Project Report

Project Name:	Practical knowledge gaining of the master's class "Sustainable International Agriculture" (SIA)
Project Duration:	Early spring to autumn 2021
Project Participants:	All students of the SIA classes represented by Marlene Wätzold and Marcela Carcamo

Supported by:

ALUMNI GÖTTINGEN

Stiftung WissenWecken

Project Goals:

The main aim of the project was to enable the students to gain some practical knowledge in gardening and apply some of the theoretical knowledge learned in class in the real field. Furthermore, the aim was to create a social space where students could meet and while exchanging topics about gardening create useful connections and improve teambuilding skills.

Various students experimented with different gardening techniques which will referred to as subprojects. These subprojects will be stated below and illustrated with pictures:

1. Humus production with the help of *Eisenia fetida* (SAVIGNY, 1826) earthworms

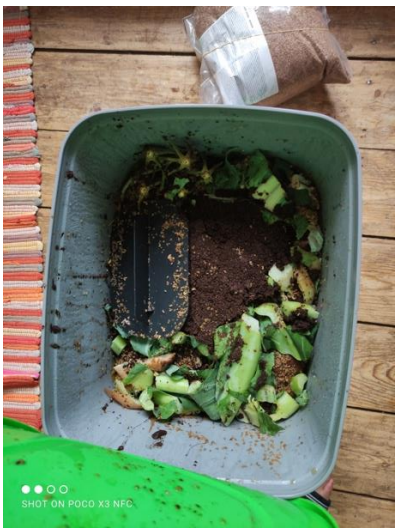
Compost earthworms are used for vermicomposting domestic and industrial organic waste. They thrive in rotting vegetation, compost, and manure. Earthworm composting is the process of converting bio- waste into worm humus, although numerous other microorganisms are involved in the process besides earthworms. Within one day, earthworms consume an amount of various kinds of organic waste equivalent to their body weight. This means, one kg of earthworms eliminates one kg of waste and converts it into humus within 24 hours (Adhikary, 2012; Hubus-Berlin, 2021). The amount of humus produced is about 50% of the amount of organic waste eaten by earthworms (Adhikary, 2012).



After ordering the earthworms, they were kept in a dark place behind the garden shed. Every few days they were fed with kitchen and garden waste. In order to prevent mice from eating the waste, they had to be surrounded by water. We were able to replicate the earthworms. Although the humus production was not enough yet to use as a fertilizer, we could use the liquid that was produced also through the other microorganisms as fertilizer.

2. Fertilizer production through Bokashi fermentation

Bokashi is a traditional agroecological technique to create organic fertilizer. Originating from Japan, it means in Japanese “fermented organic matter”. Similar to compost, bokashi is the product of microbial breakdown of organic matter. However, unlike compost, the bokashi process makes use of anaerobic microbial processes in addition to arobic microbial processes. This allows for an accelerated breakdown of organic matter in bokashi (Kittredge, 2021).
We tested this with a bokashi set. Here, kitchen waste is put in a box and bokashi microbes are added. Indeed, the process took only roughly two weeks. The liquid was collected and used as fertilizer. After our plots are harvested empty, we will add the bokashi waste into the plots and hope that they will improve the soil for next year.



3. Milpa system gardening

The so-called milpa system is a polyculture originating from the ancient Maya, but is practiced throughout Mesoamerica till today (Nigh & Diemont, 2013). Milpa can be characterized as an open-field intercropping system centered around maize. This staple crop is combined with legumes (most often red kidney beans and black beans) and some kind of ground cover crop like sweet potato or pumpkin varieties, but other crops like pepper, rice, banana or melon can also be integrated in the system, depending on the site conditions (Bernsten & Herdt, 1977).

The idea behind this ancient intercropping system is to bring poor tropical soils to their full potential by efficiently using niches and complementing each other, thus legumes are planted to fix atmospheric nitrogen that can also be used by the corn, and ground cover crops like pumpkin prevent high soil moisture loss through evaporation. Moreover, risks of total crop failure due to unfavorable weather conditions are minimized. Therefore, also different varieties of the aforementioned crops are usually planted on the same field (Bernsten & Herdt, 1977). The milpa system was developed by the ancient Mayas as a response to their specific and often difficult growing conditions but can also be applied elsewhere like our little garden in Göttingen. Here we planted maize (sweet corn) together with scarlet runner beans, pumpkins and zucchinis.

4. Greenhouse Building

Another student built a small greenhouse out of an old window and planted chili and tomato plants. The plants were watered through a small drip irrigation system that was linked to a pail hanging in the tree. This way rainwater could be collected in the pail and transferred to the plants. The plants in the greenhouse not only enjoyed warmer temperatures but were also safe from the slugs in the garden that preferred to eat the plants in the open plots.

5. Testing different seed varieties

Garlic was planted in two plots next to each other. While one plot included garlic seeds the other was planted with garlic from the supermarket. The seed garlic grew much faster and stronger. Since the supermarket garlic looked very weak and not like it would be able to produce more garlic bulbs, we thought of utilizing this plot with something else. Potatoes were planted in between the rows of garlic, since according to Plantura (2021) garlic shall prevent any pests from reaching the potatoes. Within the potatoes we also varied between potato seeds that were bought from the gardening shop and potato seeds that were normal cooking potatoes.

The pictures show the difference between the garlic originating from the garden shop (left) and the garlic meant for eating (right, in between the rows of the potato plants). Furthermore, as can be seen in the right picture, the cooking potatoes grew much faster at the beginning, however later it evened out. When we harvested the potatoes, unsurprisingly, the seed potatoes from the gardening shop had more potatoes than the supermarket ones.

6. Social events

The garden was also used as a space for teambuilding and networking. SIA students came together to garden or have a picnic. The garden is especially interesting for international students, since the German climate and topography is new to them.

Garden Enemies

Unfortunately, our greatest enemies were the slugs. They destroyed more than half of our plants. Even the “snail rings” which is supposed to protect the young plants did not help so much as can be seen in the picture. But here we also learned that slugs can dig themselves under the soil if the rings are put over the plants too loosely.

Conclusions

The garden enabled the students, some of whom had never gardened before, at least in Germany, many practical insights. We learned from mistakes and got new ideas how to improve our gardening skills in the future. Also, we learned, that maybe we should plant more plants that are not so popular by the slugs. These included beans, potatoes and peas. We hope that for next year, more SIA students can come to the garden and enjoy gardening with their classmates!

References

Adhikary S. (2012). Vermicompost, the story of organic gold: A review. Agricultural Sciences 3 (7): 905-917.

Bernsten R. H. & Herdt R. W. (1977). Towards an understanding of milpa agriculture: the Belize case. J Dev Areas 11: 373–92.

Hubus Berlin (2021). Kompostwürmer. Retrieved from: https://hubus-berlin.de/shop/wuermer/kompostwuermer-eisenia/ (26th August 2021)

Kittredge, J. (2021). The Natural Farmer How to make bokashi a nutrient rich fertilizer. Retrieved from: https://thenaturalfarmer.org/article/how-to-make-bokashi-a-nutrient-rich-fertilizer/ (26th August 2021)

Nigh, R. & Diemont, S. A. (2013). The Maya milpa: fire and the legacy of living soil. Frontiers in Ecology and the Environment, 11(s1), e45-e54.

Plantura (2021). Mischkultur bei Kartoffeln: Gute Nachbarn, Fruchtfolge & Co. Retrieved from: https://www.plantura.garden/gartentipps/gemuseratgeber/mischkultur-bei-kartoffeln (26th August 2021)