods, construction material, firewood, rope, dyes, clothing, tools as well as material for cultural and ornamental uses. The Dani's dependence on available natural resources is reflected in various established customs and traditions. One example of this is the clear division between conserved, cultivated, and uncultivated areas. Some of these indigenous conservation traditions, for example *wilehoma* (*Casuarina oligodon* protection) and *wikioma* (*Paraserianthes falcataria* protection) are presented here.

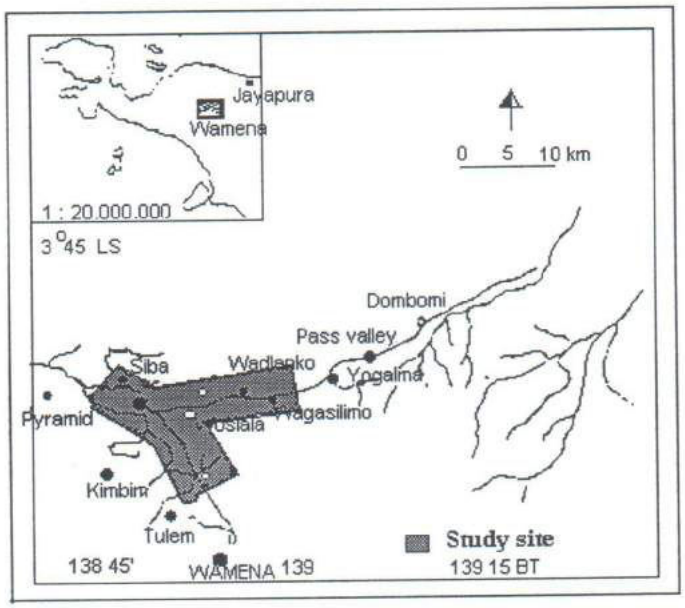
Key words: plant utilization, environmental knowledge, Dani-Baliem perception, plant diversity, Baliem Valley, Irian Jaya

INTRODUCTION

Like many indigenous people, the Dani of the Baliem Valley still depend upon hunting and gathering from the forest to meet their daily needs. The Dani know how to use many products of the forest as food, clothing, construction materials, medicines, poisons, etc. It is in the context of large-scale deforestation in the highlands of Jayawijaya Mountain, and due to an increasing interest in conserving wild genetic resources, that the present study has significance.

The Jayawijaya areas is undergoing rapid change and there is potential for some environmental knowledge to be lost is great. Cultural disturbances including young men leaving their villages for school and work, and interventions from outsiders traveling or doing development work can cause an alteration of cultural values.

Ethnobiological studies of wild resources can be applied in a variety of ways. For example, local knowledge of traditional medicines can indicate a source of new drugs, natural pesticides, or other natural products. Ethnobotanical studies also help to conserve the diversity of species and habitats, and in turn provide insight into the diversity of relationships between humans and plants. Gasping an important wild plant used by indigenous people can give basic information of this wild plant to develop and to conserve their existence. An example, *tuke (Pandanus julianettii),* its existence in the primary forest decreases, the Dani people attempt to cultivate and conserve this plant in their garden, and also *lisani* (*Acalypha amentacea*) which is used as a package of cigarette, therefore the Dani people try to cultivate this plant in their house garden.



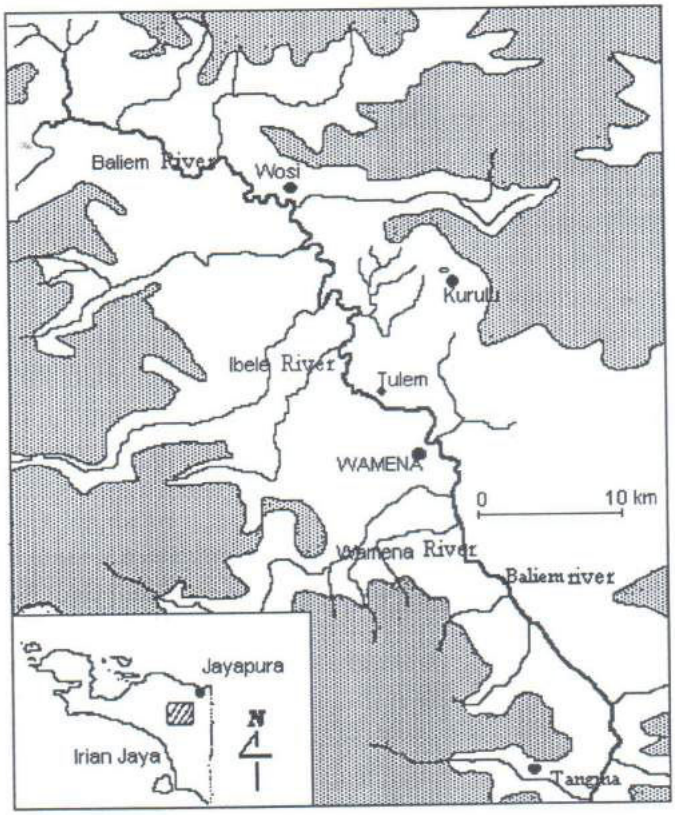


Figure 1. Study site and Baliem Valley, Irian Jaya

The observations presented here are based upon a participatory study undertaken in Dani villages and highlight the relationship between the Dani people and their environment. The results presented here demonstrate that the Dani people of the Jayawijaya mountain range (the Baliem Valley) have an extensive traditional knowledge of plant use.

STUDY AREA

The Baliem valley is a hilly plateau, ranging in elevation from 1400 m to 3500 m above sea level, and is 60 Km long by 15-20 Km wide. The valley has a prominent fault scarp farming the southern margin Alluvial deposits that fill most of the valley floor (see Figure 1) (Heberle *et al*, 1991). The main formations within the catchment area of the Baliem river include Eocene and Miocene Limestone unconformable overlying Mesozoic Sandstone (Visser & Hermes, 1962). The southeastern region of the valley is an extensive area of quartz, pitted with many dolines and, although cleared of forest, is almost uninhabited. These dolines dominated by quartz stone and impossible to agricultural activities. The valley floor is a flat alluvial silt and clay plane with a few quartz and limestone ridges emerging (Schroo, 1961). The valley walls rise to more than 3000 m on almost all sides, and from their bases alluvial fars and colluvium slopes gently down to the valley floor. Both active and relief fan and collovial mantles can be found. Swamp deposits are found most commonly on alluvial flats where drainage from the valley slopes is restricted by sediment deposition from the flooding Baliem River and the valley margins.

The Baliem valley has a tropical montane climate with an average annual rainfall of about 1900-mm (Kantor Meteorologi dan Geofisika Wamena, 1995). The mean monthly rainfall (Figure 2) shows no definite seasonal trends though the Baliem rivers show some seasonally, tending to flood during December to March when rainfall in the ranges surrounding the valley is influenced by the Northern Monsoon season (Heberle *et al.*, 1991).

The climate of enclosed highland valley in New Guinea is predominantly affected by local circulation patterns and is independent of all of but the most general conditions (Brookfield & Hard, 1966). The mean annual temperature at Wamena is 19,5 °C with a rather wide diurnal range, from a mean minimum of 14,2 °C to a mean maximum of 26,5 °C. In the highland valley it is usually hot in the daytime but cool to icy at night. The mean air humidity at Wamena and Kurulu is 78 % with a rather wide diurnal range from a mean minimum of 66 % to a mean maximum of 90 % (Kantor Meteorology dan Geofisika Wamena, 1995).

The vegetation of the Baliem Valley and surrounding area varies with the elevation and rainfall. The flora has similarities with that of Indonesia, the Pacific Islands and Australia. Observation of the Baliem valley vegetation considered in the present work draw on the description by Brass (1941), Partomihardjo et *al.* (1991); observation made by LIPI-Exploration Team, Puslitbang Biologi-LIPI during 1990-1995, and Purwanto and Walujo (1992, 1994, and 1995).

The natural vegetation of the area is largely montane and subalpine forest. A major forest boundary occurs at 1500-2200 m, below, which mixed microphyll forest of *Nothofagus, Prunus, Castanopsis* and Gymnosperms such as: *Lithocarpus, Phyllocladus, Araucaria* etc. At the top montane (> 2000 m), dominated by species such as: *Rhododendron,* and *Vaccinium,* and

Libocedrus, Phyllocladus, up to the limit of tall shrubs at 3850 m. Non-forest communities include cushion bog, grasslands and other mires, with treeferns occurring on disturbed slopes.

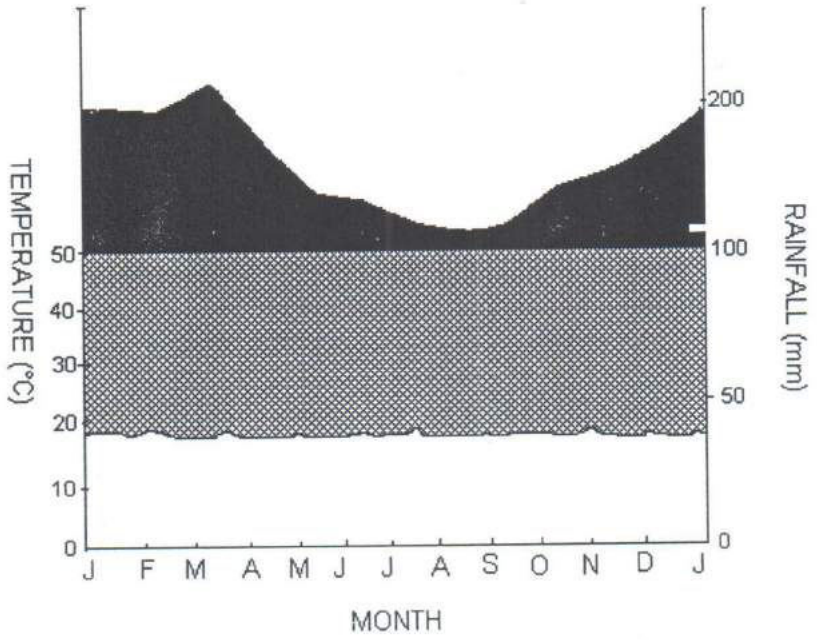


Figure 2. Climate Diagrams of the Baliem Valley Areas

The trees are large, up to 45 m in height, with a relatively sparse understorey of *saloka* (*Pandanus* spp.), *mileh* (*Schefflera* spp.), etc. Secondary forest, the floor dominated by ferns such as: *Pteridium, Gleichenia* and small trees including *Melastoma, Medinilla* and *Piper* spp.

The floor of the Baliem valley is entirely anthropogenic, because this valley is effort to all human activities (agriculture, habitation, etc.) (Heberle *et al.*, 1991), with groves of *wileh* (*Casuarina oligodon*), *lisani* (*Acalypha amentacea*), *heluk* (*Macaranga mappa*), and *pabi* (*Dodonaea viscosa*), mixed with medium grassland such as: *likuak* (*Fymbristylis* sp.), likakah (*Eragrotis* spp.); tall grassland: *jagat* (*Mischanthus* sp.), *lokop* (*Pragmites karka*), etc.; and re-growth shrub-land in addition to the garden and village site. Isolated *sin* (*Araucaria cuninghamii*), trees often mark ceremonial sites, isolated *wileh* (*Casuarina oligodon*) and *wiki* (*Paraserianthes falcataria.*) trees to material construction, fence of garden and firewood.

Some areas, such as those on relict colluvial aprons west of Wamena (Gunung Susu area), seem permanently changed to grassland, bud the deep alluvial soil of most of the area support actively regenerating shrubs and forest taxa.

METHODS

Ethnobotanical information concerning the utilization of plant resources and relationships between people and their environment was obtained by interviewing key informants. The study was carried out during several time periods: June 1990-October 1990, January 1991-March 1991, June 1991-October 1991, June 1992-September 1992, January 1995-July 1995, September 1995-November 1995. The ethnobotanical information sought includes how the Dani use plant species in their daily life. The interviews were unstructured, open-ended discussion of the environmental knowledge and the plants used.

Key informants were interviewed to get a general view concerning ethnobotanical customs. The key-informants were generally highly respected and of high status within the Dani communities, as well as knowledgeable of custom or tradition of the Dani people. These key informants were leaders - *ap metek kanekela* (chief of ritual and land tenure); *ap metek uwaela* (chief of medicine and healing); *ap metek wimaela* (chief of war), religion leaders and elders, educated people, and government officials like physicians, public health nurses. The ethnobotanical information obtained from the key informants was then confirmed by Dani people[1] and the location where the ethnobotanical activities took place was identified.

Based on the information obtained, the ethnobotanical activities were described, and the vernacular names of plants and their usage in daily life were noted. For botanical verification, all plants used for such purposes were directly collected in the field and identified taxonomically at the Herbarium Bogoriense, Research Center for Biology, The Indonesian Institute of Sciences, Bogor, Indonesia.

