

“TYLO Garden Project: Promoting Self-Efficacy and Sustainability to a Southside Community”

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The purpose of participating in the TYLO Garden project is to bring awareness about self-efficacy of desert urban farming on a micro-scale, and to promote a healthy diet and healthy lifestyle to a south side community impacted with diabetes.

Section 1: Overview of Garden Project (Mirtha Zamudio)

One of the most important aspects of traditional medicine is the conjunction between humans and the plant world. Curanderos use the natural healing powers of plants to treat various physical and emotional illnesses. Whether it is in the form of teas, tinctures, pomades or even just consumption, plants play a crucial role in healing the body. Nowadays, most of the plants produced for consumption are treated with chemicals that detract from their natural state and as a result plants lose their natural power. In his book *Herbal Medicine of the American Southwest*, Charles W. Kane writes that the best way to save nature is to “interact with her, know her through involvement” (Kane 2006, 3). This means, working with the land in order to take advantage of the resources it offers.

Purpose of Project

The purpose of this project is to utilize the knowledge of plants and apply it to a specific problem in the south Tucson community: the community is greatly affected by diabetes. According to the South Tucson Community Health Profile, 81.3% of the population is considered Hispanic (Arizona Department of Health Services 2005, 2). Within this

demographic there is a high level of diabetes affecting the south Tucson community. In the year 2002, the diabetes rate of hospitalization was 2,844.2 per 100,000 residents of the community (Arizona Department of Health Services 2005, 8). Because diabetes is a prevalent health risk among the Hispanic and Native American community we have decided to try to approach the subject through an ecological perspective. By taking the advice of Charles Kane, we decided to work with the land in order to produce plants that would prove beneficial in combating diabetes.

A Diabetes Problem

Throughout the United States obesity and diabetes are two of the ever-increasing diseases plaguing the country. Within the Native American and Indigenous population there is a high percentage of adult-onset diabetes which is a result of a high-calorie diet and lack of exercise (Bakker 1999, 24). Because diabetes can lead to other complications such as diabetic coma, damage to retinas and kidneys, neuropathy, skin ulcers, and poor circulation, people suffering from diabetes must make modifications to their normal diets in order to control their diabetes. In his article "Traditional Diet and Health in Northwest Mexico," Enrique Salmón explains how traditional foods help regulate glucose and insulin levels for people suffering from Type II diabetes. Salmón writes that food such as prickly pear, beans, and wild grains are high in soluble and insoluble fibers which take longer to digest and therefore take longer to turn into sugar (Salmón 1999, 121). As a result, our group looked to plants in order to compose a garden in the south Tucson community that would contain plants that are beneficial to regulating diabetes.

Much like the contributing authors in Cajete's *A People's Ecology* and like Mr. Madrigal from Elizabeth de la Portilla's *They All Want Magic*, who keeps up with the trends in treating diabetes and heart disease in the Mexican American community, our group had to do research on diabetes before we could begin planting. It was decided that plants considered having low glycemic indices and high in fiber were the best for treating diabetes.

The Planting Process

Because farming is a long process that requires many steps, our group had to look at options that would maximize our ability to plant quickly. Thinking back on the philosophy of native and traditional science, we decided to work with what is already available and expand on it. Within the south Tucson community exists the Tierra y Libertad Organization (TYLO). As a grassroots organization, TYLO's mission statement is to promote the ideals of equality, justice, and self-determination (Tierra y Libertad Organization 2011). One important aspect of TYLO is their Barrio Sustainability Project which has a community garden at the center of its focus. The garden is located in the backyard of one of the founder's home (see Appendix 1D). We decided to work together with TYLO because of their already existing garden and because of the knowledge provided by César López and Lui Perales, two of the organization founders.

Our work took the advice that is prevalently shared throughout Gregory Cajete's *A People's Ecology* which is to take advantage of pre-existing knowledge. The TYLO site is an essential part of our project because it allowed us to focus directly on the plants without having to worry about the preliminary preparation of the garden plot. With the knowledge provided by César and Lui, our group was able to work directly with the land and better appreciate the plants we tended to. Aside from planting low glycemic vegetables, a small rue plant was

transplanted onto the TYLO site because it too has the potential to help treat diabetes.

It is our hope that by seeing the members of TYLO working on the small backyard garden that people in the barrio will also be motivated to work with the land and make an effort to take a more hands-on approach to treating diabetes.

