

## Ethnobotanical Value of Medicinal Plants Used in the Treatment of Dengue

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### ABSTRACT

*The researcher was motivated to conduct this study because, years ago, neighbors and relatives were diagnosed with dengue fever, and no medicine is yet solely prescribed for its treatment. The researcher wrote down what plants are used to treat dengue and how they are used. It listed the local and scientific names of the plants, the parts that were used, and the different ways to prepare, give, and use the plants. It included information on medicinal plants and their value to the patients and their families. Further, it identified the assistance given by the government to the patients. Qualitative methods using a semi-structured interview and focus group discussions were employed. The ethnobotanical survey was conducted in Caoayan, Ilocos Sur, in seven barangays. There were 152 interviewees. Actual visits were done in selected places where dengue occurred. Ethical protocols were employed. As for results, 17 medicinal plants were used to treat dengue. These are papaya, tawa-tawa, camote, malunggay, ampalaya, dalandan, broccoli, kahil, neem, ipil-ipil, baraniw, bayabas, cucumber, coconut, lemon, kalamansi, and mansanas. The first three were the most commonly used among the identified remedial plants. Patients said that after two to five days of using the medicinal plants, the patients' platelets became better and later normalized. Sources of information about the efficacy of medicinal plants were relatives, friends, faith healers, rural folk, and nurses. It is recommended that papaya, tawa-tawa, camote, and malunggay leaves be used by dengue patients for a maximum of 3-5 days.*

**Keywords:** Culture sharing, papaya, qualitative method, 4s strategy

### INTRODUCTION

In the past, dengue fever spread globally, like malaria. Taiwan, the Philippines, Sri Lanka, Borneo, and some parts of China have seen growing dengue fever epidemics. A virus spread by the daylight mosquitoes *Aedes aegypti* and *Aedes albopictus* causes it.

Flaviviridae viruses cause dengue. It is considered the most frequent infection caused by viruses spread by mosquitoes, called arboviral disease. It causes severe flu-like symptoms such as a 40-degree body temperature, an acute headache, a flushed face, skin rashes, and joint and muscle discomfort. Fast-growing dengue. It is a severe public health problem in various nations. Ninety-five million of the 389 million annual infections are clinically evident. Human-*Aedes* vector transmission is endemic, hyperendemic, and epidemic. Most endemic regions have 1 or 2 dengue virus (DENV) varieties that predominate seasonally. Population growth, urbanization, worldwide travel and trade, and people's conduct that creates mosquito breeding places like plastic containers and used tires with stagnant water are all contributing to the dengue

pandemic. Vector control has a poor reduction in transmission. No anti-DENV drugs prevent or treat dengue. Vaccines under preclinical and clinical development have not been licensed (Oxford Journal, 2014).

Four to seven days after infection, dengue fever begins with a high fever, sometimes 40 °C. Red rashes may cover the body 2–5 days after the fever starts. Measles-like rashes follow.

Humans have 150,000–450,000 platelets per microliter of blood. Thrombocytosis is above 450,000 platelets." Thrombocytopenia is below 150,000. A complete blood count gives platelet numbers (CBC).

The Philippines Department of Health (DOH) declared August 6, 2019, as the National Dengue Epidemic, following 146,062 cases from January to July 20, 2019. This is 98% higher than in 2018. Six hundred twenty-two died. DOH Dengue Surveillance Western Visayas (Region VI) had 23,330 dengue cases, followed by CALABARZON (Region IV A) with 16,515; Zamboanga with 12,317; Northern Mindanao with 11,455; and SOCCSKSARGEN with 11,083. Dr. Francisco T. Duque III, Health Secretary, stated, "A national epidemic must be declared in this area to identify where a localized response is needed and to require the local government units to use their Quick Response Fund to solve the epidemic situation." Seven of these seventeen regions have exceeded their dengue epidemic threshold for three consecutive weeks. These regions are CALABARZON with 16,515 instances; MIMAROPA with 4,254; V (Bicol) with 3,470; VI (Western Visayas) with 23,330; VIII (Eastern Visayas) with 7,199; IX (Zamboanga Peninsula) with 12,317; and X (Northern Mindanao) with 11,455 cases. Region I (Ilocos) had 4,396 cases, Region VII (Central Visayas) had 10,728 cases, and BARMM had 2,301 cases. The 29th Morbidity Week (July 14–20) saw 10,502 cases nationwide. This is up 71% from 2018. (Philippine News Agency, 2019)