RESULT AND DISCUSSION

Landscape Division of the Dani

Sili (house) **and** ***Ouma*** (village)

Traditionally, the Dani people establish an « *ouma* » (a small village with 2-5 houses) where they settle. This is separate from secondary forest, primary forest and agriculture areas. Vegetation characteristics of *ouma* are *wileh* (*Casuarina oligodon*), *sait* (*Pandanus conoideus*), *haki* (*Musa paradisiaca*), *yabe* (*Cordyline terminalis*), and others plants used in daily life like vegetables and medicinal plants where planting in the house (*sili*) garden. The village of Dani enclosed by fence of wood *(ouma leget)* and generally this village divided into three parts: (1) *holakoma* (*holak* = girl and *ma* = place), this area is in front of sili where utilize to play of girl; (2) *wam laleken*, place between ouma leget and sili leget (fence of Dani house), use to take of pig in daytime; *and (3)* the Dani houses are built on group in compounds (called as *sili*). The elements of the compound (*sili*) consist of *pilamo* (men's house); *ebeai* (women's house); *hunila* (common cook house); *wamdabu* (pig sty); *silimo* (central courtyard); *pilapolik* (bone enclosure), *wadloleget* (place of traditional ritual/ghost enclosure); *opolike* (curing women's enclosure); *leget* (fence); *mukarai*

[1] Dam Elosak, Jordan Surabut, Isikale Mabel, Mulik Mabel, Kolopalik Matuan, Yusuf Alua, etc.

(entrance); *ukutlu* (yard in back side of *pilamo* and *ebei*); and *hakioma* (banana yard) (Figure 2a et 2b). The Dani house (*pilamo* and *ebeai*), in the valley term, called as « *honai* » (apparently from *hun*, older men, and *ai*, house). Structure of the honai is divided in two parts: the lower room and the floor that is used for the sleeping loft. The lower room uses for a discussion before sleeping, guest received and conserved place of war material, tools and sacred materials. The floor of the loft like the floor of the grand room is laid with a sweet-smelling grass (*yeleka*, *Leersia hexandra*). These plants were used for sleeping girder.

Wen (garden or ladang)

The Dani in the Baliem valley do not fully depend on forest product for their life. They are generally farmers practicing « *wen hipere* », i.e. garden of sweet potato. Gardens are made on land, which has been cleared by cutting and burning down its primary or secondary forest cover. Men and adolescent boys do the clearing and initial preparation of the land. Groups of men work together to enclose the gardens with wooden fences and thus raids by free-wandering domestic pigs.

The Dani cultivate many plants such as hupak (corn, *Zea mays*), *pain* (yam, *Dioscorea bulbifera*), *hom* (taro, *Colocasia esculenta*), *napire abo* (tapioca, *Manihot esculenta*) and others vegetables. The women are responsible for planting, weeding, and harvesting sweet potatoes; while the cultivation of bananas, taro, sugar cane, Pandanus, and tobacco is the men's responsibility. All of the introduced crops can be cultivated by either men or women, though women remain the primary producers, and hence sellers of vegetable and fruit. A list of the major plant species cultivated in the Baliem Valley is given in Table 2. Most of these plants are grown in gardens, which may be up to half an hour's walk away from the cultivator's village. Small gardens containing a variety of crops are usually located around the outskirts of the village (*ouma*), and bananas, ginger, and tobacco are grown within or immediately adjacent to the village.

Wen hipere is divided into three types based on agro-ecosystem and technique of cultivation. These types are *wen imah, wen alobaga, and wen yabula.* The *wen imah* gardens are located in the valley floor. Extensive irrigation canals constructed by teams of men using paddle shaped digging sticks to break up the soil serve these gardens. The ditches are 1-2,5 m wide and 1,5-2 m deep and form a grid-like pattern of interlocking canals. The soil is heaped into evenly spaced small mounds, into which the cuttings of sweet potato are planted. The *wen alobaga* gardens are located in the valley plain or in dry land areas. The irrigation ditches here are not as deep as those are in the *wen imah* gardens (0,5-0,75 m wide and 0,5-1 m deep). In the *wen alobaga* gardens, the sweet potato cuttings are also planted into small evenly spaced mounds of soil. The *wen yabula* gardens are found on the slopes and hillsides which can be as steep as 40°. Terraces are constructed from stone walls; logs and soil banks arranged perpendicular to the direction of the slope, which trap the eroding topsoil.

Wen Kulama (fallow or secondary forest)

The Dani divide the *wen kulama* into two types, *wen kulama kitma* and *wen kulama alekma.* The most important criteria used to differentiate the types are based on the structure and

physiognomy of the vegetation and time of abandoned garden (fallow). *Wen kulama kitma* is a field in the 0-5 year of fallow, very young secondary forest, vegetation cover is low (generally less than five meters) and are both herbaceous (*Imperata cylindrica, Phragmites karka, Melastoma malabarica, Leersia hexandra, Dicranopteris linearis*, etc) and ligneous (*Dodonaea viscosa, Acalypha amentacea, Casuarina oligodon, Schefflera* spp., *Homalanthus, Pittosporum ramiflorum* etc.). *Wen kulama alekma* is a field that has been fallow for greater than five years. The vegetation is mainly ligneous with a dense herbaceous covering.

The *Wen kulama* system plays an important role in the shifting cultivation cycle. It allows for rehabilitation of soil fertility, it provides a place to maintain pigs, and serves as a source of firewood, fence material and medicinal plants. Due to the increasing of the population and economic pressures in the Baliem valley, the time the field is left fallow is decreasing.

Okama (primary forest)

The Dani recognize the primary forest (*okama* - *o* = tree or wood; *ka* = leaf or herbe; and *ma* = place) as an area which support many types of vegetation. *Okama* is a source of wood, food, medicines, and a place to hunt.

The primary forest is an integral part of their subsistence living. Therefore, the forest is traditionally managed based on agreement together with their traditional leaders. Recently, local people increase the cutting of woods from the forest due to the development of the area and less control to the forest exploitation. Although the habit of planting trees is not common in this area, there is a re-greening project by Forestry Department and LIPI, however, the rate of forest degradation is faster than the rate of replanting. Re-greening effort are further compromised because the Dani believe that by burning the forest or the bushes will invite the rain. The Dani believe that the burning smoke is like cloud that it will be rainy.

The Dani consider the forest as the mystical place of their ancestors, and also as the place of the evil spirit. The effect on preservation of the forest of these beliefs is unclear. Although the Dani wish to protect the place of their ancestors, they also believe that burning the forest will chase the evil spirits away.

The Dani people recognize that the forest is a renewable resource. They believe that the forest will be renewed by adoration and obedience of the spiritual 'forest guard' called *Ayi werek*. This believes is not valid for all forest only certain places with special signs: big trees, a water source, or a cave, which can be considered a supernatural residence.

Olinmo (abandoned village)

Olinmo is a form of abandoned settlement. Abandoned settlements are characterized by « rest vegetation » similar to those found at active villages, for example *Casuarina oligodon, Pandanus conoideus and Musa paradisiaca.* Dani informants stated that the soil surrounding the abandoned villages is suitable for the cultivation of sweet potato (*Ipomoea batatas*). Within abandoned villages ligneous plants can grow and can be used as a source of wood.

Wakunmo (place sacred) **or** ***Wesama*** (place secret)

Wakunmo means sacred place (*wakun* = sacred and *mo* = place), whereas *wesama* means secret place (*wesa* = secret, and *ma* = place). There are many reasons a place might be considered sacred or secret. It might be a place to conserve a traditional item like a *segajilik* (sign of a dead man in the form of a court lance covered with *siluk* (*Imperata cylindrica*) and bound with a rope made by rattan (*mul*, *Calamus prattianus*) and *isoak*, water pot made by fruit of *Lagenaria siceraria*. It could also be a place that has historical significance, for example a site of a previous battle, or a place of a previous murder of an important person and thus a resting-place of one's ancestors. Sometimes these sites are marked by natural signs like a source of salt, a big tree (*Ficus* spp., *Papuacerdus* sp. etc.), a cave, or a water source. The sacred place might be sacred because of tradition (e.g. a place conserved and protected for keeping pigs). These sacred areas are protected and prohibited areas, and belong to particular clans or families.

Wen baru (New garden)

This type of garden has been recently been introduced by government officials. The plants cultivated here included many types of cash crops like: *hupak* (*Zea mays*), *wenyale eken* (*Glycine max*), *wenyale agat* (*Arachis hypogaea*), *wenyale mili* (*Phaseolus lunatus*), *napire abo* (*Manihot esculenta*), and horticulture plants like: vegetable: *koleka* (*Brassica oleracea* var. *botrytis*), *kol eken* (*Brassica oleracea* var. *capitata*), *kilu kera* (*Secheum edule*), *kilu tomar* (*Solanum lycopersicon*), *hobut* (*Cucurbita moschata*), *sawieka* (*Brassica chinensis*), *helica/hece* (*Capsicum annum* et *C. frutescens*), *wortel* (carrot, *Daucus carota*), *wenyale-wenyale* (*Phaseolus vulgaris*), *kibi* (*Amaranthus caudatus*), *gambas* (lectuce, *Lectuca* sp.), *bawang mola* (garlic, *Allium sativum*), *bawang mili* (onion, *Allium cepa*) ; and fruit plants : *pepaya* (papaya, *Carica papaya*), *apel* (apple, *Pyrus malus*), *jeruk* (oranges, *Citrus cinensis, C. maxima, C. aurifolius*), *apokat* (avocado, *Persea americana*), *mangga* (mango, *Mangifera indica*), *nanas* (pineapple *Ananas comosus*), *haki* (*Musa paradisiaca*), *jambu biji* (gojave *Psidium javanica*), *jambu air (Eugenia aquatica)* ; and plantation like : *kopi* (coffee, *Coffea arabica*).

Another type of new garden is the rice field. This new type of agriculture was introduced by a teacher from Tana Toraja, South Sulawesi, Indonesia in 1974. Rice cultivation was introduced to increase the efficiency of the land that were not suitable for sweet potato farming, and also to diversity food staples and to increase incomes of the people. The project was done by The Indonesian Institute of Science.

Activities of the people who live in the Baliem valley and in surrounding the primary forest do have a negative impact on the primary forest. This might be due to such factors as: (1) the Dani generally use slashing and burn shifting cultivation; (2) The Dani people require wood from the primary forest because the secondary forest/fallow areas are not capable of meeting demand; (3) Increasing population pressure and resulting agricultural invasion and erosion; (4) Development of the city of Wamena; (5) Tradition reasons such as the Dani belief that burning grassland or forest will bring rain; (6) Public awareness about the prohibition of natural resource exploitation is low; (7) Diminishing influence of the traditional laws concerning the management of environment resources due to outside cultural influences.

Plant utilization

The Dani in Baliem valley use plants and animals collected from the forest in a number of ways. The Dani people have more than 588 utilized plant species; 57 cultivated species and 531 wild species. A list of those species and their uses follows. The cultivated plants are categorized according to usage in 15 sub groups, the wild species in 18 groups (Table 1). The semi-domesticated plants, medicinal plants, and the many taxonomically interesting specimens are treated as separate major categories.

Table 1. Categories of useful plants

Categories of useful plants	Number of species
A. Cultivated Plants (Domesticated Plants)	58
1. Staple crop	1
2. Secondary food crops (incl. Cash crops)	51
2.1. Vegetable and legumes	39
2.2. Oil plants	1
2.3. Tubers	7
2.4. Spices	6
2.5. Beverage/plant juices	3
2.6. Fruit and edible seeds	20
3. Forage crops	1
4. Latex and resin crops	-
5. Fiber crops	-
6. Stimulants	2
7. Fuelwood	4
8. Ornamental crops	4
9. Aromatics and cosmetics	-
10. Dye plants	-
11. Plants of magical and ritual significance	2
12. Nitrogen-fixing plant/green manure	-
13. Utensils	-
14. Toxicants	-
15. Variation object (cigarette)	1
B. Wild Plants	231
1. Palatable, non medicinal plants	27
1.1. Edible leaves, stems and shoots	14
1.2. Edible flowers, fruits and seeds	10
1.3. Edible roots and rhizomes	2
1.4. Spices	1
1.5. Beverages/plants juices	-
2. Latex and resin plants	-
3. Rope	59
3.1. Bamboo and rattans	13 + 2
3.2. Binding/weaving	9
4. Dye plants	16
5. Ornamental plants	12
6. Fiber plants (clothes and basketry)	14
7. Plants for household utensils and tools	5 + 19
8. Plants for musical instruments and toys	6

9. Aromatics and cosmetics	3
10. Stimulants	2
11. House end hut constructions	170
11.1. Boards	136
11.2. Poles	113
11.3. Roofing	95
11.4. Walls	95
11.5. Fence	254
12. Fuelwood	290
13. Commercial timber	-
14. Ecological indicators	-
15. Plant magic and ritual significance	40
16. Ethnomycology	40
17. Toxicants	4
17.1. Fish poisons	-
17.2. Others	-
18. Variation Use	17
C. Medicinal Plants	87
1. Cultivated	6
2. Wild plants	81
D. Semi-Domesticated Plants	4

Plant medicine

Medicinal plants play a very important role in the Dani medicine. Medicinal plants are harvested from a wide range of habitats. The 87 medicinal plants found to be used by the Dani are list in Table 2. The most common method of preparing medicines is by pounding or crushing fresh material. This preparation is then rubbed over the skin or eaten.

