Cnidoscolus chayamansa: A BioCultural Diverse Plant with Potential Anti Diabetic Properties

The plant Cnidoscolus aconitifolius, also commonly referred to as Chaya or Tree Spinach, has ancient origins to the Maya regions of Chiapas, Belize, Guatemala, Southeast Mexico, Yucatan Peninsula, and Honduras (Ross-Ibarra and Molina-Cruz, 2002). Chayamansa belongs to the Euphorbiaceae family, and it is an edible crop. Chayamansa has significant importance due to its high nutritional value as a staple food among Hispanic and Maya populations, medicinal purposes specifically containing anti diabetic properties, and historic cultural value dating back to Pre-Columbian times.

Specifically, the plant species chayamansa or chaya grows 3-5 meters tall with thick stems and 5 lobes or leaves. The lack of stinging hairs makes chaya the most domesticated and cultivated variety in the Yucatan Peninsula. Also, this plant flowers year round and has an incredible tolerance when resisting drought, pests, and disease. When cooked chaya loses its
toxic substance, hydrocyanic glycoside, and can be eaten for its rich nutritional value. Chaya provides high percentages of Vitamin C, B Carotene, Protein, Calcium, Phosphorous, Iron, Thiamin, Riboflavin, and Niacin when cooked (Ross-Ibarra and Molina-Cruz 2002).

Chayamansa’s ability to noticeably grow in any environment attributes to its wide range of uses such as ornamental, food, and medicinal purposes. The main purpose of this research paper is to highlight the historical aspects of medicinal plant collection among the Maya people while investigating the unique potential anti diabetic properties in chayamansa. Moreover, offer a discussion on how chayamansa can positively serve as a sustainable healing crop within a world where the majority of the population does not have access to western medicine let alone the distribution of pharmaceutical drugs.

The culturally influential ancient group of people known as the Maya are one of the largest living groups of indigenous people in the world today (Amiguet et al, 2004). The Maya have contributed an incredibly advanced vast set of knowledge in many areas pertaining to life. This pursued knowledge is continuously being deciphered and researched by scientists today. In hopes to understand more holistically how humans relate to the natural environment we are all intrinsically connected to we can look to the Maya.

In general, the earliest use of advanced medical practices and use of medicinal plants date back to 3,000 B.C. (Joanna Michel, 1994). In the area of life concerning health, disease, healing, and treatment the ancient Maya have developed traditional knowledge over many millennia in using certain plants as vital medicine. These medicinal plants are used to cure illnesses, and treat disease every human is or can be susceptible to throughout their life time. The backbone to how exactly the ancient Maya collected their traditional healing knowledge can be revealed within their methodology. For instance, generations of trials involving human subjects who came into
contact with certain plants in one way or another imparts the experience needed for preliminary traditional knowledge (Todd Pesek et al, 2009).

In the example of the Q’eqchi Maya the perception of man constructs the concept of health and healing within their culture. In the case of the Q’eqchi Maya man is composed of body, spirit, heart, and shadow. Thus, health and happiness are dependent on the balance and harmony amongst all these components. If one of these components is out of balance then it can cause distress and physical illness. For this reason, the medicine people collect plants that have unique properties to treat these imbalances in man.

Also, the way in which these medicinal plants are collected by the medicine people have how it will be effective. For instance, prayers, incantations, and ceremonies are used in order to ask permission from these plants to serve the purpose of healing among the population (Michel et al, 2007). Often times the traditional knowledge is passed down from the elder generation to the younger generation through oral transmission. As well as, the sense of smell and taste plays a critical role in how the healers decipher which plants to use. Interestingly, the selection can be based off of information obtained from dreams the healers has had, and then applied by testing if it is effective within the population (Ankli et al, 1999).

The method used to retain this traditional knowledge can be seen through cognitive maps formed in the mind from memory of the environment by healers. This is a tool or way of remembering where exactly this plant can be found and used representing regions of the environment. The Q’eqchi Maya go precisely to these regions where they remember the medical plants to be, and is thus expressed through how they function and perceive the nature (Pesek et al, 2009).
In addition to the methods used by healers in how they obtain medicinal plants, there exists a plethora of uses for them. Importantly, chaya is used for medicinal purposes. Even though the historical written accounts for chaya is limited the text, “Recetarios de Indios en Lengua Maya” authored by Juan Pio Perez was written in 1870 may have cited some sources from the early 18th century. However, we can suggest chaya was a medicinal plant long before the Spanish arrived in Central America (Ross-Ibarra and Molina-Cruz, 2002).