As both the NCR and Region 1 (Ilocos) have reached the "alert threshold," a DOH official told people to be more careful when fighting dengue. "We are beyond the alert level and nearing the pandemic threshold," DOH Undersecretary Eric Domingo said in a Monday television interview. "An alert level means you are seeing more cases than the norm in the preceding five years, and there is a higher threshold—this is the epidemic, considerably greater than expected for that location." After months below the alert threshold, cases are rising. Officials told people to clean up and keep their children safe because the way it rains affects the mosquitoes that carry dengue. The DOH launched the Sabayang 4-o'clock Habit on August 6 to increase awareness and encourage the community to weed out dengue breeding spots daily at 4 p.m. To combat the national epidemic, Health Secretary Francisco Duque III asked government agencies, local governments, schools, and communities to implement the "4 o'clock habit get out!" vector control initiative. Because mosquitoes multiply for two to three weeks after the rain stops, dengue in the Philippines begins in July and lasts until November. Only in December do cases decrease. Highlighting the importance of early diagnosis and treatment in improving dengue survival. Domingo said that the Department of Health had given money to help, especially in areas where there were

epidemics. This money was used to buy medicine and test kits (Philippine News Agency, 2019).

Dr. Carmeliza Singson, chief of the Provincial Health Office of Ilocos Sur, told Bombo Radyo Vigan that 2,524 dengue cases were reported up to August 18, 2019. Seven people died, the last from Caoayan, Ilocos Sur. Sta. Cruz, Ilocos Sur, had the most (397), followed by Candon, San Juan, Vigan, Sto. Domingo, Magsingal, Cabugao, Tagudin, Sinit, and Sta. Maria (Kaso ti Dengue ti Ilocos Sur, Bombo Radio 2019). The cities with the most dengue cases in Ilocos Sur were Sta Cruz (135), San Juan (70), Cabugao (62), Candon City (58), Magsingal (50), Vigan City (41) Sto. Domingo (34), Tagudin (30), San Esteban (28), and Caoayan (24) (Tawid News Magazine, 2019).

Perera et al. (2018) found that the medicinal plant *Euphorbia hirta* can treat dengue fever because it kills viruses and makes more platelets. To confirm the folkloric claim, they researched pharmacology, like the isolation of active components and testing for anti-dengue.

Singh and Rawat (2017) discovered that approximately 22 Indian herbs could be used to treat dengue patients. Nevertheless, scientifically speaking, only three plant extracts revealed effectiveness. There is a dire need to conduct more investigations and subject them to pharmacological analyses.

In the study of Suleiman (2015) on a survey of the ethnobotany of healing plants used by the people of the Northern Kordofan region, he mentioned that it helped to document information that is needed in the present and the future. Considered to be the first ethnobotanical study in which statistical calculations about plants are carried out using the ICF and UV methods in the study area.

Kadir et al. (2012) mentioned that dengue fever has caused mortality and morbidity in the universe, most especially in the subtropical regions, which is the main concern of the World Health Organization (WHO) and different countries. As a result, there was an urgent need to look for medicinal plants to stop the virus.

Halim et al. (2011) claimed that papaya has several medicinal uses. The extracts of the leaves proved scientifically effective for the healing of wounds. The plant has protective effects against gastric damage in mice. At 2000 mg/kg, there was no toxicity sign; no deaths occurred with the mice observed in 14 days.

