

MARTIAN CULTIVATION: BENEFITS AND LIMITATIONS  
OF URBAN AGRICULTURE IN SAN MARCOS, TX

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**Abstract**

Urban agriculture is a growing trend worldwide, and San Marcos, Texas is not immune to this pattern. Urban agriculture consists of growing plants or raising animals in or around cities, while integrating that production with local economic and ecological systems. But urban agriculturalists in San Marcos face a variety of limitations in their pursuit of success. This research begins by discussing the benefits they provide for a city's environmental, social, and economic health. The central purpose of this research is to identify urban agriculture's limitations in San Marcos and put forward recommendations for improving the local food system. A local food system refers to a community's local food sources, production, processing, consumption, and disposal, which, ideally, are integrated and all occur within or near the community they serve. Plenty of research has already discussed the benefits and complications associated with urban agriculture, and this thesis aims to apply existing knowledge about this topic specifically to San Marcos, Texas. This research utilizes existing literature, information about policies in San Marcos and other cities, interviews with urban agriculturalists in and around San Marcos, and examples from other cities in Central Texas with successful urban agriculture systems. The results of this study may be useful for agriculturalists in the San Marcos area, local policy makers, and other interested parties in their attempts to support urban agriculture.

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**Introduction**

Urban agriculture (UA) consists of growing plants or raising animals in or around cities, while integrating that production with local economic and ecological systems. Urban agriculture, food production, and local food vending are growing trends in Central Texas. As consumers become more interested in locally sourced food and environmental sustainability, they flock to farmers markets. In Austin, Texas, farmers can charge higher prices than grocery stores do for their produce due to increasing demand and the relative affluence of the community, and the city has programs in place that support food gardens and farms. In San Antonio, agriculturalists can grow and sell their products in almost any zoning area of the city, and community members continue to push for reducing limitations on urban food production (Hagney, 2015; Hagney, 2016). In San Marcos, there is a growing desire for locally sourced produce, but the city also has a lower average income and a smaller population of food producers.

Nevertheless, local food production continues to fight on in this small city. Urban agriculture also includes smaller-scale production, in homes and backyards, but this paper will focus on San Marcos's urban farms and community gardens. Gardens typically produce food for private consumption, so members of a community farm are most likely the ones eating the food they produce. Farms, on the other hand, produce food for sale, and some farmers might argue that a major difference between gardens and farms is that farmers rely on their agricultural

activities as a main source of income. Urban agriculture strengthens local food systems, in which each part of the process- from harvesting, to selling, to consumption, waste, and reuse- happens within one community. Local food systems have environmental and social benefits, all of which urban agriculture supports. The following research will discuss the potential benefits of urban agriculture, its current limitations in San Marcos, Texas, and recommendations for supporting its growth.

### **Environmental Benefits of Urban Agriculture**

Though UA is not inherently sustainable, it has remarkably untapped potential to provide environmental and ecological benefits to urban areas, most of which center around reducing the carbon footprints left behind by cities and towns. UA presents opportunities to increase urban sustainability by reusing urban waste, reducing dependence on fossil fuels and inorganic cultivation methods, and diminishing the urban heat island effect.

### **The Problem of Urbanization**

Today, urban areas follow a general pattern of importing resources for consumption and exporting the remaining waste. UA invites urban food producers and community members to utilize these wastes productively, a concept that will continue to grow in importance in correlation with increasing global urbanization. Smit and Nasr (1992) suggest that the popular perspective on urban wastes must shift, so that urban dwellers might begin to view their waste as a resource, rather than as a problem. Smit and Nasr also discuss the importance of implementing closed-loop systems, where people consume, process, and reuse materials, rather

than consume and dispose of them. Both solid and liquid wastes, depending on the circumstances in each city, have the potential for reuse in UA. Wastewater tends to be rich in nutrients, which makes it a valuable commodity for agriculturalists.