Some of these traditional uses of chaya include the treatment of diabetes, obesity, kidney stones, hemorrhoids, eye problems, preventing coughs, improving blood circulation, decongesting lungs, stimulating lactation, strengthening fingernails, improving memory and brain function, and lowering cholesterol (Jensen 2009 and Kuti, Torres 1999). As well as, muscle disorders, joint pain, power to fight witchcraft, and kidney stones (Ross-Ibarra and Molina-Cruz, 2002). The ways to prepare chaya differ from one another depending on the illness. Chaya can be chopped, boiled, extracted, pumiced, infusions, leaves used in tea, the sap used only on skin, but oral administration is the most commonly used.

Chaya’s chemical composition has been revealed through scientific testing. Chaya consists of the following components: Crude protein, Crude fibre, Ether extract, Ash, Phosphorus, Calcium, Amino acids, Alanine, Arginine, Aspartic acid, Cystine, Glutamic acid, Glycine, Histidine, Hydroxyproline, Isoleucine, Leucine, Lysine, Methionine, Phenylalanine, Proline, Serine, Threonine, Tyrosine, and Valine (Sarmiento-Franco et al, 2003). The more basic composition includes: Water, Protein, Fat, Crude fiber, Total carbohydrates, Ash, Calcium, Phosphorus, Potassium, Iiron, Ascorbic acid, and Carotenoids (Kuti and Torres, 1996). The amount of protein chaya has is very significant. In comparison to spinach, chaya has about three
times more protein. Also, in regards to essential amino acids it is significantly higher than alfalfa (Sarmiento-Franco et al, 2003). Chaya is high in nutrients and is very healthy to consume.

The treatment of chaya as an anti diabetic has been scientifically tested. The interest in chaya as an anti diabetic can be seen by first explaining how diabetes functions. Foremost, type II diabetes is also known as non-insulin dependent diabetes. When someone is diagnosed with type II diabetes their body does not produce enough insulin or the cells will ignore the insulin. Insulin is important because it is necessary for the body to use glucose for energy. Glucose is broken down sugars and starches, and it fuels cells. The insulin takes sugars from food that has been eaten from the blood into the cells. When glucose builds up in the blood instead of these cells complications arise and illness occurs. Type II diabetes is a serious illness in which 25.8 million people suffer from in the United States let alone the mass numbers in the rest of the world (www.diabetes.org).

Approximately, 800 plants in the world are used to treat type II diabetes, and 150 of these grow in Mexico (Alarcon-Aguilara et al, 1997). Taking a closer look at the medicinal properties of chaya can help contribute to a potentially positive alleviation to type II diabetes. Derived from interviewing Maya people and the purpose of using chaya blended or ground leaves used in shakes with other vegetables is found to treat diabetes among the population (Ross-Ibarra and Molina-Cruz, 2002). Moreover, a study consisting of 16 rabbits tested the effects of chaya tea on diabetic and non diabetic blood levels. One group of 8 rabbits which were non-diabetic was split into two groups of 4 rabbits. One group of 4 rabbits was given a diet of chaya tea. The other group of 4 rabbits was given a water only diet. The second group of 8 diabetic rabbits was also split into two groups of 4. These diabetic induced rabbits were given a diet of chaya tea, and the remaining 4 diabetic induced rabbits were given a water only diet.
Thus, the blood levels of all the rabbits were measured and compared to the nutritional composition of spinach. This study resulted in the diabetic rabbits given the chaya tea diet had a significant drop in blood sugar levels (Kuti and Torres 1996). Also, another study testing the anti diabetic properties of chaya was conducted on broiler chicks. These chicks were fed chaya and were lower in mass, significantly higher levels of heart mass, liver mass, red blood cell count, and had a much lower mortality rate.

In addition to these studies many more were conducted on both humans and small animals such as mice and rats. For instance, in another study chaya is fed to hypercholesterolemic mice to investigate if chaya has any adverse affects. Three separate groups of mice were tested with two different extracts of chaya. The organic and aqueous extracts of chaya were each given to a group of mice who were fed a high fat diet, a normal diet control group, and the aqueous diet group of mice. The results revealed the aqueous extract of chaya showed a significantly decrease in cholesterol compared with the high fat diet control. This thus supports chaya as a treatment for cholesterol when used as an infusion (Velasquez et al, 2010).