Although all adults are familiar with these plants, the village elders are the most knowledgeable. Many ailments are considered to be due to evil spirits. These ailments are treated by especially knowledgeable traditional healers (*uwaela*) who perform religious rites to treat these diseases.

A study of the diagnostic and therapeutic practices of the traditional healers (*uwaela*) in the Dani societies in Baliem valley was conducted. When a person gets sick and the traditional healer is consulted, a healing ritual is needed. This is a magic-religious as well as a therapeutic ceremony. Before a therapeutic ceremony is conducted, the traditional healer discusses with his assistants (actually head of ethnic of traditional medicine, see Figure 2) to decide when and how to conduct the ritual. During the ritual, the healer is the medium of the spirit, from where he gets the inspiration and knowledge of how to treat the patient.

The ritual practices include the reciting of ritual spelling and used of ritual material (*kaneke*). *Kaneke* is a cultural material or supernatural material inheritance from their forefathers. The forefathers are a center of all traditional and ritual activities. Functions of the *kaneke* are: (a) Symbolic relationship between the Dani and their ancestors (*tugi*) and with «absolute » (*walhowak/hareken*); (b) Control of all life activities includes ideas, economic, politics of ethnic war, religious system, ritual activity, attitude and ethic; and (c) Symbolic place of a visible reality that exists.

The spirited clarifies which medicinal plants are to be used to treat the diseased, and the healer orders an assistant (*ap woghuk* and *ap itikmo mete*) to go and collect the plants. A medicinal plant is not been gathered before the sick person needs it. The consultation by the healer may include a conversation with the sick person, listening to the patient's complaints and questions concerning transgression of tradition law or taboos by the patient.

The Dani healer makes no efforts at bodily examinations or other diagnostic practices. The medical theory is poorly developed; knowledge of medicine and healing practices is not mastered through a systematic learning process, but acquired through conversations and by sharing of knowledge with other community members. The knowledge and practices are not monopolized by the healer, however, they would claim that the knowledge of how to treat a diseased person must be acquired through inspiration and, in this respect, they have a special gifts to allow them to be in contact with, and learn from the spirits. The son of the healer has the opportunity, by observing and assisting their father, to learn about medicinal plants and healing methods. There are two ways to become a healer: through genealogy or through personal ability. To be accepted as a healer, rather than just a respected person, one has to carry some specific attributes and a good moral over other community members.

Table 2. Plants for medicine by Dani societies in Baliem Valley

No	Local name	Scientific name	Family	Part Used	Important Compounds	Use
1	Abiken	*Adenostemma macrophyllum*	Asteraceae	Fl	Alkaloid	Reproduction (womb)
2	Anekuku	*Erechtites paniculata*	Asteraceae	L	-	Skin parasites
3	Anekuku	*Trachymene artakensis*	Asteraceae	L	-	Skin parasites
4	Anekuku	*Erechtites valerianifolia*	Composit.	L	-	Skin parasite
5	Duaga	*Vaccinium varingiaefolium*	Ericacaceae	YL	Terpenoid*, Tannin*	Treating wounds, dermatology, hair care
6	Ekenduga	*Cyperus sp.*	Cyperaceae	R	-	Headache
7	Ekenduga	*Cyperus sp.*	Cyperaceae	R	-	Headache
8	Engken mokah	*Centella asiatica*	Umbell.	L	glicocide,triterpe-noid,alcaloid, hidrocotilin, sterod, tanin, essential oil	Treating wounds and infections
9	Engken mokah	*Limnanthemum sp.*	Gentianic.	L	-	Treating wounds and infections
10	Engken mokah	*Erechtites sp.*	Asteraceae	L	-	Treating wounds and infections
11	Getik	*Oldenlandia verticillata*	Rubiac.	L	Terpenoid*	Reproduction (womb)
12	Haningkukuh	*Bidens biternata*	Asteraceae	L	-	Skin parasites (management of infection)
13	Haningkukuh	*Emilia nonchifolia*	Asteraceae	L	-	Skin parasites (mangement of infection)
14	Haningkukuh	*Erigeron linifolius*	Asteraceae	L	-	Skin parasites (mangement of infection)
15	Helebeleh	*Oxalis corniculata*	Oxalidaceae	L	Oxalat acid	Rheumatism
16	Heluk	*Macaranga mappa*	Euphorbiace	F	-	Hair care
17	Hetam	*Maesa verrucosa*	Myrsinaceae	L	Terpenoid*, Steroid*, Tannin*	Digestive problems
18	Hite, heta	*Zingiber officinalis*	Zingiberaceae	T	Flavonoide, poly-fenol, essential oil	Stomach ache, skin disease

19	Holim holim	*Nephentes papuana*	Nepenth.	L	-	Ear infections
20	Holowasi	*Euodia elleryana*	Rutac.	L	-	Stomach ache
21	Huagale	*Blumea riparia*	Asterac.	L, LS	Terpenoid, steroid	Oral/eye, hair care
22	Huagaleh	*Scaevola oppositifolia*	Goodeniac.	WS	-	Curing wounds
23	Hulampuah	*Emilia sp.*	Asteraceae	L	-	Curing wounds and skin parasite
24	Huli	*Polygonium capathifolium*	Polygonac.	L	Tannin, essential oil	Infections
25	Huliah	*Polygonum nepalensis*	Polygon.	L	Tannin	Curing wounds interior
26	Hunewera-go	*Medinella sp.*	Melastomac.	G	-	Skin parasite /mange
27	Inektamuk kuning	*Rhododendron macgregoriae*	Ericacaceae	L, Fl	Terpenoid*, Tannin*	Skin parasite/mange and poisson
28	Inektamuk mili,merah	*Rhododendron culminiculeum*	Ericacaceae	L, Fl	Terpenoid*, Tannin*	Skin parasite /mange
29	Inektamuk mola besar	*Rhododendron hellwigii*	Ericacaceae	L, Fl	Terpenoid*, Tannin*	Skin parasite /mange
30	Inektamuk mola kecil	*Rhododendron herzogii*	Ericacaceae	L, Fl	Terpenoid*, Tannin*	Skin parasite /mange
31	Isoak	*Lagenaria siceraria*	Cucurbit.	F	-	Stimulate maternal milk production
32	Jawi	*Laportea sp.*	Urticaceae	F	-	Rheumatism
33	Ka	*Erythrina merriliana*	Fabaceae	LS	Tannin*, Erifralin?	Reproductive (womb)
34	Kalel	*Piper arborescens*	Piperaceae	L	Piperin, essential oil	Stimulant food for pig
35	Kami	*Cinnamomum iners*	Lauraceae	L	Essential oil ?	rheumatism
36	Kilime	*Scirpus macrantha*	Cyperaceae	PS	-	Digestive problems and purgative
37	Kul	*Aneyma claripes*	Loranthac.	L	-	Treating wounds caused by arrows
38	Kule-kule	*Unidentified*	Gendub	L,S	-	Skin parasite /mange
39	Kum	*Commelina nudiflora*	Commel.	R	-	Treating wounds
40	Leh	*Alphitonia incana*	Rhamnac.	L	Terpenoid*,Saponin*,Tannin*	Soap and skin cleaner
41	Litotok	*Capillipedium parviflorum*	Poaceae	L,S	-	Treating wounds after make hole in nose
42	Magasom	*Clematis papuanica*	Ranunculac.	L	Terpenoid*	Malaria and influenza
43	Maliep	*Rubus fraxinifolius*	Rosac.	F, L	-	Dental care or toothache,stomach ache and digestive problems
44	Mayomayo	*Oxalis sp.*	Oxalidaceae	AP	Oxalat acid	Tonic
45	Milaga	*Glochidion arborescens*	Ericaceae	L	Tannin*	Treating wounds
46	Mileh	*Schefflera ischnoacra*	Araliaceae	L	-	Anti-mousquito
47	Monika	*Pittosporum ramiflorum*	Pittosporac.	L, S	-	Fevers and malaria
48	Musan	*Asclepias curassavica*	Asclepiadac.	R, L, Fl	L=Triperpenoid, alcaloid : Fl = alcaloid	Treating wounds and infections
49	Nausarik	*Bidens biternata*	Asteraceae	Fl	-	Wounds cover
50	Nirugum	*Coleus amboinicus*	Labiataceae	L	Terpenoid*, Kalium	Treating wounds
51	Nirugum	*Coleus cf.amboinicus*	Labiataceae	L	Kalium	Ointment
52	Oakpuk	*Eleusine sp.*	Poaceae	L	-	Dental care
53	Obasiwasi	*Euodia cf.elleryana*	Rutaceae	L	Essential oil, limonens	Skin disease
54	Owasiwasi	*Fagara ovalifolia*	Rutaceae	L	Steroid*	Rheumatism
55	Pabi	*Dodonaea viscosa*	Sapindaceae	YL	Alcaloid, Glicoside,Saponin*	Wounds

56	Pain	*Dioscorea bulbifera*	Dioscoreac.	T	, Tannin* alcaloide,saponin,flavonoide, polifenol	Dysentery, digestive problems
57	Pawi	*Cudrania conchicinensis*	Moraceae	L	-	Treating wounds
58	Pepaya	*Carica papaya*	Caricaceae	L,F,R	Papain,alcaloid saponin, flavonoid	Malaria and stimulant
59	Pion	*Unidentified*	Gendub	L	-	Treating wounds after make hole in nose
60	Pitel	*Unidentified*	Gendub	L	-	Cough
61	Potu	*Schefflera macrostachya*	Araliaceae	L	-	Wounds cover
62	Pum	*Bischoffia javanica*	Euphorbiac.	L	Tannin*, poison	Treating wounds
63	Sait	*Pandanus conoideus*	Pandanac.	F		Increasing blood production
64	Selon	*Decaspermum fruticosum*	Myrtaceae	L	Steroid*,Saponin*, Tannin*	malaria, dental care
65	Seno	*Castanopsis acuminata*	Fabaceae	WS	-	Back illness, linment
66	Seragan	*Desmodium sequax*	Fabaceae	L	Alcaloid	Curing wounds
67	Simo	*Homalanthus novo-guinensis or H. papuanus*	Euphorbiac.	L	-	Burns, childbirth aids
68	Simo	*Ficus odoardi*	Moraceae	WR	-	Digestive problems
69	Siragen	*Desmodium cf.sequax*	Fabaceae	S	Tannin*	Treating wounds, dental care
70	Solage		Sapotac.	L	-	Treating wounds
71	Sowa	*Setaria palmifolia*	Poaceae	L, S	-	Stomach ache, digestive problems
72	Suer	*Echinochloa colona*	Poaceae	PS	-	Stomach ache, digestive problems
73	Sumunik	*Medinilla macrantha*	Melastomac.	F, Fl	-	Stomach ache, digestive problems and dysentery
74	Wamatotok	*Blumea lacera*	Asteraceae	L	Cineol, Citrate Fenchone,	Treating wounds on pig skin
75	Wang pelangken	*Ludwigia angustifolia*	Onagraceae	L	-	Skin infection (mange)
76	Wantagah	*Vaccinium cavendisshioides*	Ericaceae	YL	Terpenoid*, Tannin*	Treating wounds
77	Warompo	*Sonchus asper*	Asteraceae	L	Flavonoid, Saponin, streroid, polifenol	Treating wounds, skin infection (mange)
78	Wib	*Grevillea papuana*	Proteaceae	L	-	Treating wounds and infections
79	Wiki	*Paraserianthes falcataria*	Fabaceae	L	Saponin*	Soap, skin cleaner
80	Wiki-wiki	*Euphorbia serrulata*	Euphorbiac.	L, R	Terpenoid*, Euforbin, Taracserol	Treating wounds
81	Wilehwileh	*Baeckea frutescens*	Myrtaceae	L	Steroid*, Saponin*, Tannin*	Fevers, aches and pains
82	Witar	*Solanum nigrum*	Solanaceae	F	Solanin,saponin solamargin, salanigrin, fat	Stomach ache, cough
83	Witarapani	*Physalis angulata*	Solanaceae	L,R	Terpenoid*, Tannin*	Malaria
84	Yawi, yiwi	*Cytandra sp.*	Gesneraceae	L	-	Rheumatism
85	Yelika	*Piper gibbilimbun*	Piperaceae	L	-	Anti-emitic
86	Yelika	*Pothomorphe sp.*	Piperaceae	L	-	Anti-emetic
87	Yokose	*Polygonum barbatum*	Polygonaceae	L, S	-	Skin parasite (mange)

Note : * analyse by Murningsih and Chairul (1995) and others are study of bibliographies, for example : Quisumbing (1951), Heyne (1987), Perry (1980), Holdsworth (1977), Hargono *et al.* (1986). F (fruit), L (leaf), R (resin), WS (water of stem), WR (water of root), LS (leather of stem), YL (young leaf)

The number of medicinal plant species used by the Dani is relatively high (87 species) compare to many other areas of Indonesia such as Bengkulu (Uji *et al.*, 1992), Kubu (Agoes *et al.*, 1975), Mentawai-Siberut Islands (Ave & Sunio, 1990), Kupang-Timor (Sangat-Roemantyo, 1991), Rote (Wiriadinata, 1991), exception for the Javanese societies use 270 species medicinal plant (Boorsma, 1938) and the Tanebar-Evav societies who have used the medicinal plant is 156 species (Purwanto, 1993).