In their study, "Ethnobotanical appraisal and cultural values of medicinally important wild edible vegetables of the Lesser Himalayas—Pakistan," Abassi et al. (2013) stated that patterns of wild edible plant usage depend primarily on socio-economic factors rather than climatic conditions or flora wealth, but have been harshly eroded in recent decades due to changes in the inhabitants' lifestyles. Use reports verifying common cultural heritage and the cultural worth of quoted taxa are analogous. Phytochemical analysis, antioxidant activities, pharmacological applications, skill training in farming, and biotechnological techniques to improve the yield are important features to consider regarding wild edible vegetables.

All the above-cited studies have bearings to the current study; these are medicinal plants that cure dengue and toxicity levels of the plants that could help the present investigation.

With the above scenario and the researcher's experience of having a son who was diagnosed with dengue years ago and knowing fully well the stresses, fears, and expenses incurred, he was interested in studying remedial dengue plants that could be the best remedies to treat dengue and recommending them to patients. The researcher took notes on an ethnobotanical survey of the plants that Dengue patients in Caoayan, Ilocos Sur, used to get better. It listed the local and scientific names of the medicinal plants used to treat people with dengue in Caoayan, Ilocos Sur, as well as the parts of the plants that were used and the different ways to prepare, give, and use them. It also provided information, such as the source of plant information as medicinal plants and the value of the plant to the patients and their families.

### **METHODOLOGY**

During a focus group discussion and a one-on-one interview, the researcher used a semi-structured technique as part of the qualitative method. The ethnobotanical survey was conducted in Caoayan, Ilocos Sur, particularly in seven barangays, namely, Manangat, Tamurong, Villamar, Naguilian, Nansuagao, Baggoc, Pantay Quitiquit, and Caparacadan, where dengue occurred. Data on dengue patients were taken from Gabriela Silang General Hospital and Rural Health Unit, Caoayan, Ilocos Sur. Letters were given to the respondents before the interview. In gathering data, individual interviews were conducted by the researcher, her students in the graduate school, and Caoayan church leaders from the different barangays. They collected ethnobotanical data directly from mothers of dengue-affected children. Patients (62), mothers (80), and ten rural dwellers confirmed the uses of the plants for a total of 152 interviewees. There were 32 female and 30 male patients, ages 10-58 years old. Actual visits were done in selected places where dengue occurred in Caoayan, Ilocos Sur. The data collected for each plant included the local name, uses, parts of the plant used, mode of preparation, and how patients learned about it. Data gathering was done from December 2018 to November 2019. The respondents received verbal and written information regarding the objectives, methods, and benefits of the current research.

Full consent was obtained from the participants before the data collection phase of the study. It meant telling the person about his or her rights, the reason for the study, the steps that would be taken, and the risks and benefits of taking part. The interviewees in the current investigation participated willingly. Respondents were not subjected to any harm, like physical risks that include physical discomfort, pain, injury, illness, or disease brought about by the methods and procedures of the research. (A physical risk may result from the involvement of physical stimuli such as noise, electric shock, heat, cold, electric magnetic or gravitational fields, etc.).

Respect for the dignity of research participants was prioritized. The protection of the privacy of research participants was ensured. An adequate level of confidentiality of the research data was considered. The anonymity of individuals participating in the research was ensured, and there was no deception or exaggeration about the purpose of the research. The researcher used codes on data documents instead of recording

identifying information and kept a separate document that links the study code to subjects' identifying information. The researcher locked the document in a separate place and made sure no one else could get to it. They also encrypted personal information, threw away, destroyed, or deleted study data and documents in the right way, and stored data documents safely in locked places.

On pictures for publication. The researcher asked the interviewees to post their pictures inside or back views for as long as their faces were not recognized.

## RESULTS AND DISCUSSION

There were 62 patients out of 80 respondents who used medicinal plants. Mothers and eldest sisters were the ones who prepared the medicinal extracts. The table below shows the remedial plants used and claimed by the patients to treat their ailments.