Similarly, a study conducted on rats investigated the natural hypoglycemic compound found in chaya. These rats were induced with diabetes, and the chaya methanolic extract was distributed to them at doses of 10, 40, and 70 mg/kg. At the 10 and 40 doses there were no observed hypoglycemic results, but at 70 mg/kg there were. Chaya had decreased the blood glucose concentration which was much lower than the control group. This study is parallel with the Kuti and Torres in 1996 when chaya tea given to diabetic rabbits which lowered their blood glucose levels up to 26% (Loarca-Pina et al, 2010). This consistently demonstrates similar notable results of anti diabetic properties present in chaya.
An important study was conducted using actual people suffering from type II diabetes. This research used 662 outpatients with type II diabetes who were interested in using alternative medicine instead of western medicine. Out of the 662 people 49% used chaya as treatment. Chaya was in the top 4 most used plants to treat symptoms from users of alternative medicine. The groups of outpatients were categorized into two groups the users of alternative medicine and the non-users of alternative medicine. The users were more likely to report they checked their feet and eyes than the non-users. Also, they are just as likely to adhere to orthodox treatment like non-users. However, they found alternative plant use in chaya alleviated their type II diabetes’ hassles much more. Furthermore, this study promotes the notion of utilizing plants to develop new oral hypoglycemic agents for diabetes. This particular study demonstrates the application of chaya research to people which sets it apart from the animal studies. This illuminates the notion of the scientific discovery of the effectiveness in chaya as a medicine.

Chaya has been used in the ancient past and continues to be widely used and accepted as an ornamental plant in back yard gardens and in many recipes passed down from generation to generation. However, by analyzing the medicinal properties of chaya we are beginning to see a much more deeper and holistic understanding as to why this plant plays a significant historical and cultural role amongst indigenous peoples throughout Mexico, Central America, to South America. It is possible to preserve this traditional knowledge which is becoming lost more and more everyday as our natural environment is being destroyed. In the modern context with globalization on the rise the ancient medicinal knowledge of the elder generations is disappearing. The younger generations are losing this remarkable knowledge, and it is not without effort to uncover this knowledge, and put it in the hands of the local population for their own benefits.
A rising issue lies within the pharmaceutical drug companies and their role among using medical plants for western medicines. It typically takes about 10 to 25 years and millions of dollars for a plant derived drug to hit the market. Often times most of these medicinal plants are profited upon through the exploitation of plant resources and indigenous knowledge. In addition, roughly 65-80% of indigenous people in the world do not even have access to these pharmaceutical drugs because they depend on traditional systems of medicine and plants as their health care (Joanna Mitchel, 1994).

In an effort endeavor to preserve medicinal plants a local non-governmental organization, Q’eqchi Healers’ Association, has been formed. The purpose of this Q’eqchi Healers’ Association is to bring together healers from the local area to maintain a garden consisting of medical plants. Also, promoting the idea of cultivation and traditional practices through education of ancient medicinal plant knowledge (Bourbonnais-Spear et al, 2006). This association is a good example of a technique to use in order to maintain the integrity of traditional knowledge. As with most good things there are some things to be aware of. With this positive influence among locals it is key to keep in mind this knowledge too can be or become exploited by profiting corporations or governmental institutions. The indigenous populations have historically been exploited and forgotten about and this is true to this day. The struggle for economic affluence and independence free from the chains of poverty is apart of the majority of the world’s populous mainly found within developing countries.

The cultivation and use of medicinal chaya is and can be a very prominent force in millions of peoples lives in many different ways. First, chaya is an ideal medical alternative that is economically easy to produce, and relatively free to use in regards to the Maya people who may already have it growing in their backyards. They can consume chaya not just because it is
grown in their region, but because of the highly nutritious values it has to prevent disease and illness found within indigenous populations. The people bound by poverty are most in need of medical plants because their health will be at more risk then people who can afford orthodox medicine.

Secondly, with the rise of the epidemic of diabetes even prescription drugs and western medicine is not effectively treating it. Chaya on the other hand is a natural plant which can possibly serve as an advantageous treatment. More research and studies need to be conducted and further consideration of this plant ought to transpire. Thirdly, due to the benefits of chaya it is an ideal plant to be introduced as a new horticultural crop (Kuti and Kuti, 1999). It would be a better alternative to monocropping while providing a nutritious source of food to mass amounts of people. In accordance with, I promote the sustainable cultivation of chaya. This includes growing it where it is originally found in regions throughout Central America. The local population to have economic and political control of how it will benefit their way of life. As well as, respecting the traditional knowledge from which is rooted within their culture to not be capitalized upon by world hegemonies.

The original taxonomy of chaya was once known as the scientific name of Jatropha aconitifolius meaning “physician” and “nutrition” in Greek. This has significant meaning because it upholds the true nature of chaya. The meaning of “physician” would not be accredited to just any plant, but rather one with special and unique medicinal properties. Although, centuries later scientists decided to regroup chaya into Cnidoscolus chayamansa to single out the stinging hairs. Naming a plant comes with great power, and the meaning upholds significant weight on the role it plays within societies. Chaya is a deserving plant which calls for further analysis of its medicinal properties due to the potential of impact it can have on the rest of the
world in the areas of alternative medicine. All in all, in the wise words of Henry David Thoreau, “A man may esteem himself happy when that which is his food is also his medicine” sums up chaya’s diverse potential role in many different aspects of life.

References