The arrival of modern medicine to the Baliem valley has not yet changed the traditional Dani medical methods and use of medicinal plants. These tradition methods are still practiced, although there are establishing the Health Care Centers (Puskesmas).

Plant foods

In the valley, the Dani use sweet potato (*hipere*, *Ipomoea batatas*) as a principal food source. The sweet potato is quantitatively the most important plant grown in the Baliem valley. Both tubers and leaves are eaten; the tubers either roasted among hot coals or baked in a pit with hot rock (called « *senii* »).

The gathering from wild plant food source is still an important activity in most Dani communities. Some food plants are collected from the wild when traditional foods are scarce. For example: *tuke* (*Pandanus julianettii*), *sait* (*Pandanus conoideus*), *Waromo* (*Pandanus brosimos*), *mumun* (*Cudrania conchichinensis*), etc.

The red *Pandanus* fruit (*sait*, *Pandanus conoideus*) is cooked and then reduced to pulpy soup by kneading. Groves of the red *Pandanus*, which are individually owned, are scattered throughout the valley landscape, often on the sites of abandoned gardens or village. *Pandanus brosimos* and *P. julianettii* are species important in the Dani diet. They grow only at altitudes above 6,500 feet. The large oily nuts produced by these trees are considered a delicacy when roasted. Most of the *Pandanus brosimos* and *P. julianettii* in the Baliem valley grows in high-elevation forest.

The Dani gather young leaves or fruits of wild plants for consumption as vegetables. A variety of vegetable species is consumed throughout the year (Table 3). Vegetable species include *liken* (unidentified), *ulepeka* (*Cyclosorus* sp.), *ulijagah* (*Planchonella* sp.), *pinthe* (*Cyathea cooperi*), *wulep* (*Pteridium aquilinum*), *wurika* (*Cassia hirsuta*), and *wurikaka* (*Desmodium schalp.*), *yipit* (*Alphinia* sp.); and species for fruits; *yirilih* (*Rubus* sp.), *maliep* (*Rubus fraxinifolius*), *koloh* (*Sauraria* sp.). Some species, such as: *sowa* (*Setaria palmifolia*), spinach (*kibi*, *Amaranthus* spp.), wing bean (*wenale*, *Psophocarpus tetragonolobus*), corn (*hupak*, *Zea mays* L.); are also cultivated either as part of the mixed cropping or in pure stands under slash-burn agriculture. *Cyathea* sp., *Cyclosorus* sp., are largely consumed during ritual ceremonies.

Most of the foods reported here are fruits, as they require less preparation and are often eaten raw. Foods that are less commonly used include those species that require elaborate preparation such as *hom* (*Colocasia esculenta*), *pain* (*Dioscorea* spp.), *and napireabo* (*Manihot esculenta*). Food plants introduced to the Dani by outsiders (missionaries, government officials, visitors, LIPI) include white potatoes, tomatoes, cabbage, papaya, carrots, beets, pineapple, lettuce, and others (see Table 3).

Table 3. The plant species utilized as food by Dani societies in Baliem Valley

Local name	Scientific Name	Family	No of variants	Note	Using
Apel*	*Pyrus malus*	Rosaceae	2	c, i	Fruit
Apokat*	*Persea americana*	Lauraceae	1	c, i	Fruit
Bisiken	*Alphinia sp.*	Zingiberaceae	-	nc	Tuber for food
Bawang kok*	*Allium fistulosum*	Liliaceae	1	c, i	Vegetable, spices
Bawang kut*	*Allium sativum*	Liliaceae	1	c, i	Vegetable, spices
Bawangmola*	*Allium cepa*	Liliaceae	1	c, i	Vegetable, spices
El	*Saccharum officinarum*	Poaceae	8	c	Beverage
Gambas	*Luffa acutangula*	Cucurbitaceae	1	c, i	Vegetable
Giawas	*Psidium guajava*	Myrtaceae	1	c, i	Fruit
Haki	*Musa paradisiaca*	Musaceae	15	c, i	Fruit, ritual, rope, etc
Hece	*Capsicum annum*	Solanaceae	2	c, i	Spices
Helice	*Capsicum frutescens*	Solanaceae	1	c, i	Spices
Helah	*Abelmoschus manihot*	Malvaceae	2	c, i	Vegetable
Helah	*Jatropha multifida*	Euphorbiaceae	1	c, i	Vegetable
Hipere	*Ipomoea batatas*	Convolvulaceae	+100	c	Staple food, ritual, vegetable
Hite	*Zingiber officinale*	Zingiberaceae	1	c, i	Spice, medicinal plant
Hobut	*Cucurbita moschata*	Cucurbitaceae	1	c, i	Vegetable
Hom	*Colocasia esculenta*	Araceae	22	c, i	Food
Hom	*Alocasia sp.*	Araceae	1	c, i	Food
Hom	*Xanthosoma sp.*	Araceae	1	c, i	Food
Hom	*Cyrtosperma sp.*	Araceae	1	c, i	Food
Huli	*Polygonum nepalensis*	Polygonaceae	-	nc	Food for bird
Hupak	*Zea mays*	Poaceae	4	c, i	Food
Jewi	*Alphinia brevituba*	Zingiberaceae	-	c, i	Spice
Kangkung*	*Ipomoea aquatica*	Convolvulaceae	1	c, i	Vegetable
Kemanggi*	*Ocimum americanum*	Labiatae	1	c, i	Vegetable
Kibi	*Amaranthus caudatus*	Amaranthaceae	1	c, i	Vegetable
Kibi	*Amaranthus hybridus*	Amaranthaceae	1	c, i	Vegetable
Kibi	*Amaranthus tricolor*	Amaranthaceae	1	c, i	Vegetable
Kibi	*Amaranthus spinosus*	Amaranthaceae	1	c, i	Vegetable
Kibi	*Amaranthus cf.viridis*	Amaranthaceae	1	c, i	Vegetable
Kikik	*Syzygium aquea*	Myrtaceae	1	c, i	Fruit
Kilu telor	*Cypomandra betacea*	Solanaceae	1	c	Food
Kilu tomar*	*Solanum lycopersicon*	Solanaceae	2	c, i	Vegetable
Kilu terong*	*Solanum melongena*	Solanaceae	2	c, i	Vegetable
Kilu kera	*Sechium edule*	Cucurbitaceae	1	c, i	Vegetable
Kol eka*	*Brassica oleracea var. botrytis*	Crucaceae	1	c, i	Vegetable
Kol eken*	*Brassica oleraceae var. capitata*	Crucaceae	2	c, i	Vegetable
Koloh	*Sauraria sp.*	Actinidiaceae	-	nc	Fruit for food
Kopi*	*Coffea arabica*	Rubiaceae	1	c, i	Drink
Kentang*	*Solanum tuberosum*	Solanaceae	1	c, i	Food and Vegetable
Lemon*	*Citrus spp.*	Rutaceae	-	c, i	Fruit, codiment, drink, medicinal
Liken	*Cyclosorus sp.*	Thelypteridaceae	-	nc	Vegetable
Liwo	*Piper miniatum*	Piperaceae	-	nc	Spice and vegetable
Lobe	*Saccharum edule*	Poaceae	-	c, o	Vegetable
Mai	*Unidentified*	Gendub	-	nc	Vegetable
Maliep	*Rubus fraxinifolius*	Rosaceae	-	nc	Fruit
Mangga*	*Mangifera indica*	Anacardiaceae	1	c, i	Fruit
Mayo	*Unidentified*	Gendub	-	nc	Salt
Min	*Ilex spicata*	Aquifoliaceae	-	nc	Fruit for feeding birds
Mumun	*Cudrania conchichinensis*	Moraceae	-	nc	Secondary food
Nanas*	*Ananas comosus*	Bromeliaceae	1	c, i	Fruit

Napire abo	*Manihot utilissima*	Euphorbiaceae	2	c, i	Food
Nasi, padi*	*Oryza sativa*	Poaceae	3	c, i	Food
Pain	*Dioscorea spp.*	Dioscoreaceae	5	c	Food
Papaya*	*Carica papaya*	Caricaceae	2	c, i	Fruit, medicinal plant, vegetable
Pare*	*Momordica charantia*	Cucurbitaceae	2	c, i	Vegetable
Petsai-cka*	*Brassica campestris*	Crucaceae	1	c, i	Vegetable
Saralek	*Vaccinium sp.*	Ericaceae	1	nc	Secondary food
Sawi*	*Brassica sinensis*	Crucaceae	3	c, i	Vegetable
Sait	*Pandanus conoideus*	Pandanaceae	4	c	Food
Saluka	*Pandanus sp.*	Pandanaceae	-	sc	Food
Sampun	*Unidentified*	Gendub	-	nc	Vegetable
Salada*	*Lectuca sativa*	Crucaceae	1	c, i	Vegetable
Seledri*	*Apium graviolens*	Apiaceae	1	c, i	Vegetable
Seluka	*Ficus sp.*	Moraceae	-	nc	Vegetable
Semangka*	*Citrulus vulgaris*	Cucurbitaceae	2	c	Fruit
Sowa	*Setaria palmifolia*	Poaceae	5	c	Vegetable, medicinal
Sukat-sukat	*Rhododendron orietes*	Ericaceae	-	nc	Bird food
Tuke	*Pandanus julianettii*	Pandanaceae	3	sc	Food
Tumi-tumi	*Flacourtia sp.*	Flacourtiaceae	-	nc	Food
Turi*	*Sesbania grandiflora*	Fabaceae	1	c, i	Vegetable
Ulep	*Cyclosorus sp.*	Thelypteridaceae	-	nc	Vegetable
Ulijagah	*Planchonella sp.*	Sapotaceae	-	nc	Vegetable
Welaluk	*Garcinia sp.*	Clusiaceae	-	nc	Bird food
Wenyale	*Psophocarpus tetragonolobus*	Fabaceae	5	c, i	Vegetable
Wenyale-wenyale	*Phaseolus vulgaris*	Fabaceae	1	c, i	Vegetable
Wenyale eken	*Glycine max*	Fabaceae	2	c, i	Food
Wenyale mili	*Phaseolus lunatus*	Fabaceae	2	c, i	Food
Wenyale agat	*Arachis hypogea*	Fabaceae	2	c, i	Food
Weramo	*Pandanus cf. brosimos*	Pandanaceae	-	nc	Food
Wortel*	*Daucus carota*	Umbeliferae	2	c, i	Vegetable
Wulep	*Pteridium sp.*	Pteridaceae	-	nc	Vegetable
Wulepeka	*Pteridium aquilinum*	Pteridaceae	-	nc	Vegetable
Wurika	*Cassia hirsuta*	Fabaceae	-	nc	Vegetable
Wurikaka	*Desmodium schalpe*	Fabaceae	-	nc	Vegetable
Yipit	*Alpinia sp.*	Zingiberaceae	-	nc	Leaf + pig blood used as vegetable
Yirilih	*Rubus sp.*	Rosaceae	-	nc	Fruit

Note : * = recent introduce plant use Indonesian name
c = cultivated
i = introduce
sc = semi domesticated
nc = non cultivated

Plants for Ritual Ceremonies

Some ceremonies at which specific plant species are used are: covers and ornament for material ceremony (*kaneke*) and war satisfaction material (*apwarek*), marriage material (*he yokal*), initiation ritual (*apwaya*), most part of traditional ritual (*mauwe*), ritual of cremation (*warekma*), ritual of fertility (*heperegenla*) and others ritual are listed in Table 4. In the Baliem Valley a large number of species are used for these ritual ceremonies (Table 4).