Toltecalli Academy

Chronic illnesses like diabetes evolve over time and the best way to treat diabetes is through prevention. Cajete states that an educational approach is essential to prevention of diabetes and needs to begin with awareness of food nutrients and links to diseases (Cajete 1999, 100). We also felt that it was important to educate the south Tucson community on how they can grow their own small gardens and become self-sufficient of healthy foods. As a result, our group expanded from the TYLO site and in collaboration with Toltecalli Academy started a new planting site at the high school. Toltecalli Academy is a public charter school that opened in 2004 and is sponsored by Chicanos Por La Causa whose mission is to “promote positive change and self-sufficiency to enhance the quality of life for the benefit of those [they] serve” (Chicanos Por La Causa 2011). Located in the south Tucson community, Toltecalli Academy is 96% Hispanic students and 3% American Indian (Public School Review 2011). Like TYLO, Toltecalli Academy had a pre-existing garden that we took advantage of to use for planting. However, unlike TYLO, Toltecalli Academy was not well maintained and the soil was not prepared for planting. As a result, we used our pre-existing knowledge and the information we had learned from Cesar and Lui and set to clean and prepare the soil in Toltecalli (see Appendix 1E).

It is through both the TYLO and Toltecalli Academy sites that we hope to bring awareness about self-efficacy of desert urban farming on a micro-scale and to promote a healthy dietary lifestyle to a south side community impacted by diabetes. The TYLO site serves as an exhibit of how it is possible to use limited space to produce a garden and the Toltecalli site will hopefully educate students on how to properly take care of their school garden and work directly with the land much like their ancestors did.

Section 2: Type II Diabetes (Hoyt Hoyt)

What is Type II Diabetes?

Type II Diabetes is also known as Non Insulin Dependent Diabetes Mellitus (NIDDM) or adult onset diabetes (Center for Disease Control and Prevention 2011). The basic description of the diagnosis is an elevated level of glucose in the body’s blood. When food is consumed the body converts the sugar present in the food into glucose which is basically just a sanguineous form of sugar. The glucose is then transported in the blood stream to the fat, muscle and liver cells in the body to be stored as energy to be used by the cells to perform their function. The body produces a substance in the pancreas called insulin to help in the process of taking the glucose from the blood stream and depositing it in the cells as energy. Type II Diabetes, for reasons still not completely understood, impedes the body’s ability to use the insulin correctly causing a state called insulin resistance. Insulin resistance keeps the glucose from entering the cells to be stored as energy and instead begins to build up in the blood stream causing elevated levels of glucose in the blood stream and that is what is known as Type II Diabetes (U.S. National Library of Medicine 2011).

Symptoms and Complications of Type II Diabetes

Often times those that are diagnosed with Type II Diabetes have no symptoms at all. Some of the symptoms that can indicate the presence of Type II Diabetes are general fatigue, blurred vision, erectile dysfunction, frequent infections or infections that heal slowly, or increased appetite, thirst, and/or urination.

Type II Diabetes can lead to several complications as the disease continues its course. Since Type II Diabetes affects the basic way in which the cells in the body receive the energy necessary to operate the damage caused by Type II Diabetes to the body can be widespread and devastating if not controlled, and even controlled Type II Diabetes can be the source of significant complications later on. Major complications can be heart attack, diabetic retinopathy, diabetic nephropathy, peripheral vascular disease, stroke, and nerve damage. There are many other minor complications associated with diabetes but the risk of the onset of all complications is greatly reduced by effective control and treatment of diabetes (U.S. National Library of Medicine 2011).

Treatment of Type II Diabetes

The approach to treating Type II Diabetes is multifaceted. The main premise to Type II Diabetes treatment is to control the glucose level in the body. In order to be able to control the glucose levels those persons diagnosed with Type II Diabetes must be able to learn how to use a glucometer. This device allows a person to obtain a reading on the exact level of glucose through a small blood sample (U.S. National Library of Medicine 2011). This allows the patient then to know how well they are controlling their diabetes through treatment. One of the first and foremost parts of effective treatment of diabetes is through diet and weight loss (Center for Disease Control and Prevention 2011). It is very important that the person diagnosed with Type II Diabetes eat at roughly the same time everyday and that they eat similar types of food. There are also several types of food, which can help lesson the effects of Type II Diabetes on the body and those will be discussed herein. Weight loss also helps the body be able to more effectively control the glucose levels. Exercise is also very important because it increases the body's energy level, reduces insulin resistance, improves blood flow and blood pressure, and lowers tension. If the glucose levels cannot be controlled by diet and exercise the medications must be taken to help the body either absorbs less glucose from food or to help the body absorb more glucose from the blood stream. If after medication and diet and exercise fail to control Type II Diabetes then a person may need to start injecting themselves with insulin to control the glucose levels in their body (U.S. National Library of Medicine 2011). Effective control of Type II Diabetes is very important in order to be able to prevent the many complications that can arise from Type II Diabetes.

