

# **Investigating the determinants of successful urban agriculture in the semi-arid region of Mitchells Plain, Cape Town.**

**Authors:** Caroline Rono & Kim Cottle

**Supervisor:** Dr Beatrice Conradie

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## **Abstract**

*SEED, a non-profit and public benefits organisation has taken the initiative to educate the Mitchells Plain inhabitants about the importance of food gardens and sustainable green living, aiming to improve the resilience of poor urban households. While the volunteers are objectively poor, they are not impoverished. The project involves assisting local volunteers with developing their own homestead garden by providing a 2-day permaculture training course alongside the bare minimum of necessary garden resources for each three harvest seasons. This paper will discuss successful household garden techniques by identifying what is unique about a fruitful gardener's approach to urban gardening. The aim here is to recognise those characteristics which secure a healthy, flourishing garden set to withstand the obstacles of climate change and the challenges of personal conflicts.*

## **Introduction**

With the increasing growth in universal population water is becoming an increasingly scarce commodity. In the Western Cape region where individuals' organised water systems channel water from the Berg River Water catchment agriculture tops the water demand chart. As such, great strain is placed on the capacity of food produced annually.

The supplementary rise in global climate temperatures is placing increased pressure on annual food production. Agricultural production capacity is falling while relative food prices are rising, thereby limiting the quantity and quality of food available (Wlokas, 2008). "With rising unemployment and increasing vegetable prices, home food gardening plays a vital part in securing household food security" (Karaan and Mohamed, 2008). Karaan and Mohamed go on to say that while it cannot be proven that it is more cost-effective to produce your own food than to buy it, it should rather be viewed in the context of a relative scarcity of monetary resources to purchase food, which is relatively easy to produce oneself.

This leads us to the aim of this paper: To highlight those factors which shelter prosperous urban homestead gardens. The upcoming sections of this paper define the project methodology: our data collection process, followed by the results and the conclusion. Embedded in the conclusion are the recommendations.

## **Methodology**

This investigation was commissioned by SEED who granted us permission to conduct face-to-face oral interviews with 8 of their current homestead gardeners. This gave us insight to the different gardening techniques used in various households. Further information was obtained online and assessed in the form of a literature review.

## **Results**

Mitchells Plain was established in the 1970's, during the Apartheid era - a coastal region categorised by a flat and infertile, beach-like sandy terrain which then rendered the land as invaluable and useless. The region faces complete scarcity of nutrient rich soil and is well known for its annual gale force winds. These factors combined provide the perfect horror for any garden enthusiast.

The paper will now discuss the factors which are most significant to growing a healthy garden in the region.

“The most common land management practices used by farmers in the study villages are crop rotation, incorporation of crop residues, application of household residues, application of manure or compost, use of slash and burn to prepare fields, and application of mulch” (Pender *et al.*, unknown).

### The importance of building your own soil

Having visited the various homestead gardens in Mitchells Plain the first thing noticed was that all the house garden plots were significantly small. Some houses did not have open soil on their property and thus engaged only in container gardening – growing plants in containers as compared to growing them in the ground. In a small garden you use the same patch over and over again, making intense use of the soil. Growing food exhausts the soil over time making it weak in nutrients and minerals. Weak soil yields weak crops which then attract disease and infect the soil and to prevent this gardeners’ need to constantly give back to the soil that which they take out (Coyne and Knutzen, 2008). Thus, the most important aspect noted was that the success of productivity of one’s garden is a direct output of how well the soil is cared for. The following garden practices were all used conjunctively by those gardeners who were most thriving:

- Compost your yard and kitchen waste, and start an earth-worm farm in the compost heap.

In Mitchells Plain where the area is overwhelmed with infertile, loose, beach sand, the soil needs to be intensely mixed with compost so that it can be infiltrated with nutrient rich minerals and microbes and fungi, necessary for the continual growth of plants. The compost serves both as a soil and as a mulch for the garden, holding the soil together so that roots can grow firmly (Coyne and Knutzen, 2008). The gardens that had their own compost heap on their property were thus proven to have the better crop yields as they could constantly add to and renew their existing soil.