Table 4. Species used for ritual ceremonies by Dani in Baliem Valley

No	Rituals	Plants used obligation	Plants used for *seni*	Plantes pour un ornement de *kaneke*
A. Different stage of individual life ritual.				
1.	***Ap waya***: initiation ritual of ***ebe waya***.	***lokop*** (*Phragmites karka*), ***pabi*** (*Dodonaea viscosa*), ***lih*** (*Alpitonia excelsa*), and ***hom tugihom*** (*Colocasia esculenta*), ***el*** (*Saccharum officinarum*), ***haki*** (*Musa paradisiaca*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
2.	***He yokal***: marriage ritual	***folok*** (*Glochidion sp.*), ***mulele*** (*Geitonoplesium cymosum*), ***hipere*** (*Ipomoea batatas*), ***yabe*** (*Cordyline terminalis*), ***pinthe*** (*Cyathea cooperii*)	***idem***	-
3.	***Warekma*** : cremation ritual	***jabe*** (*Cordyline terminalis*), ***pinthe*** (*Cyathea cooperii*), stem of ***haki*** (*Musa paradisiaca*), ***mulele*** (*Geitonoplesium cymosum*), ***musan*** (*Oeranthe javanica*), ***wererekе*** (*Polygonum sp.*), ***hipere*** (*Ipomoea batatas*)	***idem***	-
3a.	***Wakunmo*** : sacred place ritual (***wakunmo***) for ***segajilik, helukone*** construction or repair or renew of ***segajilik***	***sege*** (lance of war), ***siluk*** (*Imperata cylindrica*), ***isoak*** (*Lagenaria siceraria*), ***mul*** (*Calamus prattianus*), ***mogatheleh*** (*Cynandrum sp.*), ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*).	***idem***	-
3b.	***Ye waganuok*** : part of ***warekma*** ritual (legalization of ***ye*** contribution)	not utilize of particular plants, except ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*)	idem	-
3c.	***Netaigen aigen nasuk palge*** (***palke***) : ritual for finger cutting (for woman only) or ear cutting for man when a bereavement of their family death	***wib*** (*Grevillea papuana*), ***simoka*** (*Gonocaryum sp.*).	-	-
3d.	***Pelabe*** : ritual for finishing a bereavement	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), ***yabe ap*** and ***yabe hai*** (*Cordyline terminalis*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-

B. Rituals correspond with agricultural activities				
1.	***Jage ekat matarek***: ritual for starting new sweet potato garden.	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
2.	***Hipere kaneke*** : ritual for the first planting of sweet potato.	***leh*** (*Alpitonia excelsa*), ***pabi*** (*Dodonaea viscosa*), ***pinthe*** (*Cyathea cooperii*), ***hipere*** cultivar ***hupuk*** (*Ipomoea batatas*), ***el mongkarako*** (*Saccharum officinarum*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
3.	***Hipere samalarek***: ritual for the first harvesting of sweet potato.	***pinthe*** (*Cyathea cooperii*), ***hipere*** (*Ipomoea batatas*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
4.	***Hiperegenla*** : ritual for the plant growth fertility, pig and human healthy.	***kobo*** (*Lithocarpus ruffovillosus*), ***lay*** (*Papuacedrus sp.*), ***mul*** (*Calamus prattianus*), ***mulele*** (*Geitonoplesium cymosum*), ***pinthe*** (*Cyathea cooperii*), ***yuragap*** (*Podocarpus neriifolius*), ***leh*** (*Alpitonia excelsa*), ***mogat heleh*** (*Cynandrum sp.*), ***siki*** et ***werasi*** (fougères), les feuilles de ***haki*** (*Musa paradisiaca*), ***lisani*** (*Acalypha amentacea*), ***pah*** (*Lithocarpus cf. ruffovillosus*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	***yabe*** (*Cordyline terminalis*), ***yebi*** (*Riedelia paniculata*), ***yiwi*** (*Amomum sp.*), ***helte-helte*** (*Alpinia sp.*), ***likaka*** (*Eragrotis bengkalise*), ***mak-mak*** (*Fimbristylis dichotoma*), ***likuah*** (*Fimbristylis sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***Namafnikiabut*** (*Dipteris conjugata*), ***sagan*** (*Desmodium dasypodium*),
5.	***Agat wesa*** : ritual for soil (***agat***) fertility	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), ***yabe*** (*Cordyline terminalis*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-

C. Rituals correspond with conflicts				
1.	***Wim kaneke hagasin*** or ***wimaela iyasuok***: ritual for preparing of war.	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), and plants used for covered and ornament of sacred materials.	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	***yabe*** (*Cordyline terminalis*), ***yebi*** (*Riedelia paniculata*), ***yiwi*** (*Amomum sp.*), ***helte-helte*** (*Alpinia sp.*), ***likaka*** (*Eragrotis bengkalise*), ***mak-mak*** (*Fimbristylis dichotoma*), ***likuah*** (*Fimbristylis sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***Namafnikiabut*** (*Dipteris conjugata*), ***sagan*** (*Desmodium dasypodium*),
2.	***Suap*** : ritual for war declaration. ***Suap*** is arrow.	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), plants used for ornament and covered of ***kaneke*** and ***apwarek***	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
3.	***Pel***: ritual for devil enemy protection.	not used plants particularity, except: ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
4.	***Wam amuli*** : ritual for reinforce of ***kaneke*** in order to invite the dead war spirit of the family member.	***walimo*** (*Leptospermum sp.*), ***walimo-walimo*** (*Rapanea sp.*), ***ulep*** (*Cyathea sp.*), ***sisika*** (*Cyclosorus sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***kuteleka*** (*Solamum verbascifolium*), ***helte-helte*** (*Alpinia sp.*), ***hipere*** (*Ipomoea batatas*) et ***pinthe*** (*Cyathea cooperii*), ***likaka*** (*Eragrotis bengkalise*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	***walimo*** (*Leptospermum sp.*), ***walimo-walimo*** (*Rapanea sp.*), ***ulep*** (*Cyathea sp.*), ***sisika*** (*Cyclosorus sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***kuteleka*** (*Solamum verbascifolium*), ***helte-helte*** (*Alpinia sp.*), ***pinthe*** (*Cyathea cooperii*), ***likaka*** (*Eragrotis bengkalise*).
5.	***Ap warek sewiloka*** : ritual for reinforcement of new ***ap warek.***	***Walimo*** (*Leptospermum sp.*), ***walimo-walimo*** (*Rapanea sp.*), ***ulep*** (*Cyathea sp.*), ***sisika*** (*Cyclosorus sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***kuteleka*** (*Solanum verbascifolium*), ***helte-helte*** (*Alpinia sp.*), ***ulul*** (Orchidaceae), ***likaka*** (*Eragrotis bengkalise*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***kuteleka*** (*Solanum verbasifolium*), ***helte-helte*** (*Alpinia sp.*), ***ulul*** (Orchidaceae), ***likaka*** (*Eragrotis bengkalise*)
6.	***Siragan isa*** or ***o lih*** : ritual for peace between two confederation war.	***lih*** (*Alpitonia excelsa*), ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
7.	***Eka isago*** or ***oka isago*** : ritual for	***lukaka*** (*Ischaemum cf. rugosum, Paspalum*	***hipere*** (*Ipomoea batatas*), ***lukaka***	-

	limit clarification of ***isa-eak*** territory. This limit is signed by ***sait*** (*Pandanus conoideus*) cultivation and the dry herb.	*conjugatum*), ***sait*** (*Pandanus conoideus*), ***pinthe*** (*Cyathea cooperii*), ***hipere*** (*Ipomoea batatas*).	(*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	
8.	***Wam wakunuok*** : ritual for reinforcement of the ***isa-eak*** link.	***lih*** oi ***leh*** (*Alpitonia excelsa*), ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
D. Others rituals :				
1.	***Wam mauwe*** or ***ebeakho*** : grand ritual of Dani-Baliem people.	***hipere*** (*Ipomoea batatas*) ; ***jabe*** (*Cordyline terminalis*) ; ***pinthe*** (*Cyathea cooperii*), ***el aboak*** (*Saccharum officinarum*), ***peleh*** (*Ficus sp.*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	***Walimo*** (*Leptospermum sp.*), ***walimo-walimo*** (*Rapanea sp.*), ***ulep*** (*Cyathea sp.*), ***sisika*** (*Cyclosorus sp.*), ***puali*** (*Neprolepis lauterbachii, N. exaltata*), ***kuteleka*** (*Solanum verbascifolium*), ***helte-helte*** (*Alpinia sp.*), ***ulul*** (Orchidaceae), ***likaka*** (*Eragrotis bengkalise*)
2.	***Timpat*** : is a necklace. Ritual for give a sign to a person who has done a certain ritual. This ritual is a symbol of the close relation between the tradition	***pinthe*** (*Cyathea cooperii*), ***hipere*** (*Ipomoea batatas*).	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
3.	***Niesok ai*** : ritual for ***pilamo*** construction. This ritual is a signed by herb that is used in the ***seni.*** These herbs are bonded in the pillar of ***pilamo***. This ritual is a symbol of the fondament of the Dani-Baliem life, notably for the construction of ***pilamo kanekela.***	***sak-sak*** (*Polygonum sp.*), ***yeleka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***pinthe*** (*Cyathea cooperii*), ***hipere*** (*Ipomoea batatas*), ***yabe*** (*Cordyline terminalis*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
4.	***Wam oup*** : ritual for curing sick pig.	***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), pig fat.	-	-

5.	***Seni eka*** ou ***isatarek*** : ritual for forecasting knowing a bad condition in the future. During this ritual, the Dani people cook herbs, if the herbs are not done is it indicating the decrease condition.	***yeleka*** (*Leersia hexandra*), ***pinthe*** (*Cyathea cooperii*), ***hipere*** (*Ipomoea batatas*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
6.	***Erowali*** or ***Ima wusa*** : ritual for custom transgression « ***pabi*** » (woman violation in same ***ebe***). In this ritual, a person who has done must be thrown into the water.	***pabi*** (*Dodonaea viscosa*), ***asim*** (*Pandanus pectianus*), ***leh*** (*Alpitonia excelsa*), ***hipere*** (*Ipomoea batatas*), ***pinthe*** (*Cyathea cooperii*), ***tun*** (*Microlepis speluncae*)	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-
7.	***Miso hagatarek*** or ***miyo persioko*** : ritual for inviting the rain.	***yabe*** (*Cordyline terminalis*)	-	-
8.	***Wam ilko*** : ritual for giving food to uncles (***nami*** = uncles and ***neak*** = aunt)	***hipere*** (*Ipomoea batatas*), vegetable and pigs. This ritual does not utilize a particular plant..	***hipere*** (*Ipomoea batatas*), ***lukaka*** (*Ischaemum cf rugosum, Paspalum conjugatum*), ***yeleka*** (*Leersia hexandra*), ***lisani*** (*Acalypha amentacea*).	-

Plants used for construction, fencing or fire wood

Dani communities in the Baliem valley utilize wood for fuel and occasionally for building material. Materials for the construction of houses are more specific than those for firewood. People habitually use *hamud* (*Kania eugenioides*), *alengkah* (*Eugenia* sp.), *biye* (*Scleropyrum leptostachyum*), *kul* (*Timonius montana*), *and sagi* (*Nothofagus rubra*) for housing. These species are still found in the primary forest at certain elevation. The people, instead, use other species of trees for house building materials (wall, pole, plate dorm are made from wood) as listed in Table 5, and roof is made from *siluk* (*Imperata cylindrica*).

Wood for fence can come from many species of tree found in the secondary forest and primary forests (Table 4.). The utilization of wood for garden fence is a big problem for the Dani. To build garden fences requires great quantities of woods and the cycle of the shifting cultivation (time fallow) does not allow the forests to supply the amount of wood that is needed. Therefore the Dani exploit forest reserves.

Dani women usually carry out firewood collection for daily needs when there is an agricultural activity such as cutting, slashing and burning. Most wood required of ritual purposes (*mauwe*) is collected from the primary forest by groups of Dani men.

People still utilize wood resources found surrounding the village, for example *wileh* (*Casuarina papuana*) and *wiki* (*Paraserianthes falcataria*).