Type II Diabetes and Hispanic Demographics

Type II Diabetes impacts different demographic groups in very different ways. Cajete in his book states that certain groups have a higher incidence of diabetes within their population. He states that ten point six percent of all Hispanics are diabetics and a staggering twelve point two percent of all Native Americans are diabetic within the United States (Cajete 1999, 221). The Center for Disease Control and Prevention (CDC) shows even more eye opening statistics about diabetes. According to the CDC the population served by Indian Health Services (IHS) is reported to have 16.1 percent of the total adult population diagnosed with diabetes (Center for Disease Control and Prevention). Within that statistic 33.5 percent of

American Indian adults living within Southern Arizona have been diagnosed with diabetes. Nationally 11.8 percent of all Hispanics have been diagnosed with diabetes and within Hispanics 13.3 percent of Mexican Americans have had the same diagnosis. Compared to non Hispanic white adults Hispanics are 66 percent more likely to be diagnosed with diabetes and among Hispanics, Mexican Americans are 87 percent more likely to be diagnosed with diabetes than any other Hispanic demographic group (Center for Disease Control and Prevention 2011). The numbers are clear and diabetes is obviously a disease, which is greatly impacting the Hispanic and Native American populations of the United States and subsequently those same populations not only in Southern Arizona but specifically in Tucson as well. According to a 2002 community health profile for South Tucson 81.3 percent of the population is Hispanic so the effects of diabetes must be significantly prevalent within the community in South Tucson (Arizona Department of Health Services 2005).

Section 3: TYLO & Self-Efficacy (Imelda G. Cortéz)

In definition self-efficacy is a psychological term used to define a person's belief in his or her own competence. From this there are many other terms that can be used to substitute self-efficacy such as self-determination, self-sustainable, etc. Tierra Y Libertad Organization had demonstrated a tremendous amount of self-efficacy through the Barrio Sustainability Project that they coordinate both in a barrio location and at a local High School (<http://www.facebook.com/TierraYLibertadOrganization>). It was because of this that we have partnered with the organization to bring awareness about the Diabetes issue that consumes many Native & Mexican-American people, most of which reside in south Tucson. Because TYLO primarily organizes out of the South Side Tucson it was only fit to learn and work alongside them. Our group has diligently been working with the organization to sustain the garden that is located at Toltecalli High School, it is there were we have been implementing the permaculture ethics that TYLO has demonstrated to us as well as learning from the earth and in ways creating medicine as we work the land.

Admittedly working in the garden and taking care of the earth is medicine in itself. There are many ways to remain balanced and healthy throughout your life. For some health means being physically healthy, this then creates an unbalance in the health cycle. There are four components to health; physical, mental, emotional, and spiritual. If a person is focusing in only one of these components then that person becomes unbalance. For instance, if a person goes to the gym for hours at end and is always focusing on their physical health they can become unbalance/unhealthy. The strongest man or woman on earth may have that physical trait but they might be spiritually and mentally disconnected. With this it is easy to see how a garden can bring equilibrium to the person. While working with the earth you become spiritually attached to the soil and the plants that are being grown. By being spiritually attached to the earth you are transmitting your energy to it, making you emotionally attached to soil and plants you are working with. This specially becomes true when planting the seeds for the new crop season, as you are putting the tiny seed in each hole you leave a tiny piece of you that will help the plant grow. In addition, when tending to the plants, meaning watering them or taking out the weeds, you almost enter a trance in which you feel tranquil and at peace with the earth and yourself, thus enhancing your mental health. Finally starting a garden and preparing the earth for planting and harvesting is hard work that requires physical strength in order to turn the soil, dig holes and clean out the unwanted weeds out of the garden. In final analysis it is clear to see just how a garden, especially the Barrio Sustainability Project that TYLO has is medicine in itself.

While working with TYLO we have been able to learn and incorporate the permaculture ethics into the work that we are doing. The permaculture ethics are; first take care of the Earth, take care of the people and finally share the surplus (David Holmgren. <http://permacultureprinciples.com/index.php>.) It is through these ethics that self-efficacy is created amongst a community and most importantly health is reestablished amongst the people. As Shorty puts into context, “the traditional methods bring the grower into intimate contact with the soil, sun, and water. In contrast, machinery separates people from the natural world.” (Shorty 1999, 140) By working with the earth and taking care of it a special connection is created to the work that you are doing. Within the special connection, healing begins to take place, especially for those who come from a farming community and now feel constrained because of city life. While this healing is being produced some sort of medicine is also being generated through working with the earth. Furthermore, one of the most important components of permaculture is the treatment of the earth. Shorty illustrates this by asserting that, “as we participate in the ancient ways, we strengthen our own foundation.” (Shorty 1991, 149) This then creates self-determination; which leads to the road of healing by laying out the foundation of your roots. By working once again with your roots you not only strengthen the soul but also the body, garden work is hard work that requires physical and mental strength to keep up with the changing seasons.