When visiting the eight homes, we noticed that those homes using compost intense container-gardening were yielding the largest and most fertile crops. While ground garden beds consist largely of the loose, infertile soil, which is mixed with compost, the containers are filled with compost from the bottom up, allowing the lowest roots of the crops to reach and absorb strong nutrients and minerals. This allows the soil to retain water more effectively, maximising the output crop yield.

Another technique which was very effective was found in one home which made use of a compost intense trench bed. Similar to that of the container, but on a larger scale, the trench bed is an area of soil which has been uprooted and reconstructed in layers, applying layers of compost and layers of the original soil. The idea here is the same as that of the containers: plants’ roots grow deep down into the soil and so having compost rich soil deep under allows for greater efficiency of absorption which enhances the crop yield: both in quantity and quality. The trench bed requires labour-intensive manpower as well as huge amounts of compost, manure and mulch. Since Mitchells Plain is an area dominated by low-income households where the gardeners are predominately women, in their older age (40-60), this custom proves impracticable.

Lastly is the significance of developing a worm compost pile alongside your worm-free compost pile. Worm castings “are packed with water-soluble nutrients as well as beneficial microbes and bacteria” (Coyne and Knutzen, 2008). This is highly useful in Mitchells Plain where the soil is nutrient scarce, and while the compost adds minerals and nutrients to the soil, it requires relatively large amounts since the soil was bare to begin with. Furthermore, the water retained in the worm castings makes it possible for the soil to retain increased volumes of water.

Managing the use of good organic matter is thus the basis for high quality soil. “Practices that promote good soil organic matter management are, thus, the very foundation for a more sustainable and thriving agriculture.” (Magdoff & Van Es, 2000)

- The importance of mulching the soil

Mulch is very similar to compost in that it is organic matter, but it is much less decomposed. It consists of leaves, bark chips, straw, pine needles and other tree and plant matter from the surrounding garden area. It acts as a protective layer, retains moisture, helps regulate soil temperature, provides a living habitat for beneficial insects, and as it breaks down over time, it improves the quality of the soil (Coyne and Knutzen, 2008).

Again, it is important to remember that the soil in Mitchells Plain is very dry and loose. It struggles to retain water and it lacks a natural ecosystem full of nutrients and micro-organisms and fungi which grow in warm, wet conditions. Thus the use of mulch has largely enhanced the quality of the soil and hence the productivity of gardeners’ crop yields.

- The importance of crop rotation

“Crop rotation reduces the value of production significantly, at least in the short run. In the longer term, however, crop rotation may contribute to productivity by helping to restore soil fertility and reducing problems of pests and diseases.” (Pender *et al.*, unknown)

This also applies to how a garden is organised: Planting a variety of crops in the soil and rotating them during seasons of harvest largely adds to the resilience of the garden as each plant absorbs differently from the soil and appeals to different pests and diseases (Coyne and Knutzen, 2008). One of the gardeners involved in this study mentioned that different crops attract different pests. When crops are planted in variety the pests have very little to feed off and so they move away to find more concentrated areas of the food they are interested in.

According to Barthel and Isendahl(2012), diversity of garden crops has been defined as a dominant principle of social–ecological resilience. Folke *et al.*, (1996) reassures this theory mentioning that diversity of species serving the similar functional groups add resilience to that specific ecosystem function (e.g. pollination) since each plant group responds in a different way to a given disturbance.

### Networking is key

It was found that participants who engage with other farmers experience thriving yields since they exchange tips and tricks in farming. There is evidence of valuable exchanges between trained and untrained gardeners. “The concept of gardening groups clearly appeals to the gardeners, and appears to be a crucial mechanism for enhancing community cohesion, exchanging experiences, and building capacity.” (Karaan & Mohamed, 2008) Even though there is a great importance in direct engagement with their own gardens, it is also vital for new gardeners to watch other more experienced ones and be involved in the techniques they use (Hale *et al.*, 2011).