Solid waste can also contribute to UA, and both organic and inorganic wastes are useful. Many inorganic components of urban solid waste can be used as materials for construction or improvement of plant beds, fields, irrigation systems, fences, and buildings (Smit & Nasr, 1992). Organic solid wastes are a major component of compost, and are useful as natural fertilizer. By reusing urban wastes productively, UA decreases urban throughput- the amount of material passing through a system- thereby reducing the harmful impacts wastes currently have on landscapes and water supplies. One of the consequences of increasing urban waste is that landfills inevitably contain soluble compounds that can leach into and contaminate groundwater supplies (El-Fadel, Findikakis, & Leckie, 1997). In addition to leachates, landfills also release gases, namely carbon dioxide and methane, when the biodegradable contents within “react quickly with oxygen,” changing landfills’ chemical makeup and spurring anaerobic decomposition (El Fadel, Findikakis, & Leckie, 1997).

Urban communities not only need to resolve the issue of urban waste, but also must address the reality of the urban heat island effect. Despite what some lifelong urban dwellers might assume, the concrete roads they spend so much time on were not always there. Their presence contributes to a phenomenon called the urban heat island effect, an increase in a city’s average temperature that occurs when urban structures absorb thermal energy throughout the day and then

release them during the night. When vegetation covers the ground instead of asphalt, plants, soils, and water use thermal energy for evapotranspiration (when water transfers from the land to the atmosphere), thereby reducing the amount of thermal energy released back into the environment (Stone & Rogers, 2001).

### **Fossil Fuels & Chemical Inputs**

Not only can UA reduce throughput, it may also be able to lower urban dependence on fossil fuels. The majority of the energy consumed by large-scale agricultural operations goes into producing inorganic fertilizers and pesticides (Pimentel, 1998). Today, agriculture is conventionally practiced on a scale so large it cannot function without intensive methods of fertilization and pest control. As supplies of oil and phosphate recede, fertilizers become more expensive (Barrow, 2012). Additionally, the environmental costs of inorganic fertilizers and pesticides worsen after these chemicals have done their jobs in the fields.

Runoff from farmlands exposed to nitrogen-rich fertilizers finds its way into both freshwater and marine ecosystems. Take, for instance, the Mississippi River, which feeds the Gulf of Mexico. Chemical runoff from farmlands along the Mississippi finds its way into the river, and the excess nitrogen present in this runoff allows harmful algal blooms to occur in water sources. Harmful algal blooms occur when growth cycles of microscopic algae get out of control (National Ocean Service). When these algae decay, oxygen in the water depletes, killing off or displacing other life and creating a dead zone, such as the one in the Gulf of Mexico (Horrigan, Lawrence, & Walker, 2002). Not all algal blooms are harmful, but nutrient-rich runoff causes the rapid and widespread growth associated with these

deadly consequences (National Ocean Service). Excess nitrogen in soil also decreases biodiversity, which has a variety of other impacts. For example, loss of biodiversity within an ecosystem can lead to a decrease in community stability and changes in structural complexity and ecosystem functioning (Brose et al., 2017). Counteracting this reduction in biodiversity, urban farms and gardens can increase biodiversity by creating environments that attract microorganisms, birds, insects, and reptiles (Towle, 1996).

Aside from the chemical throughput of industrialized agriculture, operating field machinery consumes 19% of the total energy spent in this industry (Pimentel, 1998). Small-scale UA, when compared with large-scale industrialized agriculture, has a lower need for mechanized equipment, though equipment does still play a central role to farms' success. However, the cost of human labor can take a heavy toll on farmers attempting to maintain or expand their operations. Fortunately for farmers, in cities like Austin, Texas, urban agriculture continues to draw the interest of urban consumers, allowing farms to recruit interested volunteers, sometimes providing shares of produce in return for their work, as seen at Austin's Green Gate Farms and Boggy Creek Farm.

