

An Agroecological Survey of Urban Farms in the Eastern Bay Area to Explore Their Potential to Enhance Food Security

This participatory community-based project was carried out over the summer and fall of 2014 in 21 farms and gardens in the East Bay (Alameda and Contra Costa Counties) to determine the main agronomic problems limiting production, and to help inform future outreach and training to increase production on these urban farms.

Objectives

1. To determine cultural practices currently used by urban farmers and their effectiveness to overcome the identified limiting factors of soil constraints and pest, disease, and weed pressure
2. To quantify actual yields reached in various urban farms subjected to varied soil and pest management practices under different spatial and temporal combinations of crop species and varieties

This information will provide a baseline that can be used to plan a series of on-farm research trials to explore urban agriculture best practices and management designs to overcome production constraints and optimize yields.

Methods

1. Farm managers were surveyed for soil and pest constraints and practices used. This survey included 21 urban farms and gardens and included school gardens, community gardens, and personal gardens that had been opened to the community.
2. Soil was sampled for nutrient and contaminant levels.
3. Two types of yield analysis were completed:
 - Productivity: Number of crop species, plants, and vigor was assessed to estimate productivity for a given quadrat (1m²)
 - Yield: Farmers were instructed to weigh all produce grown in specific plots (6m²)



People's Grocery California Hotel. Photo by Miguel Altieri.

Results

Soil

Nine out of ten sites had high soil fertility and exhibited good soil quality indicators. No samples contained elevated levels of total trace metals. Most of the surveyed gardeners followed agroecological practices to maintain soil fertility and quality.

Water

The need for irrigation is often complicated by urban water prices and access. All but two survey respondents noted that if the farm itself was responsible for irrigation costs they would not be able to operate the farm. Of surveyed farms, 52% had an organization or partner that covered the costs of irrigation. Many farms are on city property and the city itself pays for irrigation needs. Only 10% of the farms (two) had wells that were used for irrigation; both were worried about the quality of the water as well as the possibility of the well running dry.

On-farm animals

Less than half of the farms surveyed had on-farm animals (chickens, goats, ducks, worms, or bees). Raising chickens was the most popular (42%), as they ate much of the crop

residues and provided manure. The presence of animals had a positive correlation with on-farm soil building.

Insect Pests

Many farmers were following best practices to promote beneficial insects for biological control, such as providing habitat strips, intercropping/planting flowers, and facilitating a more heterogeneous crop plan. Despite these measures, some pests such as cabbage aphids were prevalent. Generally, most farms recognized that the most effective pest repellants were good soil health, on-farm biodiversity, and strong plant vigor.

Weeds

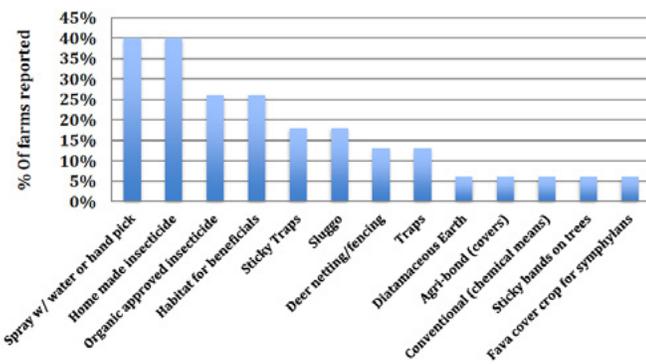
Many farmers struggled with weeds. However, the majority of farmers mentioned that methods used to control or prevent weeds are “effective” to “generally effective.” Some farmers take advantage of “weed” cover after plants get past their period of critical competition, but most allow presence and growth of aggressive weeds (amaranth, grasses) to levels that reduce crop yields. 30% of the quadrats sampled had some form of mulch. However, in many of these cases, the mulch cover was very light and was not effective in blocking weeds. Plots with a thick mulch showed high weed suppression.

the targeted 10 kg/m² of productivity (established by our team based on production levels reached by intermediate Cuban urban farms) and demonstrates the potential for increased yields in Bay Area urban agriculture with additional research, outreach, and institutional support. Low yields seemed associated with bad choice of crops, poor management, and low levels of crop diversity. A large number of heavy, high-producing crops (tomato, squash, and strawberry) resulted in high estimated productivity and are hypothesized to be a large factor in the variation seen in the data.



Community Garden “rating” system.

Methods of Pest Control



Productivity

Estimated productivity results varied among farms. This was most likely due to the diversity of goals, labor support, and organizational characteristics of each farm. Average estimated seasonal yield ranged from 3.43 kg/m² to 17.16 kg/m², with a mean productivity of 7.09 kg/m² for all farms included in the study. This estimate is less than

Conclusions

By surveying 21 farms, the team evaluated the effectiveness of cultural practices used to overcome agronomic problems, as well as yield levels in farms undergoing different crop combinations and management practices. Such diagnosis has provided key information to start a series of on-farm research trials to define and scale-up via best agroecological soil and pest management practices, so as to overcome identified constraints and enhance yields.

Research Team

Miguel Altieri, Céline Pallud, Joshua Arnold, Courtney Glettner, and Sarick Matzen (Environmental Science, Policy, and Management)