

2017 Re-inventing Japan Project

Universidade de São Paulo, Department of Plant Science,

6th year, Caio Cugler Siqueira

Tokyo NODAI Department: Biosciences

September 08, 2017

I study agronomic engineering at the University of São Paulo, it is a five year course and I decided to extend a year more to make the exchange to the Tokyo University of Agriculture. When I saw in Brazil that there was a partnership between the two universities and opportunity for studying at NODAI I soon thought it would be a great opportunity to apply.

I have always admired by Japan as an example of respect, organization and millenarian culture and believed that living in that country would be an unique opportunity not only to my academic environment but also would add a lot to my personal growth.

The academic growth was also a great opportunity for me, in Brazil my final research is about vertical farming and Japan is one of the best places to understand that kind of technology. I also visited a vertical farm in Yokohama during July that I will describe in this report.

At April 15, Mariana and I traveled from São Paulo to Frankfurt and then to Tokyo, Azael from NODAI's CIP received us at airport and explained important initial information about first procedures at University and about government health insurance, it was so important all the help and I'm really thankful, because first days are the most difficult to adaptation and these information helped us a lot.

So then I received my ID student card and applied to all subjects that I want to study at NODAI: Environment and Agriculture, Food and Environment in Economic Development, Planning and Design of Landscape Architecture, Japanese Agricultural Development, Life History and Applications of Landscape Plants and basic Japanese language classes.

At these classes I had important background of how Japanese people deal with agriculture in the country. I also had more contact with NODAI students that choices this classes in English and they want to make foreign friends, curious about change experiences from each county.

At Environment and Agriculture classes all professor taught in various classes about the relationship between human activity and the environment and also use of technology to create a better use of sustainable resources. We had classes about use of Satellite Imagery, Desertification, Control, Dehydration and others. It was great to listen different aspects of agriculture, Brazil have a desertification problem at northeast and it was great to understand more about NODAI experience to solve the same problem in Africa.

At Food and Environment in Economic Development we had classes about credit and how to solve poverty and give access to small agricultural producers. The most interesting at this class, in my opinion, was a presentation in which each country showed, week by week, the agricultural and economic reality in their own countries. So each week students presented how the United Nations SDG's are being developed in their countries (Japan, France, Taiwan, Turkey, China, Peru, United States and Brazil).

It was really interesting to prepare about agriculture in Brazil and discuss what the country is doing to have a better sustainable food production. Some people had the wrong impression about our production in some aspects and was a good opportunity to solve questions from them.

Another class was Japanese Agricultural Development, when we learned more about cultural products related to agriculture chain, as rice and sake, and it was possible to see how the history of Japan is related with the food habits in the population and the environment.

My favorite class was Japanese language, in that was possible to understand how to read hiragana, katakana, basic kanji and create basic sentences talking about hobbies, food, time, objects and relate with verbs to communicate with my Japanese friends from my laboratory. In this class we also had amazing special classes to get closer Japanese culture, such as ink art and manga club. It was really funny and also different experiences! Naomi and Azael prepared really good classes and it was great to learn more about Japanese culture and language.

And had two more classes: Planning and Design of Landscape Architecture and Life History and Applications of Landscape Plants. In these classes we usually had field trips during weekends.

At Life History and Applications of Landscape Plants we had four field trips. First field trip was in the beginning, in my second week in Japan, was the first one and also that one which gave the first impression about Japan. We meet Professors Suzuki and Tanaka in Chitose-Funabachi Station and used train to Shinjuku Gyoen Park area. After the explanation of the history of the park, we walked around and saw flowery sakuras everywhere, it was very emotional for me because I saw as one of the symbols of Japan's nature and during all my life I wanted to see that Japanese sakuras in person.

We also visited an wonderful glass greenhouse with tropical plants, where I recognized plants from my country and saw lots of different species. All the glass structure and architecture really impressed me.

About the flora in Shinjuku Gyoen Park, those that more impressed me were the Himalayan cedars, distributed in lines forming an interesting landscape combined with the huge space between them with little stones; when we visited there we saw a man sitting and painting the landscape in his drawing. There is more than 20.000 trees in the park, including approximately 1.500 sakuras trees, that have different period of bloom depending of the species; most of them bloom at April.

Another field trip was to Santomeshinden area with Professor Kojiro Suzuki, we visited agricultural facilities and understand more about how farmers in Japan deal with problems to produce food. In Japan the growing price of lands closer Tokyo city became a problem to small farmers, they are with problems to keep living and producing food in their own propriety. Its important to keep an green belt of farmers around the city to guarantee food security to population.

Close Kawagoe prefecture we visited propriety in a field trip in Santomeshinden to see how is made agricultural cultivation and see the difference between agriculture in Japan and another countries. Close the family house it was a small forest with trees to protect against the strong wind. That area is maintained for more than 300 years passing through generations of family and with this the knowledge is also passed, teaching the young generations how to produce in that same area maintaining the harmony between food production and environment.