Another energy advantage of localized food production is that transportation of food decreases significantly. Food miles refer to the distance food travels between its source and its destination, where consumers purchase it. Moving food from one part of town to another requires many fewer food miles than does moving it across the country. The issue of food miles is a growing debate



in the United States. Weber and Matthews (2008) calculated the average distance between food and their places of sale to be 1,020 miles.

### **Human Benefits of Urban Agriculture**

Not only can UA contribute to the sustainability and environmental health of communities, it can also improve the physical and social health of residents. A study on community gardening in Tokyo, Japan, asked allotment gardeners to self-report on the perceived benefits they received from allotment gardening (Soga et al., 2017). Gardeners, in comparison to non-gardeners who were also surveyed, reported higher perceived general health, mental health, and social cohesion, regardless of their varying lifestyles and social classes. According to Soga et al., the amount of time spent gardening did not significantly influence the perceived health of surveyed gardeners, which means that people can improve their health by spending any amount of time gardening or in nature (2017).

UA can improve people's physical health. Though gardening is often undervalued as a form of exercise, researchers have found connections between gardening and reduced risks for obesity and heart disease (Bellows, Brown, & Smit, 2004). UA also shows promise in improving human diets through directly exposing people to healthy foods (Soga et al., 2017; Bellows, Brown, & Smit, 2004). When people interact with their food sources directly, they are more trusting of the food's quality and more interested in integrating it into their diets. In a society disconnected from food sources and often settled into less active lifestyles, UA offers a valuable opportunity to address major health issues.

Community gardens and urban farms, if applied not only in middle class or affluent neighborhoods, but also in low-income neighborhoods, have the potential to decrease health inequality and food insecurity (Bellows, Brown, & Smit, 2004). For example, in a neighborhood of East Austin in Texas that qualifies as a food desert, Green Gate Farms provides fresh produce as a healthy food alternative for lower income families and individuals. Austin's Sustainable Food Center, whose mission is "to cultivate a healthy community by strengthening the local food system and improving access to nutritious, affordable food," allows farmers and other local food producers to accept Lone Star SNAP (Supplemental Nutrition Assistance Program)- formerly known as food stamps- and WIC (Women, Infants, and Children). Those who are registered with SNAP or WIC can use their credit at farmers markets and farm stands, and in return, the Sustainable Food Center reimburses the vendors (Sustainable Food Center).

UA can also improve social cohesion within a community. Community gardens provide a public space in which people can interact, share experiences and knowledge, and build social capital (social networks within a community that help the community thrive). San Marcos community gardeners reported building relationships with other members of their garden, which gave them access to further knowledge about gardening, and gave them access to new social networks. During my first visit to a community garden in San Marcos, one gardener approached me and offered me free vegetables, picked directly from their plot, and discussed the effects of a recent freeze on the garden's produce. Other gardeners present conversed, and one gardener gave another advice about the needs of a

particular vegetable. Connecting community members interested in UA will be helpful in supporting UA's growth in San Marcos, and community gardens provide opportunities for people to make these connections while supporting one another.

When it comes to education, urban farms and gardens play an important role in introducing young community members to food sources and outdoor education. It is no secret that young people today spend a lot of time immersed in electronic technology, and much less time outside, getting their hands dirty. Field trips to gardens and farms, along with lessons at on-site school gardens, give students a chance to interact with their food in an unfamiliar way. For example, New Farm Institute, an education nonprofit located at Green Gate Farms in East Austin, hosts field trips from grade schools all over the city, as well as from other programs, such as businesses, universities, and volunteer organizations. The farmers offer tours of the urban farm, where visitors learn about livestock, produce, how the farm runs, how organic farming works, and the process of growing plants from seed to harvest. Visitors can also volunteer their time to help the farm with projects, such as building chicken coops and birdhouses, harvesting and preparing vegetables for sale, seeding plants in the greenhouse, taking care of livestock, and working on compost piles. These field trips provide young people with life skills, as well as teach people about the importance of local food systems.