As is seen in the article titled *A Navajo's Meditations on Food and Culture* by Lawrence Shorty he clearly states the fact that, “We have replaced what we need with what we want, and as much as we want.” (Shorty 1999, 133) This thus brings a culture of consumption, never satisfied with having the necessities but always wanting more. One of the major problems with diabetics is the fact that they tend to over consume something that taste “good” rather than intake something that is healthy for them. Shorty mentions the teachings of the Navajo elders who say, “When we eat other peoples’ food we begin to think and become like them. Eat more and we will ‘forget’ how to be Navajo.” (Shorty 1991, 133) This in itself has much truth to it, as is seen in many Mexican communities who crave to be “American” which has shifted the traditional ways of life to a life of consumption. Now everything is bought at a supermarket, the essentials are no longer located in the back yard, now we drive and pick up what we need at a store. Through this we become more and more unhealthy. Because of our great dependency on a store we have become incompetent in producing our own foods, forcing us to consume and consume. It was because of this acquired culture of consumption that TYLO saw the necessity of going back to the roots and growing things organically and traditionally so that our future generations can once again regain the health that some have forgotten. Through the Barrio Sustainability Project TYLO has been able to bring self-efficacy to a marginalized community that before thought that they could not have gardens like the ones their parents or grandparents had.

Once the people are able to be self-sustainable and not dependent on the supermarkets for their every day needs, they begin to assert their power as humans and as people of this country. Once this consciousness is established a healthy living process begins to take place. As Clayton Brascoupe affirms in his article titled *Reflections of a Native American Farmer*, “the activity of generating food for ourselves and our community also become a political act.” (Brascoupe 1999, 155) Diabetes makes people dependant on the government produced and supplied insulin, medication that for some is unaffordable and therefore have to resort to other treatments or simply not take any at all. By generating our own food we then become independent of this political tie and thus make our lives more sustainable and healthier.

Brascoupe latter reaffirms that, “by growing food for ourselves, we are asserting our political sovereignty.” (Brascoupe 1999, 156) One of the things that TYLO takes into consideration is the reinstatement of political sovereignty of the people, especially those of the South Side who have been marginalized and striped of its resources. Over time the South Side community has been pushed away and forced to live under a political climate that does not allow them to properly become self-sustainable. With construction permits limitations to what you can and can’t have in your back yard, chickens & goats outlawed out of the city, while cats and dogs are welcomed. Animals that will produce something good for you are replaced with cats and dogs that are only there to accompany you. People have been forced to give into a life that was not for them.

Lastly, by understanding and becoming aware of the ties that people have to the Earth and its effects of people we then realize the importance of self-efficacy and the impact it has on healing. By incorporating the permaculture ethics you then begin a healing process that not only begins to heal the person who is building a garden in their backyard but also transmits that healing to a next door neighbor and healing especially begins to happen within your own family. It was through the Organization Tierra Y Libertad that our group was not only able to help with the Barrio Sustainability Project but was also able to learn to care for the earth and in return we also began to heal.

Section 4: Importance of Maintaining a Healthy Diet (Tiffany Mendibles-Escobar)

The plants implemented at TYLO and Toltecalli High School fulfilled the goal of the project, planting plants that are diabetic friendly. Besides educating the community about foods that are helpful for diabetics, it was important for the project to push the essentiality of micro-scale farming. It is critical to educate the community on micro-scale farming because it re-introduces self-efficiency to a region that slowly became urbanized over time. The urbanization of the Southern Arizona region created a domino effect where urban farming once sustained communities, to a transition of convenience where foods are easily bought in the stores. The means of convenience significantly impacted communities because populations were no longer connecting with the earth and building relationships with the plants to sustain themselves. The disconnection with nature and the deprecation of plants due to urbanization consequently lead to the disconnection of human-plant relationship that leads to an unhealthy diet. This section of the paper covers the importance of maintaining a healthy diet and how this ideology applied to the TYLO project. A healthy diet is much more than consuming foods that are beneficial to one’s health; a healthy diet also includes respecting and building relationships with the plants. When concurrently recognizing and practicing both goals, an individual may began to become self-sufficient by building a relationship with the earth that will give back and nurture an individual suffering from health problems such as diabetes.

What Constitutes a Healthy Diet?

The emphasis of the project was to promote awareness towards maintaining a healthy diet by planting foods that nurture the body of a diabetic. There are two approaches to understanding what it means to have a healthy diet. The first approach is concrete; recognizing that maintaining a healthy diet means to be conscious of the foods that are consumed. According to *The American Journal of Clinical Nutrition*, “replacing high-glycemic-index

carbohydrates with a low-glycemic-index forms will improve glycemic control and, among persons treated with insulin, will reduce hypoglycemic episodes” (Walter Willett, JoAnn Manson, Simin Liu 2002, 2745). It is important for diabetics to recognize that consuming foods that contain high-glycemic indexes can significantly spike blood sugar levels. Being conscious of diabetics and watching over foods that have high glycemic indexes, the members of the TYLO project planted foods such as beans and radishes because those specific foods have a low glycemic index that will better nurture a diabetic’s body.