Table 5. List of plants used for construction, fence construction material or firewood

Local name	*Scientific name*	Family	Use
Ageruyuh	*Pruuus grisea*	Rosaceae	C, F, FW
Agenyet	*Unidentified*	Gendub	C, F, FW
Alengkah	*Xanthomyrtus sp.*	Myrtaceae	C, F, FW
Alengka	*Eugenia sp.*	Myrtaceae	C, F, FW
Alimo	*Engelhardia rigida*	Juglandaceae	F, FW
Alok-alok	*Berberis sp.*	Berberaceae	F, FW
Amiksabuk	*Embelia viridiflora*	Myrsinaceae	C, F
Baga	*Sloanea archboldiana*	Elaeocarpaceae	C, F, FW
Berakai	*Porophyllum ruderal*	Rubiaceae	C, F, FW
Biye	*Sclerophyrum leptostachyum*	Santalaceae	C, F, FW
Dep	*Ardisia sp.*	Myrsinaceae	F, FW
Dili	*Prunus sp.*	Rosaceae	C, F, FW
Duaga	*Vaccinium angulata, V. varingiae -folium*	Ericaceae	F, FW
Fulu	*Rhododendron hellvigii*	Ericaceae	F, FW
Hamud	*Kania engunioides*	Myrtaceae	C, F, FW
Hapawor	*Glochidion sp.*	Euphorbiaceae	C, F, FW
Hapusi	*Planchonella firma*	Sapotaceae	F, FW
Harowaknen	*Glochidion rubrum*	Euphorbiaceae	C, F, FW
Heitem	*Flacoutia sp.*	Flacourtiaceae	C, F, FW
Helah	*Jatropa multifida*	Euphorbiaceae	C, F, FW
Helon, polet	-	Sapindaceae	C, F, FW, arrows (siken eken)
Heluk	*Macaranga mappa*	Euphorbiaceae	C, F, FW
Hemer	*Cinnamomum sp.*	Lauraceae	F, FW
Hemere	*Schizomeria serrata*	Cunoniaceae	F, FW
Hentam	*Maesa verrucosa*	Myrsinaceae	C, F, FW

Heya	*Castanopsis sp.*	Fagaceae	C, F, FW
Heit, Heye, Het	*Castanopsis acuminatissima*	Fagaceae	C, F, FW
Hia	*Debregeasia dichotoma*	Urticaceae	F, FW
Hiabogheh	*Actinodaphne multiflora*	Lauraceae	C, F, FW
Hok	*Streblus asper*	Moraceae	F,FW, sali, noken, yokal
Holim-holim	*Pittosporum pullifolium*	Pittosporaceae	C, F, FW, sege
Holisigom	*Rhododendron macgregoriae*	Ericaceae	F, FW, ornamental
Holison	*Rhododendron herzogii*	Ericaceae	F, FW, ornamental
Horap	*Unidentified*	Gendub	C, F, FW
Hubu	*Celtis rubrovinea*	Ulmaceae	Firewood for cremation
Hubuh	*Microcos sp.*	Tiliaceae	C, F, FW
Hugi	*Trema orientalis*	Ulmaceae	C, F, FW
Hula-hula	*Euodia elleryana*	Rutaceae	F, FW
Hule	*Ficus sp.*	Moraceae	F, FW
Hulikjagah	*Microcarpus sp.*	Microcarpaceae	C, F, FW
Hulok	*Trema cf orientalis*	Ulmaceae	C, F, FW
Hum	*Tetractomia lauterbachiana*	Rutaceae	C, F, FW
Hunerago	*Medinella sp.*	Melastomataceae	FW, medicinal
Hunowerago	*Rhyticaryum sp.*	Icacinaceae	C, F, FW
Ih	*Litsea sp.*	Lauraceae	C, F, FW
Ilkelik	*Rapanea papuana*	Myrsinaceae	C, F, FW
Ilakelik	*Glochidion philippicum*	Euphorbiaceae	C, F, FW
Illulik	*Elaeocarpus rosea*	Elaeocarpaceae	C, F, FW
Imakot	*Gonocaria sp.*	Gonocariaceae	F, FW
Inetamuken	*Rhododendron cf macgregoriae*	Ericaceae	F, FW, poison
Jagad	*Mischantus sp.*	Poaceae	C, F
Jilih	*Piper wilhelmia*	Piperaceae	FW, medicinal and ritual
Joli	*Tristania obovata*	Myrtaceae	C, F, FW, sike
Jual	*Glochidion vinkianum*	Euphorbiaceae	C, F, FW
Ka	*Erythrina crista-galli*	Fabaceae	F, FW
Kait	*Adinandra sp.*	Theaceae	C, F, FW
Kait	*Gardenia sp.*	Rubiaceae	C, F, FW
Kaloli	*Eugenia sp.*	Myrtaceae	C, F, FW
Kalolih	*Steganthera sp.*	Monimiaceae	C, F, FW
Kami	*Cinnamomum iners*	Lauraceae	F, FW, Medicinal
Kebir	*Wendlandia paniculata*	Rubiaceae	C, F, FW
Kekantu	*Rhamnus nephalensis*	Rhamnaceae	FW, rope
Kekatu	*Segeratia theezans*	Rhamnaceae	C, F, FW
Kepi	*Canarium pilosum*	Burseraceae	C, F, FW, utensil
Ki	*Nothofagus starkenburgii*	Fagaceae	C, F, FW
Kibako	*Rhododendron herzogii*	Ericaceae	F, FW, ornamental
Kibid	*Leviera beccariana*	Myrtaceae	F, FW
Kimpi	*Octomyrtus pleiopetala*	Myrtaceae	C, Utensil, cano
Kobo	*Lithocarpus ruffovillosus*	Fagaceae	C, F, FW
Kolakima	*Rapanea accuminium*	Myrsinaceae	FW
Koloh	*Sauraria sp.*	Actinidiaceae	F, FW, Fruit, leaf for base of cooking
Kolokan	*Steganthera hirsuta*	Monimiaceae	F, FW
Kop	*Diospyros sp.*	Ebenaceae	C, F, FW
Kubangko	*Ardisia sp.*	Myrsinaceae	C, F, FW
Kubangko	*Rhododendron bayerinckianum*	Ericaceae	F, FW, utensil

Kul	*Timonius montana*	Rubiaceae	C, F, FW
Kul	*Fagraea ceylanica*	Loganiaceae	C, F, FW
Kulok-kulok	*Dysoxylum caulostachyum*	Meliaceae	C, F, FW
Lait	*Podocarpus pilgeri*	Podocarpaceae	C, F, FW
Lawelay	*Eugenia cuprea, E. mosa*	Myrtaceae	C, F, FW
Lay	*Papuacerdus sp.*	Coniferae	C, F, FW
Leget bulah	*Drymaria sp.*	Caryophylaceae	F, FW
Leh	*Alphitonia incana*	Rhamnaceae	F, FW, ritual
Libah	*Cleome sp.*	Capparaceae	FW
Libah-libah		Sapindaceae	FW
Lisani	*Acalypha amentacea*	Euphorbiaceae	F, FW, Cigarette
Logon	*Ilex cf cymosa*	Aquifoliaceae	FW
Lokop	*Pragmites karka*	Poaceae	C, F
Lulaken	*Polygala sp.*	Polygalaceae	C, F, FW, sike
Lupue	*Melochia umbellata*	Sterculiaceae	F, FW
Mepsengkek	*Flacourtia rukam*	Flacourtiaceae	C, F, FW
Milaga	*Glochidion rubrum*	Euphorbiaceae	C, F, leaf for base of sweet potato cooking
Mileh	*Schefflera ischnoacra*	Araliaceae	F, FW
Mileh	*Symplocos sp.*	Symplocaceae	F, FW
Min	*Ilex spicata*	Aquifoliaceae	F, FW
Monika	*Pittosporum ramiflorum*	Pittosporaceae	F, FW, utensil
Mototo	*Psychotria dolichocarpa*	Rubiaceae	FW
Mukut	*Sauraria sp.*	Saurariaceae	F, FW
Mumuli	*Ficus sp.*	Moraceae	C, F, FW
Mupakep	*Eugenia sp.*	Myrtaceae	FW
Nirugum	*Coleus amboinicus*	Labiatae	FW
Nogolilih	*Wendlandia sp.*	Rubiaceae	C, F, FW
Finthe	*Cyathea cooperi*	Cyatheaceae	FW, ritual
Nyaksugun		Rutaceae	FW
Pabi	*Dodonaea viscosa*	Sapindaceae	F, FW
Pagali	*Gonocarium sp.*	Icacinaceae	F, FW, sege
Pagale	*Garcinia schraderi*	Clusiaceae	F, FW, sege
Pah	*Lithocarpus ruffovilosus*	Fagaceae	F, FW, ritual, wadloleget
Palok	*Sterculia sp.*	Sterculiaceae	C, F, FW
Panteb	*Psychotria chrysantha*	Rubiaceae	C, F, FW
Pawi	*Cudramia conchicinensis*	Moraceae	C, F, FW
Pelud-pelud	*Alangium pillosum*	Alangiaceae	F, FW
Pia, pig	*Garcinia sp.*	Clusiaceae	F, FW
Pipit	*Mussaenda reinwardtiana*	Rubiaceae	F, FW
Pogottmilih	*Prunus cf grisea*	Rosaceae	C, F, FW for victim
Pogum	*Rhododendron culminosolum*	Ericaceae	C, F, FW
Polok	*Sterculia sp.*	Sterculiaceae	C, F, FW
Pom	*Myristica holdingerii*	Myristicaceae	C, F, FW
Pompalep	*Eugenia sp.*	Myrtaceae	F, FW, ornamental
Popoli	*Pittosporum ferrugineum*	Pittosporaceae	C, F, FW
Poroom	*Rhododendron sp.*	Ericaceae	F, FW, poison, ornamental
Poroon	*Rhododendron cf herzogii*	Ericaceae	F, FW, ornamental
Potmili	*Prunus sp.*	Rosaceae	C, F, FW
Poter	*Sloanea paradisianum*	Elaeocarpaceae	C, F, FW
Potuh	*Schefflera lucida*	Araliaceae	FW

Poum	*Myristica halrungii*	Myristicaceae	C, F, FW
Puluh-puluh	*Alangia vilosum*	Alangiaceae	C, F, FW
Pum	*Anthrophyllum macranthum*	Araliaceae	C, F, FW
Put	*Anthrophyllum sp.*	Araliaceae	C, F, FW
Saberage	*Unidentified*	Gendub	C, F, FW
Sagalaleh	*Vaccinium sp.*	Ericaceae	C, F, FW
Sage	*Platea excelsa*	Icacinaceae	C, F, FW
Sageit	*Podocarpus sp.*	Podocarpaceae	C, F, FW
Sagi	*Nothofagus rubra*	Fagaceae	C, F, FW
Sagi	*Diospyros sp.*	Ebenaceae	C, F, FW
Saiko	*Garcinia bancana*	Clusiaceae	C, F, FW
Saluka-saluka	*Viola betonicifolia*	Violaceae	F, FW
Sanah	*Prunus sp.*	Rosaceae	FW
Selon	*Metroxyderon pullei*	Myrtaceae	C, F, FW
Seno	*Castanopsis sp.*	Fagaceae	C, F, FW
Si	*Euphorbia sp.*	Euphorbiaceae	C, F, FW
Sibilak	*Elaeocarpus sp.*	Elaeocarpaceae	F, FW
Simo	*Homalanthus novo-guinensis*	Euphorbiaceae	C, FW, medicinal plant
Simoka	*Gonocaria sp.*	Icacinaceae	FW
Sin	*Araucaria cunninghamii*	Araucariaceae	C, F, FW
Sip	*Diospyros sp.*	Ebenaceae	C, F, FW
Sop	*Macaranga sp.*	Euphorbiaceae	C, F, FW
Suagal	*Saphium sp.*	Euphorbiaceae	C, F, FW
Suakhal	*Gaulteria sp.*		C, F, FW
Sugun	*Wendlandia paniculata*	Rubiaceae	C, F, FW
Sumunik	*Dimorpanthera denticulifera*	Ericaceae	FW
Takotoghah	*Flacourtia sp.*	Flacourtiaceae	C, F, FW
Taluk	*Engelhardia sp.*	Juglandaceae	C, F, FW
Tentuk	*Cinnamomum sintoc*	Lauraceae	C, F, FW
Tition	*Willughbeia sp.*	Apocynaceae	F, FW, rope
Tomi-tomi	*Flacourtia sp.*	Flacoutiaceae	C, F, FW
Tumpuk	*Cinnamomum sp.*	Lauraceae	F, FW
Ul	*Polyosma ilicifolia*		F, FW
Ula-ula	*Myschocarpus pentaphyllus*		C, F, FW
Uleh-uleh	*Eurya acuminata*	Theaceae	C, F, FW
Umakar	*Drymis sp.*	Winteraceae	F, FW
Utholeh	*Medinella macrantha*	Melastomataceae	F, FW
Vi	*Castanopsis acuminatissima*	Fagaceae	C, F, FW
Waben	*Pseuderanthemum sp.*	Acanthaceae	C, F, FW, sike
Wah	*Timonius sp.*	Rubiaceae	C, F, FW
Wake	*Peltoporum inerme*	Fabaceae	C, F, FW
Waken	*Rapanea allensis*	Myrsinaceae	C, F, FW
Walehaleh		Ericaceae	C, F, FW
Walih	*Timonius sp.*	Rubiaceae	F, FW
Walih-walih	*Diospyros sp.*	Ebenaceae	C, F, FW
Walimo	*Rapanea sp.*	Myrsinaceae	FW, ornament of kaneke
Walimo-walimo	*Leptospermum sp.*	Myrtaceae	FW, ornament of kaneke
Waloh	*Ardisia sp.*	Myrsinaceae	C, F, FW
Wame	*Unidentified*	Gendub	C, F, FW
Wampisin	*Glochidion sp.*	Euphorbiaceae	C, F, FW, sike
Wamporoh	*Ardisia sp.*	Myrsinaceae	C, F, FW