### **Martian Cultivation**

In San Marcos, Texas, there is a small but growing community of urban farmers and community gardeners, gradually gaining further traction. There is a Farmers Market Association, led by those who have been active vendors at the San

Marcos Farmers Market for at least a few years. Farmers Markets are held on Tuesday evenings from 3:00-6:00 PM at The Hitch, a food truck park downtown, and on Saturday mornings from 9:00 AM-1:00 PM, on San Antonio St. between LBJ Dr. and Guadalupe St., which is also in downtown San Marcos. The road is blocked off for the outdoor market each Saturday, and vendors operate out of pop-up tents lining both sides of the street. Vendors include farmers selling produce, meat, and eggs; beekeepers selling honey; artisans selling jewelry and other products; a local coffee roaster; and a local kombucha company. A few farmers from outlying towns travel into San Marcos to sell their produce at the Farmers Market.

There are three community gardens within San Marcos, and a handful of urban farms situated on the edges of the city. One of the three most prominent community gardens in San Marcos is located behind St. John's Catholic Church on Hopkins St., and the land belongs to the church. This particular garden has been operating since World War II, when it was founded as a Victory Garden. The two other community gardens are located in residential areas on land owned by the City of San Marcos. The City of San Marcos worked with the nonprofit organization Sustainable San Marcos to start both gardens as part of the San Marcos Neighborhood Gardens program, a branch of Sustainable San Marcos (SMNG). The San Marcos Neighborhood Gardens require that each member pay \$40 per year, and the garden behind St. John's Catholic Church charges a membership fee of \$20 per year. The San Marcos Neighborhood Gardens have a more rigid set of requirements, including required service time each month and standards for plot maintenance (SMNG).

Sustainable San Marcos is a nonprofit organization, founded in 2008, whose mission is “helping the San Marcos community move towards a sustainable future” (SSM). They have formed committees centered on water, waste, energy, and transportation, but their most developed committee focuses on food. Their food committee consists of two neighborhood gardens and Edible San Marcos, a branch of the nonprofit that promotes gardening throughout the community, provides educational resources for community members, and actively participates in the city dialogue on sustainability (SSM; Edible San Marcos).

### **Martian Limitations**

Overall, UA in San Marcos is heading in a successful direction. Urban farmers and gardeners face, for the most part, the same challenges as agriculturalists anywhere else. Freezing weather and storms, lack of time, lack of money and equipment, and a need for more knowledge all affect the success of UA in San Marcos. In regards to time, urban farmers must sometimes work off-farm jobs, sacrificing their time and energy, to make ends meet. One farmer described keeping a job elsewhere until the farm started pulling in enough revenue. Another had to work an off-farm job, while also farming part-time, until they could retire, at which point they shifted to full-time farming.

Another improvement that agriculturalists in San Marcos would benefit from is the installation of a permanent site for the Farmers Market. Currently, the most popular Farmers Market in San Marcos takes place on a street blocked off on Saturday mornings. That street is downtown, near bars where people sometimes

park and leave their cars overnight. When 9:00 AM comes, vendors have to work around those parked cars, which take up space for tents and vendor vehicles. There are also no portable restrooms available for Farmers Market customers, which means that customers have to resort to using restrooms in downtown businesses. Additionally, on rainy days, vendors experience lower turnout and lower success rates. Alternatively, the New Braunfels Farmers Market boasts portable restrooms and a large awning, under which sits a stage and several sets of tables and chairs. This market goes on, rain or shine, and the turnout does not suffer quite the same blow as it does in San Marcos. Part of this consistent flow of customers in New Braunfels also comes from longstanding and loyal relationships between vendors and community members.