The second approach of maintaining a healthy diet relates to the idea of reciprocity; if an individual nurtures the plants, then the plants will nurture the individual. Gregory Cajete’s book *People’s Ecology* captures the essence of caring for plants by American Indian theology of “spiritual ecology” the maintaining of a “kinship with the land...plants and animals” (Cajete 1999, 3). Spiritual ecology will help an individual maintain a healthy diet. If an individual takes the time to foster and respect the plants, then they will build respect in the plant. Elizabeth de La Portilla’s *They All Want Magic* describes the phenomenon of society believing the healing nature of plants stems from magic. When in reality De La Portilla claims the plants work when an individual who has “faith and compassion” in the plants, for that is “the real magic” (De La Portilla 2009, 68). Believing and practicing in the healing powers of plants is one perspective of maintaining a healthy diet.

One of many goals of the project was recognize the long standing tradition of respecting the plants, something that was displaced from urbanization. A hypothesis by Stephan Kellert called the “Biophilia Hypothesis”, suggests that human identity and fulfillment is dependent on their relationship with nature (Stephan Kellert and Edward O. Wilson 1993, 42). Finding and fulfilling an identity is another component of leading a healthy diet because an individual will realize the necessity of nurturing plants and will begin to incorporate these plants in their every life. This then will slowly break the individual away from the mainstream sustenance and lead them back to a cultivation that will heal their body, mind and spirit from disease.

TOCA and It’s Relation to TYLO Garden

Cajete’s idea of spiritual ecology and formulating a relationship with nature is apparent in the TYLO garden project. Every member in the group came to realize the human intervention required in order to cultivate plants. Through the blood, sweat, tears and the occasional blister formations on the hands, the members of the project understood the sacrifices that needed to be made in order to establish the everlasting relationship with the plants. These simple ideologies are applied within a local community organization called TOCA that focuses on the reestablishment of the Indigenous diet and to promote the diet around their local community. TOCA which stands for Tohono O’odham Community in Action. The organization is complex, divided into different categories that have a different focus. For the purpose of the paper and speaking of maintaining a healthy diet, TOCA understands the centrality of promoting a healthy lifestyle through the production of their indigenous foods. “TOCA’s Food & Wellness program creates physical, spiritual, cultural and economic wellness through the promotion of traditional food (TOCA 2007). Very similar to TOCA, the members of the TYLO garden too promoted wellness through the garden by planting, nurturing and bringing about awareness to the foods that were planted.

Like the TYLO project, TOCA aims at being a model for the Indigenous community to

follow. Both programs are successful at “establishing a model that will be replicated in other native and rural communities” (TOCA 2007). The native communities and the greater southwest community is eradicating the existence of diabetes in their communities. With the guidance of TOCA and the willingness of students partaking in a class project, they will grow together through their faith and respect of the plants. This marks one step closer at re-establishing an Indigenous diet that is well rounded to include the well being of not only the body but also of the soul.

Section 5: Rationale for Foods Planted (Elizabeth Gillman)

Many criteria were considered when choosing the plants to be grown in the TYLO garden. A diabetic diet was the foundation for the selection process. The focus was on foods with low glycemic indices and blood sugar lowering properties, as well as herbs with advantageous effects for diabetics. The planting season was also taken into account when planning the garden. Since the planting was done in February, the vegetables and herbs had to be hardy enough to last through the end of an Arizona winter, including several frosts. Finally, it was important that the plants be familiar to Tucsonans, and could be easily incorporated into their diet and lifestyle patterns. The plants that fit these criteria and were planted at TYLO were chiltepin chilies, garbanzo beans, snap peas, radishes, carrots, and rue.

Chiltepin chilies

Chili peppers contain the chemical capsaicin which is what gives them their spicy flavor, and which may also have healthy effects on blood sugar levels. Diets that include chili have shown potential in lowering post-meal hyperglycemia in people who are at a high risk of developing type II diabetes (Ahuja 2006, 63-69). That is, by regularly eating meals that contain chili peppers, one can better control their blood sugar levels and thereby reduce their risk of developing diabetes. The health benefits of chiltepin chili peppers in addition to their spicy flavor make them a great addition to any South Tucson garden.

Garbanzo Beans, Snap Peas, Radishes, and Carrots

A hallmark characteristic of a diabetic diet is that it focuses on foods that will not cause blood sugar levels to spike. That is, the foods in a diabetic diet should have low glycemic index (GI) values. Most vegetables have low glycemic indices because of their high fiber content. This is indeed true for garbanzo beans, snap peas, and radishes. Garbanzo beans and snap peas have GIs of 39 and 40 respectively, and radishes can have a GI between 15 and 50 (The World’s Healthiest Foods 2011). Since these values are below 55, the vegetables are considered to have low GIs. Cooked carrots have a GI of 56, placing them in the “medium” GI category, but on the low end of the range (Mendoza 2003). The GI values of the planted vegetables reflect their high fiber content. Complex carbohydrates such as fiber are digested relatively slowly, preventing spikes in blood glucose levels, which can be harmful to one’s cardiovascular and metabolic health.