**Table 1**

*The remedial plants used by patients to treat dengue in Caoayan, Ilocos Sur*

Local Name of Plants	Scientific & English Names	# of patients who used	Plant Part used	How the patients prepared the remedial plants.
1. Papaya	<i>Carica papaya</i> (Papaya)	20	Leaves	Grind three leaves using a blender, add one glass of water, add 1 tsp honey to make the taste better/sweeter because the papaya extract has an unpleasant taste. Drink for the whole day. Do this for 2-5 days.  Grind one biggest leaf, remove the midrib, put one glass of water, squeeze, get the extracts, then add one tsp sugar, drink for the whole day, and repeat this for 2- 5 days.
2. Tawa-tawa	<i>Euphorbia hirta</i> (Snake Weed)	14	Leaves	(Decoction) Boil 20-25 leaves in a kettle with three glasses of water. Consume the extracts for a day, and do it for four days.
3. Camote	<i>Ipomoea batatas</i> (Sweet Potato)	5	Camote tops	Get 20-25 camote tops, boil for 10 minutes or less, then add vinegar, sugar, and paminta; eat it 3x a day for five days.
4. Malunggay	<i>Moringa oleifera</i> (Horseradish)	5	Leaves	Boil a cupful of marunggay leaves with a glass of water in a kettle for 5 minutes, then drink it for one day, and do it for five days.

Local Name of Plants	Scientific & English Names	# of patients who used	Plant Part used	How the patients prepared the remedial plants.
5. Ampalaya	<i>Momordica charantia</i> (Bitter gourd)	4	fruit	Grind three ampalaya fruits, squeeze, and get the juice to add half a glass of water, get the extracts, and put 2 tsp brown sugar, drink for one day, and do it for five days.
6. Dalandan	<i>Citrus aurantium</i> (orange)	1	fruit	Cut one fruit and squeeze, get the juice, put desired sugar, and drink. Do it 3x a day for five days
7. Broccoli	<i>Brassica oleracea</i> (broccoli)	1	Stem flower	Boil half a kilo and eat it with vinegar, sugar, and salt; eat for the whole day for three days or more.
8. Kahil	<i>Citrus sinensis</i> (Orange)	1	Fruit	Eat five fruits for the whole day for seven days
9. Neem	<i>Azadirachta indica</i> (Neem)	1	Leaves	Boil 7 leaves of neem with two glasses of water, add sugar or honey, get the extract, and drink it at regular intervals. Do it for three days.
10. Ipil-ipil seeds	<i>Leucaena leucocephala</i> (Ipil-ipil)	1	Young Seeds	Get 3 -4 young fruits, eat the young seeds, and do it for three days. These remove worms, too, aside from curing dengue.
11. Baraniw	<i>Cymbopogon citratus</i> (Lemongrass)	1	Leaves	Boil seven leaves, then add 3 ½ glasses of water, add sugar or the like, drink for the whole day, and do it for 3-4 days.
12. Bayabas	<i>Psidium guajava</i> (Guava)	1	Leaves	Get seven fresh leaves to grind, add a small amount of water, enough for extraction, squeeze, get the extracts, put a tablespoon of sugar, then drink 2 x a day for four days.
13. Cucumber	<i>Cucumis sativus</i> (Cucumber)	1	fruit	Get five cucumbers, slice them, soak them in a 1/3 bowl vinegar, add half tsp sugar and salt, eat for the whole day, do it for 3-4 days.
14. Coconut	<i>Cocos nucifera</i> (Coconut)	1	fruit	Drink the coconut water for the whole day, two coconuts a day for seven days.