### **Other Area Trends**

San Marcos, Texas is a thriving city of about 60,000 people, and it is flanked to the North and South by two major Texas cities: Austin and San Antonio. Both of these growing areas have made great strides toward improving the conditions for local food producers. In 2016, San Antonio's City Council altered their Unified Development Code (UDC) to allow food gardening and marketing in every type of zoning area. They coined these food-producing operations "residential market gardens." Alternatively, they have also expanded the reach of urban farms, which they define as properties where the farmer does not live on-site, and enough crops are grown to be sold off of the property (as opposed to selling on-site like residential market gardens). These operations are now allowed throughout the city as well, only requiring a special use permit in single-family residential zones.

This concession was added to the UDC after its initial proposal in January (Hagney, 2016).

Following this development, it is now up to homeowners associations (HOAs) whether or not residents can produce food in larger quantities on their properties. HOAs receive their authority at the state level, and so the City of San Antonio cannot restrict their authority. If individual residents want to grow food in their yards, they must approach their HOAs and attempt to gain approval (Hagney, 2016). In an attempt to combat existing restrictions on urban farming, some city council members pushed to simplify the process of allocating vacant lots in residential zones to serve as sites for local agricultural production. Though it is a sign of further hope that some community members want such changes to take place, they were not successful this time around (Hagney, 2016).

There are, however, other forces in action to promote urban food production in this city, such as the Food Policy Council of San Antonio, which connects farmers with helpful resources for running successful operations. They provide information about writing business plans and finding affordable land options, and help farmers find microloans and sales outlets. Some local restaurants have been buying produce from local farmers. Wholesalers like Farm to Table and Truckin' Tomato also buy in bulk from local farmers (Hagney, 2016).

This paper has already discussed a few examples of successful UA support systems in Austin, and it is clear that these two large cities, between which San Marcos lies, understand the benefits of UA and are putting more work into ensuring its success in their own communities. San Martian activists, policy

makers, and urban agriculturalists will find helpful models for solving some of UA's problems by looking to their neighbors.

### **Recommendations**

Supporting the success of UA is possible, as shown by examples in San Antonio, Austin, New Braunfels, and across the country and the world. There is plenty of evidence of its benefits for urban communities, and many members of the San Marcos community seem to understand that. There are some actions, however, that can help urban agriculturalists better succeed in San Marcos.

On a policy level, the City of San Marcos could support UA by protecting existing farmland and green space from development. Development is a common topic of discussion in San Marcos, where Texas State University's increasing student population brings in a continuous stream of apartment complexes and chain restaurants. A past instance of development on a previous green space, which was situated on a floodplain adjacent to the San Marcos River and John Stokes Park, led to massive flooding that could have been avoided, had that area been protected. The pro-development city council that allowed this situation to unfold as it did has since been replaced. By "grandfathering in" existing farmland, the City of San Marcos and its new city council can protect green spaces for future use as parks, gardens, and farms. These green spaces have environmental, social, and economic benefits, many of which have been discussed in this paper.

When suitable land is available, the City of San Marcos and organizations such as Sustainable San Marcos can identify it as potential farm or community garden land and facilitate leasing or buying processes. For example, Austin's



Sustainable Food Center maps out and advertises available land that is appropriate for agriculture (Hagey, Rice, & Flournoy, 2012). One struggle faced by many new farmers is the lack of access to suitable land, and in San Marcos, that issue will most likely become more severe as the town continues to draw in residents. But urban development does not necessarily have to mean building structures for use as homes and businesses; it can mean developing sustainable businesses such as farms and gardens. The city council must balance the multitude of values present in the community, including those posed by urban agriculturalists. Whether or not farmlands are protected and utilized effectively and sustainably depends on the goals set forth and maintained by the City of San Marcos.