Rue

The common rue is known in Spanish as ruda, and has the scientific name *Ruta graveolens*. It is traditionally used to treat many diseases, but new scientific research has demonstrated its potential in treating type II diabetes. Researchers Figueroa-Valverde et al. concluded that an extract of the herb causes a hypoglycemic effect when administered to diabetic lab rats (Figueroa-Valverde et. al. 2009, 898-907). That is, it significantly lowered the

blood glucose concentrations of animals that had been induced with diabetic metabolism responses. Published clinical studies on humans are lacking, but rue shows promise as a natural treatment for diabetics and was therefore included in the TYLO garden (see appendix 1A).

Existing Plants

At the time of planting, there were already some plants in the TYLO garden which are worth mentioning with respect to a diabetic diet. These include the prickly pear cactus, and several leafy greens and cruciferous vegetables.

Prickly Pear Cactus

Also known as Nopal, the Prickly Pear cactus is very useful for managing non-insulin dependent diabetes. Its pads are a good source of soluble fiber, which has been shown to delay the uptake of dietary sugar into the blood stream. If it is taken before meals, prickly pear can lower blood sugar levels by as much as 20% in type II diabetics (Kane 2009, 204).

The flowers of the prickly pear cactus could also be beneficial for type II diabetics. They are high in flavonoids, which promote tissue healing and strengthening. An infusion made from the flowers can be topically applied to weak or poorly-perfused tissues (Kane 2009, 204-205). For diabetics, this could include the soles of feet which are susceptible to ulcers due to the neuropathy and poor peripheral circulation associated with diabetes. (See appendix 1B)

Leafy Greens and Cruciferous Vegetables

The leafy greens and cruciferous vegetables that had already been planted at the TYLO garden included cabbage, spinach, kale, and broccoli (see appendix 1C). All of these have a glycemic index ranging from 15-50, or within the “low” category, making them well-suited for a diabetic diet (The World’s Healthiest Foods 2011).

Future Additions

Later in the spring, more plants could be added to the TYLO garden to contribute to its objectives, such as the trumpet flower.

Trumpet Flower

Also known as Tronadora, the trumpet flower is a healthy addition to a diabetic diet. If it is taken with meals, it can aid type II diabetics with blood glucose control. Although the biochemical mechanism has not been confirmed, this could be because trumpet flower blocks dietary glucose absorption (Kane 2009, 246).

Section 6: Harvesting and Preparation (Ramón Muñoz)

How much easier is it to develop relationships with plants that are encountered on a daily basis than with plants that are not? How much easier is it to learn and develop relationships that are studied and engrained in the traditional environmental knowledge of neighboring communities than to establish new ones? The TYLO and Totecalli gardens are exemplary of a means to incorporate familiar foods as medicine into the diets of a very diverse community afflicted by diabetes; however, this incorporation will only be possible if the community adopts and develops a relationship with the plants. The American Indian theology (Cajete 1999, 3) as described by Gregory Cajete acknowledges that nurturing relationships with plants is to realize the medicinal powers of the plants. By nurturing the plant one also nurtures in a self-directed manner and the relationship becomes reciprocal and symbiotic: both human and plant, spirit and body benefit from the relationship. Gregory Cajete also describes that the teaching gardens serve for the “fuller development of their [the young people’s] natural connections and

[participation] in the age-old ...way of connecting to place and living a healthy life” (93). Accordingly, if South Tucson assumes responsibility of living healthily, the communal relationship with plants should mirror the native and long established relationships of the Pima, the Seri, the Tohono and Akimel O’odham, the Hiaki, the Apache, the Yavapai, the Havasupai and others who have inhabited the Southwest’s watersheds and elevations for time

immemorial. The 6th elemental section of this gardening project write-up will summarize narratives of these preexisting relationships that natives have developed with those plants that are also encountered in the TYLO and Totelcalli community teaching gardens. What better way of building relationships than discussing foremost the means of harvesting and preparation?

Mesquite (*Prosopis glandulosa*, *P. velutina*)

Mesquite is known to have been consumed for thousands of years. Examined coprolites found in the Ocampo and Tehuacan caves, in Tamaulipas and Puebla, Mexico respectively, suggest its importance in the Aztec diet was second only to metl (agave, maguey). Mesquite is considered a robust tree. A perennial, mesquite does not require watering; it is drought resistant.

Mesquite’s extensive surface-root system aids in minimal soil loss, in the prevention of soil erosion, and capturing the maximum of seasonal rain. Mesquite can produce 10,000 kg of biomass per hectare per growing season (30% of which is consumable) with only several centimeters of rainfall (Ortiz de Montellano 1990). Mesquite fruiting beans contain galactomannin, a fibrous gum, which lowers glycemic responses, and therefore suitable for people with non-insulin dependent diabetes mellitus (NIDDM). Alternatively, they also contain heat sensitive protease inhibitors that slow protein digestion. Cooking mesquite pods and seeds may then interfere with the body’s absorption of proteins (Hodgson 2001, 178-189). As a corollary it may be best to consume mesquite pulp as a cool infusion or cool *atól*.