Wangken	*Embelia coriaceae*	Myrsinaceae	C, F, FW
Wantagah	*Ilex mestegi*	Araliaceae	F, FW, sege
Warade	*Rhododendron sp.*	Ericaceae	F, FW
Watugi	*Tecomanthe nitida*	Bignoniaceae	F, FW
Wayo	*Unidentified*	Gendub	F, FW
Weke	*Peltoporum inerme*	Fabaceae	C, F, FW
Welangkon	*Vaccinium sp.*	Ericaceae	C, F, FW, sike
Welih	*Symplocos sp.*	Symplocaceae	F, FW
Werakap	*Podocarpus sp.*	Podocarpaceae	C, F, FW
Wese	*Commersonia incana*	Rhamnaceae	C, F, FW
Wesengke	*Polyscias sp.*	Araliaceae	F, FW
Wib	*Grevillea papuana*	Proteaceae	C, F, FW
Wiki	*Paraserianthes falcataria.*	Fabaceae	C, F, FW
Wileh	*Casuarina oligodon*	Casuarinaceae	C, F, FW
Wileh-wileh	*Baeckea frutescens*	Myrtaceae	F, FW
Wintago	*Vaccinium olbicans*	Ericaceae	C, F, FW
Wol	*Buddleja asiatica*	Lageniaceae	F, FW
Wolo	*Ardisia sp.*	Myrsinaceae	F, FW
Wopi	*Podocarpus sp.*	Podocarpaceae	C, F, FW
Wot	*Schefflera sp.*	Araliaceae	F, FW, sege
Wu	*Eugenia acuminatissima*	Myrtaceae	C, F, FW
Wul	*Meliasina ilisiphia*	Sarifraganaceae	C, F, FW
Wulikagal	*Diospyros sp.*	Ebenaceae	C, F, FW
Wumpak	*Gardenia hemingtonii*	Rubiaceae	C, F, FW
Wunagaleka	*Xanthomyrtus schlechteri*	Myrtaceae	C, F, FW
Wurikawot	*Schefflera chimbuensis*	Araliaceae	FW
Wusi	*Mallotus sp.*	Euphorbiaceae	C, F, FW
Yabogheh	*Elaeocarpus sp.*	Elaeocarpaceae	C, F, FW
Yage-yage	*Callicarpa caudata*	Verbenaceae	F, FW
Yalemeh	*Glochidion sp.*	Euphorbiaceae	F, FW
Yibi	*Nothofagus sp.*	Fagaceae	C, F, FW
Yibih	*Schizomeria ilicifolia*	Schizomeriaceae	C, F, FW
Yibiah	*Starchytarpeta australis*	Verbenaceae	C, F, FW
Yilok	*Eugenia cf verstegii*	Myrtaceae	C, F, FW
Yomoloh		Sapindaceae	C, F, FW, sike
Yuragap	*Podocarpus cf neriifolius*	Podocarpaceae	C, F, FW
Yuwae	*Vaccinium sp.*	Ericaceae	C, F, FW
Yomotlib	*Unidentified*	Gendub	F, FW

NOTE : C = contruction material ; F = fence ;FW = firewood and *sike, sege*, etc = see in the utensils of Dani section.

To make rope, the Dani use many wild plants. See Table 6. Rope is a very important in the building of the Dani traditional houses. These ropes are used to connect all parts of the house. *Jagat* (*Mischantus* sp.), *hite* (*Mischantus floribundus*), and *pinthe* (*Phragmites karka*) are used in the construction of the second floor (the sleeping loft).

Table 6. Plants used to make rope by the Dani people

Local name	Scientific name	Family	Use
Alimo	*Engelhardia rigida*	Juglandaceae	Fibre for selok (bands)
Amiksabuk	*Embelia viridiflora*	Myrsinaceae	Rope

Aniok	*Embelia sp.*	Myrsinaceae	Rope
Digi	*Astronia sp.*	Melastomataceae	Fibre for rope and noken
Eneit	*Raulvia rostrata*	Apocynaceae	Rope
Fuluk	*Unidentified*	Asclepiadaceae	Rope
Haki	*Musa paradisiaca*	Musaceae	Rope, fruit, ritual etc.
Hale	*Ficus sp.*	Moraceae	Fibre for rope, noken, sali
Helebeleh	*Unidentified*	Rubiaceae	Rope
Heleayoh	*Unidentified*	Gendub	Rope
Helekakap	*Clematis phanerophlebia*	Ranunculaceae	Rope
Hili	*Cyperus sp.*	Cyperaceae	Rope
Hilikuah	*Cyperus monocephala*	Cyperaceae	Rope
Hilukuah	*Bidens sp.*	Asteraceae	Rope of tabacco
Hok	*Streblus asper*	Moraceae	Fibre for rope, sali, yokal, and noken
Huagaleh	*Scaevola oppositifolia*	Goodeniaceae	Rope
Ilak-ilak	*Alyxia stellata and A. floribunda*	Apocynaceae	Rope, noken and sali
Ilalaka	*Alyxia sp.*	Apocynaceae	Rope, noken and sali
Isibungkak	*Embelia ribes*	Myrsinaceae	Rope
Isibongkah	*Hoya sp.*	Asclepiadaceae	Rope
Iyobere	*Derris sp.*	Fabaceae	Rope
Kekantu	*Rhamnus nephalensis*	Rhamnaceae	Fibre for rope
Lata	*Cipadessa baccifera*	Meliaceae	Rope
Likuah	*Fymbristylis sp.*	Cyperaceae	Rope
Likuluk	*Cyperus sp.*	Cyperaceae	Rope
Masem	*Clematis cf phanerophlebia*	Ranunculaceae	Rope
Mogatheleh	*Unidentified*	Fabaceae	Rope of Wadloleget
Mul	*Calamus prattianus*	Arecaceae	Rope, binding purpose
Mulele	*Geitopplesium cymosum*	Liliaceae	Rope
Pipuk	*Eleusine indica*	Poaceae	Rope of castration
Pompare	*Bochmeria platyphylla*	Urticaceae	Fibre for rope, noken
Ponnieta	*Ficus wassa*	Moraceae	Fibre for rope, noken, sali, yokal, timpat
Sabuak	*Salacia macrophylla*	Hyppocratiaceae	Rope
Sagaiheleh	*Lycopodia sp.*	Lycopodiaceae	Rope
Saliwali	*Palmeria ferruginea*	Monimiaceae	Fibre for rope
Tition	*Willughbeia sp.*	Apocynaceae	Fibre for rope
Wagayom	*Clematis sp.*	Ranunculaceae	Rope
Wamamoli	*Scleria levis*	Cyperaceae	Rope of castration
Wintete	*Jasminum sp.*	Oleaceae	Rope
Wola	*Tetrastigma dichotomum*	Vitaceae	Rope
Wolaheleh	*Rivinis sp.*	Phytolaccaceae	Rope
Wuluheleh	*unidentified*	Gendub	Rope
Yain	*Ficus sp.*	Moraceae	Fibre for rope, yokal and noken
Yiluah, yilula	*Bamboo*	Poaceae	Rope
Yokberek	*Tetrastigma cf dichotomum*	Vitaceae	Rope
Yowalat	*Cipholopus lutescens*	Urticaceae	Fibre for rope and noken

Plants used as dyes

The plants listed in Table 7 are used as dyes. Generally, the Dani do not know the synthetic coloring material from chemical material, but they know some of plants used for natural dyes.

Heider (1972) have reported that there are only two colors termed by the Dani, « *mili* » and « *mola* », these terms are not based purely on brightness. *Mili* includes both dark and cold colors, *mola* light and warm color. There is no equivalent English categorization of the spectrum, where dark and light are purely brightness-based (Heider and Oliver, 1972). Example of *mili* was reliably placed among the darkest greens and blues. *Mola*, however, appeared to have two basic focal points, the most common is a dark red, the less common is a pale pink.

Table 7. Plants used as dyes by Dani people

Local name	Scientific name	Family	Part	Color
Hupak-hupak	*Gardenia tubifera*	Rubiaceae	fruit	yellow
Teteit	*Ilex spicata*	Aquifoliaceae	resin	brown - yellow
Sapui	*Bixa orellana*	Bixaceae	grain, fruit	red
Kibi	*Amaranthus sp.*	Amaranthaceae	grain	red
Weayuken	*Mealstoma malabathricum*	Melastomataceae	fruit	violet
Weayuken	*Medinilla speciosa*	Melastomataceae	fruit	violet
Sel	*Pandanus sp.*	Pandanaceae	leaf	white
Wi wamagai	*Agrostophyllum majus*	Orchidaceae	rind of stem	yellow
Wi kiabut	*Dendrobium sp.*	Orchidaceae	rind of stem	yellow
Wi kilaboga	*Dendrobium piestocoulon*	Orchidaceae	rind of stem	yellow
Wi wampi	*Dendrobium phlox*	Orchidaceae	rind of stem	yellow

Plants for clothing, ornaments and tools

The categories « clothing » and « ornament » are highly ambiguous categories whose use unduly restricts functional analysis. But if one treats « clothing » and « ornament » as functional attributes rather than as exclusive categories, one can deal with objects of attire in a flexible classification system, which facilitates broad functional analysis. The category « attire » includes a large number of cultural objects relating specifically to the person, which are worn, carried, smeared, or hung on the body. Attire as a category contrasts with other categories of portable objects, because of their specialized functions, may be considered in the categories of « tool » weapon or « utensil » (Heider, 1970).

Functionally, Dani attire serves as protect the body against the element. It can also serve expressive and decorative functions; can have magical effects; function as a status symbol and help in transportation of other items. The attire of the Dani reflects and even goes beyond the general egalitarianism of Dani society in Baliem valley. The attire distinctions in Dani society are categorized based on age, sex and marital status.

Male attire

Penis gourd (*koteka, holim, Lagenaria siceraria*)

Penis gourd is the only essential men's garment. It is a narrow gourd tube about the diameter of the penis, which is slipped over the penis thus covering it. The gourd is held in place by two string called « *siniki* », these strings also hold the gourd erects. A small loop tied

through holes in the lower end of the gourd encircles part of the scrotum and often at least one testicle. The upper string, which passes around the waist and is fixed to the upper end of the gourd or, if it, is a long gourd, to the middle of the gourd. The *siniki* strings are made from the fiber plait of *win* (*Ficus* sp.), *honabun/yilok-yilok* (*Eugenia verstegii*), *ilak-ilak* (*Alyxia floribunda*), etc.

The Baliem valley Dani gourds are distinctive: (1) *segalep* (big penis gourd, vertically); (2) *hiyok* (medium penis gourd, standing out at a 45°); and (3) *holim mot* (little gourd, long and color is white-yellow).

The ornament wore by men are:

1. *Sekan* (arm bands) :

   Most Dani males wear armbands just above the elbow most of the time. Occasionally young girls also wear armbands. The band arm, which is worn on wrist, called *sinikale*. The most common armbands are woven from plait of *tikil* (*Dicranopteris liniaris*), *mul* (*Calamus prattianus*), *masem* (*Clematis phanerophlebia*), *mulele/mukulele* (*Geitopplesium cimosum*), *wi* (*Dendrobium* spp.).

   A common variant is a pig scrotum armband, made of the penis, seminal duct, and scrotum of a boar, which have been removed in one piece. According to the Dani, the scrotum armband, which is made from pigs killed for important ceremonies, have the power to protect the wearer from ghosts.

2. *Timpat, timpar* (necklace or neck gear) :

   Most of the Dani wear some objects suspended from a string around their neck. These necklaces, which often include ornaments, magical objects, tools, *pikon* (a music instrument which made from bamboo). They are made from fiber of the *honabun* (*Wikstroemia venosa*), *win* (*Ficus* sp.), *and ponieta* (*Ficus wassa*). The number of *timpat* necklaces wore by Dani males indicated that the number of ritual ceremonies they have participated in.

3. *Wamaik* :

   In the battle men wear pig tusks in the holes of their nasal septum. Other ornamental battle attire includes hand-held cassowary feather whisks and feather wands.