Even after urban farms and community gardens become established, they still face obstacles. Both community gardens and farms rely on labor to achieve success, and while the entire idea behind community gardens is that residents involve themselves in the workload, farms do not operate under the same system. Farms may invite volunteers to work, sometimes in exchange for a share of produce, but they require funding to pay workers and to purchase necessary equipment. Farm equipment is expensive, and farmers often need assistance, perhaps in the form of grants, to buy what they need in order to keep operations running. Environmentally aimed organizations, such as Sustainable San Marcos, should offer grants for farmers to purchase equipment so they can continue to contribute to the community's well being. Sustainable San Marcos might also consider helping urban farms and gardens find affordable liability insurance, which requires plenty of time, attention to detail, and knowledge of available

options. Advice from experts and UA advocates could help urban agriculturalists find the insurance company and plan that best suits their interests, while still leaving them with time and energy to continue their regular operations.

The City of San Marcos's Planning and Development Services Department lists that part of its mission is "to continue our commitment to providing high quality customer service to the various groups we serve, including builders, developers, landowners, neighborhood groups, city commissions, outside agencies and the citizens of the community" (City of San Marcos). Perhaps this statement should also include "urban agriculturalists or food producers." Of course, sometimes community conflicts may arise surrounding urban farms and gardens. Some neighbors might find them unattractive or otherwise disapprove of their presence, but the Planning and Development Services Department could facilitate community-based planning, wherein resident and agriculturalist concerns could be identified, discussed, and worked through to allow for the most seamless transition possible (Hagey, Rice, & Flournoy, 2012). UA should benefit the community rather than cause it to suffer, and it is partially the job of the city government to identify and promote the most effective solutions, as well as to decrease tension between agriculturalists and other members of the community.

Aside from the importance of support from public and private resources, individual community members and local business owners also have roles to play in helping UA succeed. The United States economy is a capitalist one; therefore, decisions are made based on the level of predicted profit those decisions will achieve. And for almost every product or service on the market, there are

consumers ready to spend money. That money goes on to support the maintenance and/or growth of certain businesses, companies, and industries. So if consumers want to know where the products they purchase come from- and perhaps how they are made- then eventually companies will give them that information. The customer is always right, so if consumers decide they prefer locally sourced produce, it is likely that grocery stores will work through the obstacles that keep them from buying produce from local growers in order to meet demand. Consumers have a lot of power in these decisions, so long as they use their voices to demand change.

On a more day-to-day scale, consumers can choose to spend their money at local farmers markets or farm stands, thereby supporting local UA and their neighbors who practice it. Local restaurants can also support UA by purchasing bulk produce from local agriculturalists. A local restaurant in San Marcos, the Root Cellar Café, sometimes purchases locally produced foods, but smaller yield size and higher likelihood of unstable production prevent restaurants from relying solely on UA as a source for meat and produce. But if community members, business owners, policy makers, and private advocacy groups worked together to support UA's growth, there may come a day when buying local produce in bulk would not be an issue.

### **Conclusion**

Of course, making UA an integral part of city life is no simple task, and there are other issues involved that are not discussed in this paper. For example, while UA has many environmental benefits, there are also environmental risks

associated with certain aspects of it. Part of creating a sustainable local food system requires maintaining environmentally friendly agricultural practices. The use of chemicals is less common in UA, but if an urban farmer decides to use them, there could be negative consequences for neighbors and for the urban environment. In San Marcos, where the San Marcos River is central to the culture of the city and contains a variety of endemic species, agricultural chemicals present a serious risk. Future planning should consider these consequences, and may even put legislation into place that forbids the use of such chemicals and instead encourages organic methods. While city government, local businesses, and members of the community are all responsible for promoting environmentally sustainable practices in San Marcos, urban agriculturalists also have an obligation to maintain such practices.

In order to understand what types of urban agriculture and associated supportive services best fit in San Marcos and in any community, one must also understand the context the city provides. Farmers' and gardeners' access to affordable land and water, economic opportunity, environmental conditions, in combination with the social and political needs or goals of a community, determine the long-term success of urban agriculture (De Zeeuw, 2000). Cities are dynamic and often experience change at a fast pace, so urban agriculture has to keep up with those changes in order to have a chance at long-term success.

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