There are several different species of mesquite, some bitter and the others sweet. One should distinguish by tasting the fruit; only species *P. glandulosa* and *P. velutina*, which are sweet will be discussed in the scope of this project; however, cultivation and preparation will be similar for the bitter species. The growing season waxes in May and wanes through December. Mesquite beans (pods) are traditionally collected during the summer months. Young mesquite beans are used for eating, while the mature beans are used for preparing medicinal teas and infusions for most medicinal purposes.

Traditional preparation of the mesquite beans for consumption requires creating a meal or *pinol*. The Mohave dry the beans for two weeks before grinding into a meal; alternatively the beans may be roasted in hot ashes, or according to the Seri, sprinkled with sand heated by fire. Traditionally the seeds and the fibers are not consumed; therefore, upon grinding the bean, the seeds and fibers are removed, but not thrown away (these may be used for medicine). The stone *metate* may be used to grind because the mesquite seeds are very hard and do not break. The Cahuilla, San Diegueño and Cocopa prepare a layered cake, alternating between sprinkled meal and water, which then is allowed to dry overnight. Having dried the pods for 4-6 weeks, the Ópata prepare an *atól* called *péchita* by allowing the pods to soak in water overnight (*a serener*), mashing and extracting the juice, and adding cinnamon and cloves (Hodgson 2001, 178-189).

Alternately mesquite may be used for its medicinal properties. Mesquite may be prepared to help with gastritis, the inflammation of the stomach. An infusion of two to ten grams of seeds and bark with 1/6 liter of water and may be taken before meals or at the moment of gastric irritation (Sámono Tajonar, 41). Also the sap of mesquite can be dissolved in water and taken

as a cure for dysentery (Torres 1983, 44).

Prickly Pear (Nopal, *Opuntia oricola*, *O. phaeacanthce*, *O. engelmannii*, Tuna, *O. santa rita*)

Prickly Pear is a very powerful plant for people who are afflicted by NIDDM. "Half a cup of *nopal* eaten in the morning is...believed to help keep blood sugar in check" (De la Portilla 2009, 101). The cactus may contain amylose, a sugar that breaks down more slowly than refined sugars and sugars like amylopectin. As for prickly pear's cultivation, the cactus readily grows in the desert. The cactus bears fruit in mid-Summer; new growth is present from June through January. Prickly pear is traditionally harvested in the late summer (Frank 1991, 118). Deeper green colored pads are more readily picked for their associated tenderness, while maroon colored fruits are picked. Parasitized fruits develop abnormally elongated and are red-orange colored, not maroon; their consumption may lead to digestive complications (Hodgson 2001, 125-130).

To derive the nutritive sources from prickly pear the pads are most commonly cleaned, chopped, and boiled. The River Pimas, Tohono O' Odham, and San Diegueños eat nopales with chiles. The Tiapai scrape off the clochids (spines) and wash, dice and cook the nopales for 20 minutes, sometimes with onions, tomatoes, and peppers. The pads can also be prepared as a *licuado*. To prepare the fruit, the *tuna* is customarily cleaned, to remove the spines, and the juice extracted. The Tohono O'Odham remove the seeds and allow the pulp to dry in the sun, followed by mashing and extracting of the *tuna*'s liquid (Hodgson 2001, 125-130). Syrup can be prepared by combining the *tuna*'s juice with honey and lemon juice (Frank 1991, 121).

For diabetes the medicinal prickly pear takes form of a liquid that is ingested. A water boiled with 2 *nopales*, a *calabacita tierna*, and the *cascaras* of 10 tomatoes, and allowed to *serener* is suggested for daily ingestion to help people with diabetes (Tecuciztécatl 2000, 46). Another *licuado* for ingestion includes the combination of one half of a *nopal*, 3 cloves of Japanese garlic, a piece of aloe, the juice of 3 large lemons, honey, blended and taken while fasting is also suggested to also help people with diabetes while also following a regimented diet (Lemus Pérez 1993, 15).

Prickly pear has various healing properties besides those for people with diabetes. The juice is used to treat burns. A prickly pear paste with egg yolks, honey, and maguey was traditionally imbibed by the Aztecs as a cure for hepatitis. The *tuna* sliced in half and heated is placed on abscesses to draw out infection. (Torres 1983, 51). Finally, a *nopal* filleted in half, applied with honey, reclosed, allowed to *serener*, and consumed after fasting is suggested for strengthening the lungs (Lemus Pérez 1993, 39).