Agricultural technical assistance is anticipated to increase the value of crop production considerably (Karaan & Mohamed, 2008). This can be done through agricultural training and extension programs which provide courses on maintenance of gardens. Since SEED provides permaculture courses to all participants, it was found that those who took the effort into engaging personally with the gardeners beyond the scope of the classes had successful gardens. This provided them with tips on which crops to grow when and what are the most efficient methods to use (Coyne & Knutzen, 2008).

Face-to-face interaction is not the only way to receive such information for those who are unable to reach out to other gardeners. Knowledge can also be sought out from literature where gardeners

can find what they need to know from books. They can learn more about which crops are suitable for the particular climatic region they reside in and the methods that have proved to be successful.

Growing the right crops

Due to the unavailability of suitable land space, gardeners should implement an efficient land management technique (Baiphethi & Jacobs, 2009). This means that only crops that will be beneficial should be grown. These crops include those that are edible, medicinal or serve an alternative purpose (Coyne & Knutzen, 2008). These alternative purposes consist of windbreakers, natural pesticides and dynamic cultivators that aid in acting as ‘ground boosters’ by adding nutrients into the soil.

**Table 1: A frequency table displaying the respective crop types grown amongst the 8 gardeners.**

Name of Crop	Frequency
Spring Onions	8
Lettuce	8
Spinach	8
Wild Basil	7
Comfrey	6
Red Lettuce	6
Red Spinach	5
Yarrow	5
Coriander	4
Parsley	4
Beetroot	4
Cabbage	4
Tomatoes	4
Green beans	3
Chilli	3
Squash	2
Strawberry	2
Sweet Potato	1
Pumpkin	1
Avocado	1
Pawpaw	1

The table above shows how many participants grew a particular type of crop. The findings proved those who implemented this companion planting technique yielded more fertile plants. The most commonly used dynamic cultivators were comfrey and yarrow which were either planted where their nutrients would seep into the soil or soaked in water and sprayed over the crops. In order to facilitate pest control, natural pesticides such as flowers and wild herbs were grown thus avoiding the toxicity that comes from manufactured pesticides while also beautifying the garden.

All in all, this ensured proper utilization of the limited resources available. These include: space which is limited due to the low standards of living; water, so that it only aids in the production of functional crops beneficial to the gardeners’ consumption and time spent (Coyne & Knutzen, 2008; Bibbo *et al.*, 2007).

### *The importance of grey water recycling*

Since the Mitchell's plain area has dominantly low-income group residents, their food expenditure can be as much as 60-80% of their total disposable income (Baiphethi & Jacobs, 2009). This means that they have less than half of their disposable income left to spend on other expenses, while most houses are filled with large families that need to be catered for which further aggravates the situation. Moreover, the dry soil of this semi-arid region means that gardeners have to water much more since the water drains straight increasing their water expenses. During summer the condition is worsened since additional supplies of water are required to offset the high rate of evaporation (Smaleet *al.*, 2009. This means that the required amount of water might not be utilised, and thus not reach the roots which mostly require water to ensure the plant is not susceptible to heat, shock and drought (Coyne & Knutzen, 2008).

Therefore, water conservation techniques are necessary. The findings obtained revealed that participants who used the grey-water system conserved a great deal of water and saved on water expenses while indirectly being environmentally conscious. Gardeners would primarily use rain water for their plants, as it was collected either in barrels, bottles or tanks. Likewise, recycled water from the home was used, bath water or rinsing water from washing dishes and clothes, or both. Since this bathroom, dishes and laundry water is not mixed with toilet water it is perfectly safe and is used as a homestead garden irrigation technique in the poor region of Jordan (Faruqui & Al-Jayyousi, unknown). Water that had been mixed with detergents or chemicals was diluted with clean water as it was feared that the undiluted form would have adverse reactions with the soil subsequently damaging the plants: a consequence which would take much longer to remedy because the soil would need to be made fertile again. Overall, these techniques enabled them to water their crops much more without any financial implications. By being able to water sufficiently, they need not constantly water the plants. Furthermore, it was also found that watering the crops in the evenings conserved water since this practice avoided the problem of day time heat evaporation.