Local Name of Plants	Scientific & English Names	# of patients who used	Plant Part used	How the patients prepared the remedial plants.
<b>15. Lemon</b>	<i>Citrus limon</i> (Lemon)	1	fruit	Cut one lemon, squeeze, put it in a glass filled with $\frac{3}{4}$ warm water, add one tsp sugar, and drink; one may do this 3x a day for five days.
<b>16. Kalamansi</b>	<i>Citrofortunella microcarpa</i> (Calamansi)	1	fruit	Slice 5 calamansi into two squeezes, then put in a hot cup of water, put 1 tsp brown sugar or honey, and drink; you can do this 3x a day for seven days.
<b>17. Mansanas</b>	<i>Malus domestica</i> Apple	1	fruit	Get three apples, slice them into many, put them in a blender, and grind. Add half a glass of water and 3 tsp honey (Honey is added just to improve the extract). Drink for the whole day, and do this for five days.

As seen in Table 1, papaya leaves were used by many; this is the most popular among the medicinal plants used to cure dengue in Caoayan, Ilocos Sur; the mothers and patients mentioned that it is likened to a miracle, platelets were going down but when the patients drank the plant extracts their platelets went up after eight hours. On the 2nd day, as they continued to drink, they were better, and on the third/4th/5th/sixth day and on the seventh day were released from the hospital. Tawa tawa, the 2nd popularly used, was also effective. They said after continuously drinking the extracts for 3-7 days, their platelets normalized. The third and fourth highest were kamote, malunggay leaves, and ampalaya fruit. All the rest only one is used for each of the remaining medicinal plants mentioned above. It is also noted that the young ipil-ipil seeds, when the patient ate these, not only was her dengue healed, but died parasitic worms were also ejected at her anus.

Ahmad et al. (2011), in their study on papaya leaves to cure dengue fever, mentioned that patients drank water first. Before the administration of the papaya extract, the patient began to vomit, so physicians gave fruit juices and 25 mL of papaya extract to the patient in the morning and evening. After two days, the blood samples were observed for different parameters. In the first blood report, it was observed that the platelet count, white blood cells, and neutrophils increased to  $73 \times 10^3/\mu\text{L}$ ,  $3.8 \times 10^3/\mu\text{L}$ , and 56.0 percent, respectively. Using the same dose of extracts, on the second day, the blood report showed that the PLT count reached to  $120 \times 10^3/\mu\text{L}$  while WBC and NEUT reached  $4.4 \times 10^3/\mu\text{L}$  and 64.2 percent, respectively. On the third day, PLT count ( $137 \times 10^3/\mu\text{L}$ ), WBC ( $5.3 \times 10^3/\mu\text{L}$ ), and NEUT (71.1%) increased. In the fourth blood report (PLT:  $159 \times 10^3/\mu\text{L}$ , WBC:  $5.9 \times 10^3/\mu\text{L}$  and NEUT: 73.0%) and fifth report

(PLT:168×10<sup>3</sup>/μL, WBC: 7.7×10<sup>3</sup>/μL and NEUT: 78.3%), the PLT, WBC, and NEUT reach to their normal levels.

Perera et al. (2018), in their study on *Euphorbia hirta*, revealed that this plant has folkloric use in curing dengue in remote places in the Philippines. The leaves of the plant above, locally known as "Tawa-Tawa," are prepared through decoction and drank by patients for days.

### **Summary of Testimonies of the Interviewees**

The mothers and patients were very thankful that they were able to use the above medicinal plants that helped the patients normalize their platelets. After taking in the extracts after one day, they became good, and religiously taking in the extracts after two days, their patients' blood platelets became better. After 3 to 5 days, their blood platelets were fully all right. Some of them did not need any more blood transfusions because after drinking the extracts and before the red cross rescuers arrived, their platelets normalized. They said that their sources of information were the internet, relatives, friends, neighbors, the elderly, faith healers, and even nurses. They said that, especially for papaya, tawa-tawa, and camote leaf extracts, the medication was like a miracle, and because of this, the mothers proclaimed in their barangays the effectiveness of the extracts. When asked about the toxicity level, others said that after 5 -7 days of using, they stopped because they were afraid there might be toxicity in the plant constituents, especially papaya and neem, which are bitter in taste. The medicinal plants were so important to them, and they were no longer afraid that any member of the family would be stricken by dengue again; they already knew what to do. They further mentioned that if symptoms show like fever, pain behind the eyes, sudden headaches, vomiting, severe joint and muscle pain, fatigue, nausea, or skin rash, which appears two to five days after the onset of fever, they must go immediately to the hospital or RHU, and if diagnosed by the doctor as "dengue," they will immediately apply their medicinal plant extract medication.