Sunflower (Girasol, *Helianthus annus*)

Sunflower has many nutritive and medicinal properties. The entire plant may be used for these purposes. *H. annus* growth waxes during the early Spring and is ready for gathering by early to mid summer. Sunflower is traditionally gathered for food according to the Clarkdale Apache once the head (inflorescences) has sun dried and the petals begin to fall to the ground. The Mohave beat the head with a stick so that achenes (the singular seed-containing fruits) fall into a gathering basket. The Western Apache collect the sun dried achenes while the San Carlos Apache prefer to dry them over a fire. The achenes are then carefully ground using a wooden *metate* and tossed into the air such that the hulls are blown away in the wind (Frank 1991, 137). They may be ground into a paste with peanut butter consistency and used as a mush, gruel, or soup thickener. Pasty bread is made by baking the sunflower paste with corn meal and hot water. Candy is made by grinding sunflower achenes with baked agave (Hodgson 2001, 87). Lois Ellen Frank, author of *Foods of the Southwest Indian Nations* offers a recipe for Zuni

sunflower cakes in which sweet dough of boiled sunflower achenes and ground corn meal is fried (Frank 1991, 159).

Used medicinally, a tincture of *H. annuus* is made. A tincture to cure colds is made by mashing the stems and soaking in 60 proof alcohol for a month (Torres 1983, 54).

Rue (Ruda, *Ruta graveolens*)

Rue, colloquially *ruda* is also a strong medicinal plant. The plant is personified in Elizabeth de la Portillas book *They All Want Magic*. To those with good spirits, Ruda's odor is agreeable whereas those who are ill-spirited experience a noxious smell. Its odiferous qualities also render it useful as a bundle that is passed over a patient while prayers are offered and affected (De la Portilla 2009, 99). Ruda is used for earache, gastrointestinal and menstrual problems, nervousness and diabetes (Rotblatt 2002, 407). For earaches, ruda's medicinal properties can be afforded through the smoke of dessicated leaves or in its juice warmed in a pomegranate rind that is directed to the affected ear (Curtin 1997, 159). An infusion of ruda, taken without sugar, alleviates stomach pains and also acts as an emmenagogue, a tea that promotes menstruation (Torres 1983, 52).

Trumpet flower (Tronadora, *Tecoma stans*)

Tronadora is an important remedy known for those affected by diabetes. It is a bush of the family *bignoniáceas* with yellow flowers and oblong leaves. "[Tronadora's] importance should be known throughout the world" according to María Teresa Lemus Pérez in her book *Remedios Naturales*. She suggests that an infusion made with ten grams each of *tronadora* and *guayacán* in 1 liter of water should be imbibed in the course of one day (Lemus Pérez 1993, 75). Another infusion calls for 2-10 grams of root matter and one-seventh of a liter of water taken twice daily after meals (Sámano Tajonar, 25).

Hummingbird bush (*Chuparosa*, *Coomeme*, *Justicia Californica*), Coriander (*Cilantro*) and Chile (*Chiltepín*, O'olas ko'okol, *Capsicum annuum*)

Chuparosa, *Cilantro*, and *Chiltepín* are present in the teaching gardens. *Chuparosa*, a flowering bush attracts many pollinators, but historically the nectar was not only used by the hummingbird: the Tohono O'Odham also suck the nectar from the budding flowers, which provide a negligible source of nutrients (Hodgson 2001, 75). *Cilantro*, a green aromatic plant grows abundantly and boundlessly at the Totecalli garden. Infusions made with the fruiting seeds are known to cure nausea, flatulence, and diarrhea (Torrez 1983, 32), while salads made with cilantro and onion strengthen the lungs and aid in regaining energy (Lemus Pérez 1993, 35). *Chiltepín* has been in use for c. 8000 years and grows particularly under shade trees. *C. annuum* provides nutrients such as Vitamins A, B₂, and C, niacin and potassium; it is also an antioxidant. The inhabitants of Rio San Miguel, Sonora bottle the green fruit in vinegar. The Hiaki use the fruit as a piquant condiment: it may be added to beans, maize, and meat dishes as done by the Tarahumara and Guajiro and alternatively friend with ground cherry fruits. *Chiltepín* aids in digestion and also in increasing peripheral circulation for which reasons patients with diabetes should seek its traditional usage (Hodgson 2001, 233-235).

Many more plants are suggested to aid with diabetes. Such plants, listed by their colloquial Mexican names include: Aceitilla, Chia, Cholla, Damiana, Malabar (*Solanum verbascifolium*), Manazilla del Rio, Matarique (*Psacalium decompositum*), Prodigiosa (*Brickellia grandiflora*), Sávila, Tejocote (*Crataegus mexicanus*), Topozan (*Buddleia americana*), Zarsasparilla (*Smilax officinalis*) amongst others (Rotblatt and Ziment 2002, 403-407). Each of these can be prepared traditionally; some can be prepared as an infusion (infusion), bath (baño), tincture (tintura),

salve (pomada), etc. However, the contexts for these plants are not further discussed because they are out of the scope of the plants that exist at the TYLO and Totecalli gardens.

Appendix

1A

1B

Planting the rue at TYLO.

Nopales at TYLO.

1C

Cabbage, spinach, kale, and broccoli.

1D: TYLO Garden Site
Site

1E: Toltecalli Academy Garden

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