### *The degree of environmental awareness*

While there is no available data available on this topic, the interviews conducted produced interesting results regarding this topic. It was found that there exists a significant relationship between the degree of environmental awareness and the productivity of one's homestead garden.

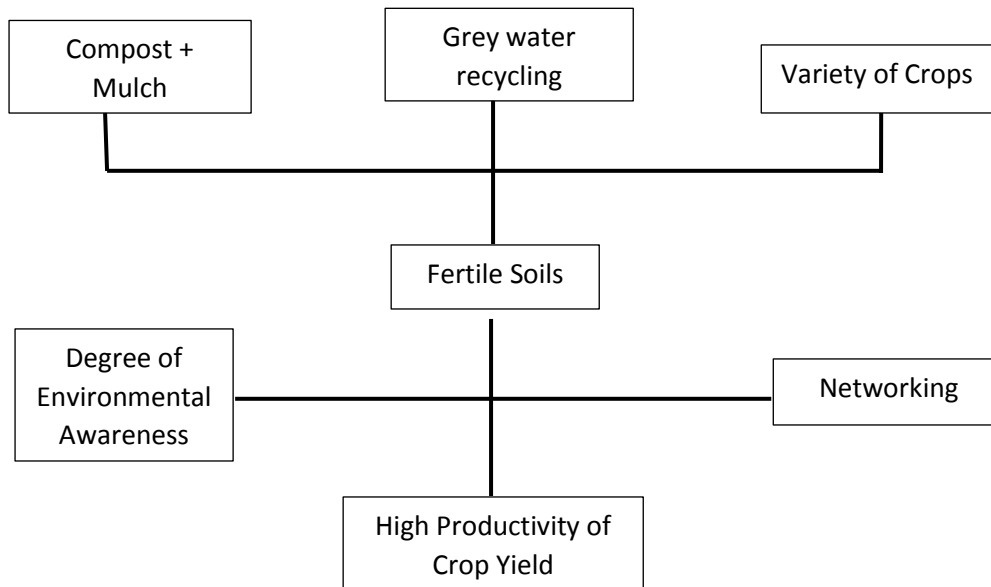
One household which was particularly successful was involved in making jewellery and garden equipment from recycled materials. The other most thriving gardener was in the process of developing his homemade version of a hydroponic watering system. He also made use of organite stones and pyramid models in his garden which he believed increased his yield productivity. The last gardener of the most successful lot had turned her entire outside area into a garden - food and flora garden - covering her front area, the side of her house and her backyard.

Environmentalism is defined as a strongly held belief that one is required to and is responsible for respecting, protecting and preserving the natural world from man made suffering. Thus environmental awareness appears to provide the greatest incentive (alongside escalating food prices) for individuals to be garden intensive (The Pachamama Alliance, unknown).



## Conclusion and Discussion

It can be summarised that networking, the use of sufficiently composted soil, grey water systems and an individual's degree of environmental awareness are the main determinants in the dynamic outcome of urban homestead gardens in the Mitchells Plain region.



**Figure 1: The determinants of highly productive urban garden crops in the Mitchells Plain region.**

To ensure that the above mentioned practices are understood and used by the regions homestead gardeners, SEED should aim to broaden their permaculture training course and provide extension programmes for the beginners who show a high degree of interest in the initiative. Keraan & Mohamed (2008) mention that consistent and regular gardening training and extension programmes were established as critical needs in an almost identical (sponsored) programme initiative in Kayalitscha.

Furthermore, given the time and the necessary financial and other resources SEED should consider decentralising their training workshops in order to achieve greater outreach of its programme for the convenience of its beneficiaries (Keraan & Mohamed, 2008).

The project has a bright future and in the long run farmers may be induced to take advantage of this opportunity as a source of income by selling the crops they grow, thereby strengthening their economic purchasing power as well as becoming more food secure.



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