4. *Walimo* :

   Walimo is an ornament similar to a tie that is made from plait fiber of *mul* (*Calamus prattianus*), *honabun* (*Wikstroemia venosa*), and adorned with *walimoken* (Crustaceae). In the traditional ceremonies men wear *walimo* hung around their necks.

5. *Sanibusa* :

   Sinibusa is a leaf of *kem* (*Eleocharis dulcis*) or *yabeka* (*Cordyline terminalis*) or *hom* (Colocasia *esculenta*) or *sisika* (*Christella arida*), and musan (*Oeranthe javanica*) is held in the behind to protect the anus from flies after excrement.

6. *Inigahale* (head gear) :

Made of fiber plait of *tikil* (*Dicranopteris liniaris*), *yilok-yilok* (*Eugenia verstegii*) and between the fiber plait slipped with grains of *wearagabuak* (*Coix lacryma-jobi*), and other ornaments like synthetic beads, feather of paradise bird, etc.

Other male attire: Men, especially older men, may carry small net pouches slung from their shoulders. These are called *hanum su* (tobacco net), and hold the makings of cigarettes. They are made from fiber of *win* (*Ficus* cf. *drupacea*), *ponieta* (*Ficus wassa*), *hok* (*Streblus asper*) and *honabun* (*Wikstroemia venosa*).

Female attire

1. *Sali* (girl's skirt)

Sali is the dress worn by girls from about one year of age until the time of marriage. *Sali* is made of reed or string hanging from a string around the waist to mid-thigh. Based on material it is made from *sali* is divided in three categories: a). *Sali kem* : *sali* is made of *kem* (*Elaeocharis dulchis*) ; b). *Sali isobat* : *sali* made from fiber plait of *win* (*Ficus* cf. *drupacea*), *lisani* (*Acalypha amentacea*), *yain* (*Ficus* sp.), *yohewisa* (*Bochmeria nivea*), *yowalat* (*Bochmeria malabarica*), *ilak-ilak* (*Alyxia floribunda*), *sel* (*Pandanus* sp.) ; and c). *sali kuguk* : *sali* made of mixed between *sali kem* and *sali isobat.*

Based on method of worn sali is divided into a) *sali ampok*, *sali* is used on the interior part ; and b) *sali ebeai*, *sali* is used in the exterior part.

2. *Yokal* (women's skirt)

Yokal is the skirt worn by all married women, which is to say all normal adult women. The *yokal* is made of some twenty-five to thirty meter of braided cord wound around the hips. The skirt gives minimal coverage to the public region and is held in place by pressure around the hips, producing, in time, calluses at the contact point.

The *yokal* is a braided cord made of strands of fiber of *win* (*Ficus* cf. *drupacea*), *hilan* (*Ficus* sp1.), *yain* (*Ficus* sp2.), *ponieta* (*Ficus wassa*), *wurigi/enekemusi* (*Dawsonia beccari*), *hok* (*Streblus asper*), *sikepupuk* (*Sida rhombifolia*), *yohewisa* (*Bochmeria nivea*), *digi* (*Astronia* sp.), *yowalat* (*Cipholophus lutescens*), *diki* (*Bochmeria malabarica*), and with yellow-red or yellow orchid fibers braided-in to from a brightly colored upper surface. These orchids are : *wi kiabut* (*Dendrobium* sp1.), *wi kilaboga* (*Dendrobium piestocaulon*), *wi wamaga* (*Agrostophyllum majus*), and *wi wampi* (*Dendrobium phlox*).

Based on how it is worn *yokal* is divided into *yokal yibin* (*yokal* wore in the interior part) ; *yokal wiyakul* (*yokal* wore in the exterior part) ; and *yokal ebeai* (combined between *yokal yibin* and *yokal wiyakul*).

The Dani's utensils or tools

1. *Noken, su* (The women's carrying net)

Noken is a large string bag with a wide mouth and a forehead strap. The Dani net is knitted with loose open loops. Nets are made by women or older girls. The maker

alternately knits the net and adds to the length of the string by rolling fibers into it on her thigh, so that each net is made of a single string. A split stick shuttle may be used to draw the loose string through the loops. Before knitting the net, the string may be colored by red clay, a blue-purple flower base, or a yellow-to-orange root. The string may also be decorated by winding strips of brightly colored orchid fiber around it.

Noken is made from the fiber of *sikepupuk* (*Sida rhombifolia*), *win* (*Ficus* cf. *drupacea*), *ponnieta* (*Ficus wassa*), *yain* (*Ficus* sp1.), *hilan* (*Ficus* sp2.), *hok* (*Streblus asper*), *yohewisa* (*Bochmeria malabarica*), *digi* (*Astronia* sp.), and *yowalat* (*Cipholopus lutescens*). Plants used to color the string are: *sapui* (*Bixa orellana*, given rose colored); *teteit* (*Ilex spicata*, sticky plant sap give brown color); *kibi* (*Amaranthus* sp., grains give a rose color); *weayuken* (*Melastoma malabathricum*, fruit give violet color); *hupak-hupak* (*Gardenia tubifera*, fruit split in two part and rubbed on fiber to give yellow color); The orchids for coloring are similar to that for coloring in the *yokal* making.

2. *Sege* (lance or digging stick)

Based on use the *sege* can be divided into three types : (a) *ap sege* (*sege* used for battle/lance), this *sege* is made by wood of *joli* (*Tristania obovata*), *pagali* (*Garcinia schraderi*), and *dibu* (Myrtaceae) ; (b) *Sege akibak* (*sege* used for tillage/digging stick), generally *sege akibak* is made by wood of *kul* (*Fagraea ceylanica*), *mepsengkek* (*Flacourtia rukam*), *pabi* (*Dodonaea viscosa*), etc. ; and (c). *sege hipere sega* (*sege* for sweet potatoes digging, generally, this *sege* used by women, and made of all wooden-plant.

3. *Jagabilik* (stone ax and stone adzes)

The stone adzes are used for chopping down trees, for shaping thing as digging sticks, for smoothing planks, for breaking pig bones during butchering, for splitting logs into planks or firewood.

For hafting, the adze is hafted on a piece of wood shaped. The woods for hafting and chisel are : *hulebusuk* (*Planchonella* sp.), *hok* (*Ficus ampelas*), *ilak tugun* (Rutaceae), *kimpi* (*Octomycetes pleiopetala*), *monika* (*Pittosporum ramiflorum*), etc.

4. *Ye* (Symbolic stone)

Ye is all exchange stone. All sacred stones are called « *habo* ». One type of symbolic stone is used only for the sacred collection of object, kept in certain men's houses and may be called a sacred stone. The others are used primarily for exchange at funeral ceremonies and may be called exchange stones.

Exchange stone parts : the exchange stone is usually slightly bowed along the long axis and slightly elliptical in outline. The concave surface is called « *elok eken* », cheekbone or face, and the convex side is called « *opolike* », back. The narrow end is called « *ukul oak* », head or skull bone ; the long edges are called « *elak* », side or edge ; and the border end is called « *alokhe* », anus.

Ye, often they have elaborate decorations tied around the center of the stone. The decorations of the exchange stones are called in general « *etani* ». *Etani* is made of same plait fiber of plants, which used in the preparation of *yokal, su* and *sali* (see item *yokal*).

5. *Sike* and *sike eken* (bow and arrow)

The bow and arrow are used by the Dani for fighting, hunting, and killing pigs. The bowstring is a rattan/*mul* (*Calamus prattianus*) or *wim* (bamboo) band about one-two centimeter broad. The arrows are composite, a plain reed shaft and a hardwood point.

Bows are made of several different woods, such as : *lulakun* (*Polygala* sp1.), *waben* (*Psedeuranthemum purpureum*), *welangkon* (*Polygala* sp2.), *joli* (*Tristania obovata*), *yomolo* (Sapindaceae), *pagali* (*Garcinia schraderi*), *wampisin* (*Glochidion* sp.), most of which can be obtained from the local forests. Shaping the bow involves the same processes as that of the spear ; rough shaping with the adzes, finer smoothing with sandstone and finally with leno-grass, and leaf of *hok* (*Ficus ampelas*).

The bowstring is made of a strip of rattan or bamboo. It usually includes one or two of the thick node ridge.

Arrows (*sike eken* or *ekat maleh*) for fighting are made of several different hard woods: *welangkon* (*Polygala* sp2.), *waben* (*Pseuderanthemum purpureum*), *yomoloh* (Sapindaceae), *wampisin* (*Glochidion sp.*), *polet* and *wio* (unidentified). The thick end of *sike eken* (arrow) called as *maleh ukut* are made of trunk/stem of *pinthe* (*Phragmites karka*) and *hite/yerona* (*Mischantus floridulus*). For unite between *maleh ekat* and *maleh ukut* is string fiber of *mul* (*Calamus prattianus*).

There is considerable variation in the design of *sike eken* arrows used for fighting in terms of barb patterns, notches, and decoration of the tip and shaft.

Bamboo arrow (*wim sike eken*), bamboo-tipped arrows are used primarily for killing pigs, birds, but are also carried and shot in battles. These arrows are tipped with a long blade made of an arc-section of bamboo, with a sharp point. The concave face of the arrow is often decorated with notches or dots cut in the soft inner side of the bamboo.

There are five types of bamboo arrows on the type of bamboo (*wim*) used: (1) *wim magawin* ; (2) *wim saknegali* ; (3) *wim timpho* ; (4) *wim kilu* ; and (5) *wim sibak*.

There is a considerable variation in the way that these arrows are fixed to the shaft. They may be simply bound on by many irregular windings of a threadlike fiber ; or a tight, bumpy woven sleeve may bind them. Often the binding is smeared with a white limestone paste that is also used on the band of the dark long spear.

6. *Disu*

Disu is made of pigs bone that formed like needle. The *disu* is used to remove arrows from a corpse that has been struck, to castrate a pig (*wam waliken waganuok*) or to sew up the scrotum after the castration operation. The following plants are used as thread material: *helabon, pipuk, yolalek* (*Eleusine indica*).

7. *Tul*

Tul is a utensil that made of pig bone, formed like a knife and used to split *hipere* (*Ipomoea batatas*), woods, etc.

8. *Pikon*

The *pikon* is a traditional bamboo mouth harp, made from a single piece of reed and played by pulling at a string attached to one end. *Pikon* are made from pin the reed

(*Phragmites karka*). A section of the reed including one septum is cut and split in half. With flint flakes the three long pieces are shaped and scraped thin. A hole is bored in the end just beyond the septum and a string passed through, which is then held by a knot. The two outside strips are longer than the center vibrating one.

9. *San*

The *san* is a tool that is used to patch rest of food like pig bone, tuber of *Ipomoea batatas*, *Dioscorea spp.*, etc. The *san* can be made from many wood: *kobo* (*Lithocarpus ruffovilosus*), *pah* (*Lithocarpus* sp.), etc.

10. *Sengken intok*

Sengken intok is used to start a fire. *Sengkan intok* is made of bamboo rope, wood, dry *siluk* leaf (*Imperata cylindrica*), *holia* (*Bidens biternata*), *jagat* (*Sacharum spontaneum*), *lokop* (*Pragmites karka*), *yeleka* (*Heckeria* sp.). The method used to start the fire is to rub the *sengkan intok* material between bamboo and wood.

11. *Isakpel*

Isakpel is used to pinch/pressing the tobacco leafs during dry processing. *Isakpel* is made of a banana stem (rib) *haki oak* (*Musa paradisiaca*), and *jagat* (*Saccharum spontaneum*) or bamboos as a pincher. As a rope material *mul* is used (*Callamus prattianus*) and *mulele* (*Geitopplesium cimosum*).

12. Others utensil

a. *Kontitugi* : wood-chip used to catch of *konti* (bat)
b. *Fulok* : is made of joint of bamboo (*wim*) used to grow up of flame
c. *Hanumpali* : cigarette pipe that is made of it joint of *lokop* (*Pragmites karka*)
d. *Hilba* : is Dani's tool used to pinch hot stones and bring them to the cooking hole. *Hilba* is made of all wood
e. *Bubuk* : tools made of all wood and formed like a scoop with a handle. *Bubuk* is used to move hot charcoal

Others utilization of plants by the Dani

Some plants like: *hanum* (*Nicotiana tabacum*), *lisani* (*Acalypha amentacea*), *yarewel* (*Glochidion* sp.), and plays an important role in the daily lives of the Dani people. These plants are used to make cigarettes. Almost all of the older Dani smoke.

CONCLUSION

Given the diversity of the Irian Jaya flora and the relative lack of information concerning ethnobotanical uses of plant material from this area, ethnobotanical studies such as this one are likely to reveal a wealth of information about previously undocumented useful species. With development programs and the influence of cultures outside of the Baliem valley,

knowledge concerning traditional practices and traditional utilization of forest products may soon be lost. Therefore ethnobotanical research that includes taxonomically and ecological data are a matter of urgency to identify species which require protection and further investigation.

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