### **On the importance of the medicinal plants used to treat dengue**

To them, this means a lot because of their children's lives. This helped them minimize expenses and mostly released their fears/anxiety of death and where to borrow money for their expenses of medicines and blood. Even if the government gave money to the 4P's recipients, it is not enough. They said they need the medicinal plants gathered from their yards, or 30 pesos camote tops, for example, could already save numerous lives. One also mentioned that with this medicinal plant, "papaya," she used, she appreciated the culture of her friend because she was then the source of information (her friend's tribe members were stricken with dengue, and they were cured by using papaya extracts). To her, this papaya had strengthened their friendships. Mothers said the occurrence of dengue with the medicinal plants as a solution to their problem had made their family relationships closer as each member of the family was so concerned about the well-being of the patients. As a result, many of them planted



the medicinal plants mentioned above, especially papaya, tawa tawa, camote, and malunggay.

### **Assistance the government gave to the dengue patients:**

Dengue patients in Caoayan, Ilocos Sur were assisted by the government. They were given free physician's consultation fees and medicines. The LGU sanitary inspectors went to their houses to remove the sources of dengue; they removed stagnant water and water stored in different containers like bottles, wheels, etc. Bills in the hospital amounted to PhP 38,000 plus were free because they are 4Ps and have their PhilHealth. They were given insecticides to spray at home. They were frequently visited by the LGU / barangay officials. Because of Dengue, the 4 S strategy was conducted. It stands for "Searching and destroying" for sites of mosquito breeds; "Self-protecting measures" like wearing long pants and long sleeves and daily use of mosquito repellent; "Seeking early-stage consultation"; and "Supporting fogging activities" in parts to prevent the spread.

It is also noted that those who belong to well-to-do families did not receive any assistance from the government because they did not declare the occurrence of dengue in their families.

## **CONCLUSION**

Seventeen medicinal plants were used to treat dengue in Caoayan, Ilocos Sur. These were papaya, tawa-tawa, camote, malunggay, ampalaya, dalandan, broccoli, kahil, neem, ipil-ipil, baraniw, bayabas, cucumber, coconut, lemon, kalamansi, and mansanas. The first two were the most used among medicinal plants. After two to five days of using the plants, the patients' platelets became better and later normalized. Sources of information about the efficacy of medicinal plants were relatives, friends, faith healers, rural folks, and nurses too. The medicinal plants that cured dengue made the mothers and patients more confident and hopeful in life, freed them from high expenses, and even made friendships and relationships closer, and culture sharing was observed. There was the assistance provided to the dengue patients from the government, like free medicines and doctor's fees, mosquito spray, and home health inspections. As a result of the dengue occurrence, the affected families planted papaya, tawa tawa, camote, malunggay, and ampalaya.

## **RECOMMENDATIONS**

It is recommended that papaya, tawa-tawa, camote, and malunggay leaves be used by dengue patients for a maximum of 3-5 days. The other medicinal plants found effective may be used by the patients too. The phytochemical analysis and toxicity level of the medicinal plants should be studied for the safe use of patients.

Flyers or brochures can be made and copyrighted for the above-mentioned medicinal plants after their toxicity level is determined. However, for the non-toxic,

these should be campaigned for their remedial use. The results of this study should be disseminated as soon as possible after the procedures have been standardized.

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