It was really impressive for me listen a farmer that cultivates in same area since he was born and the same family cultivate through generations, it have a historical value and connection to the environment. It also was interesting to observe the particularities of Japanese agriculture compared to Brazil and listen experiences of my another friends in the trip (as France, China, Taiwan and Tukey). After the farm we walked around a temple and had lunch in a japanese traditional restaurant, really delicious food!

The third field trip was at 9th floor of Seibu Ikebukuro building, were it was possible to visit a wonderful roof garden called "Water Lily Garden" inspired by famous Monet painting of a small bridge through a river surrounded by trees and flowers. It has an explanation about the engineering process to build a strong basis to keep the garden in the roof of the building. They constructed holes to distribute the weight and support the implementation of plants and water. The floor with blue color to simulate of water contrasting with the green of plants created a really good effect.

It also have all irrigation system to keep plant well looking and a small greenhouse to cultivate new plants. I personally stayed surprised how it was possible to develop that kind of garden in the top of a building, while I walked through the garden I just forgot that I was in an artificial garden in a building.

This same impression occurred during the next garden visited, in Toshima Ward Office, in this second garden there was a distribution of the garden between different

floors, and I became stunned to see the little river way they created artificial waterfalls from one floor to another. The time of construction of the garden also was interesting for me (3 months), working day and night to develop that garden in Toshima Ward Office.

Another place that we visited in this field trip was Minami-Ikebukuro Park, close to Ikebukuro Station. The park was reopened in 2016 after five years of renovations. It has a huge area with grass where people can just relax and enjoy the landscape. It is an incredible green space in middle of town.

After that, the last place that we visited in that day was the Sunshine Aquarium, and we had an opportunity to visit a new area that is still not opened to the public, where we saw a garden and a new aquarium for penguins that is possible to feel you are in the ocean swimming with them. After that we walked to another part of the aquarium, where we saw incredible species of worldwide marine life, including from my country (an aquarium with fishes from Amazon!). I particularly became fascinated by jellyfish and octopus, first time I saw these animals so close.

The last field trip of Life History and Application of Landscape Plants was to Ueno area, where we saw first the Iriya Asagao market (Morning Glory) close Iriya Kishimojin temple. The market had dozens of morning glory sellers. After visiting the Morning Glory Market, we walked around to Ueno Park, it was really hot weather so we did a quick walk around the park and after separating the group I personally visited the National Museum of Nature History.

Sensei Kojiro and Mizuniwa talked about the origin of Ueno Park, they were deciding another use for the area but Anthonius Franciscus Bauduin decided it could be used for creation of a park, with historical value, relaxing and recreation for the population and a safety area in natural disasters as earthquakes.

After walking around the top part of Ueno park we went to the bottom part, where is a lake named Shinobazu Pond full of lotuses and huge leaves that covered the surface of water; in this same lake we saw Bentendo Temple. It was not my first time in Ueno park, but now I at least have more idea about the beginning of the park and its historical value, I really enjoyed the field trip!

Another class was Planning and Design of Landscape Architecture, in that I participated of two field trips: to Takao-san and Nippori. At May 14 we used Keio line in Shinjuku Station with sensei Kazuya Kurita and sensei Tsunomu Hattori to go to Takaosanguchi Station, located in foot of the Takao-san. We started to climb Takao-san through the waterfall trail and stopped to see the temples around the way. The landscape was really amazing and we heard the story about each temple.

Mount Takao is famous for association with devotion to tengu. Two figures standing in front of the Izuna Gongen-do Hall exemplify the two types of tengu. The smaller tengu is depicted with a beak of crow, while the larger one has a big nose. The small tengu is considered to be still undergoing religious training, while the large tengu is

often likened to an experienced yamabushi who has attained spiritual power through religious training at Mount Takao.

Tengu, long-nosed demon-like beings, are believed to dwell on sacred mountains acting as the messengers of the deities and buddhas to chastise evildoers and protect the good. They are often depicted holding a uchiwa, that sweeps away misfortune and brings about good fortune.

The trip was really amazing for me, that was the first time I climbed a mountain. When we reached the summit (599 meters) and then from there it was possible to see a beautiful landscape. Unfortunately it was not possible to see Mount Fuji because it was too cloudy.



Image 1: Summit of Takao-san with Planning and Design of Landscape Architecture class.

The second trip from Planning and Design of Landscape Architecture was to Nippori Downtown. We meet 10:30am at Nippori Station sensei Ayumi Arai and sensei Hattori. Then we walked around Yanaka area, the most traditional district in Tokyo.

Yanaka is famously one of the most quaint and aged parts of the city. It was spared the Allied fire bombings during the WWII and survived the Great Kanto Earthquake and Fire of 1923. In the past, the area was a thriving artisan town housing some of the country's most famous writers and visual artists.

Today it retains a similar spirit and an afternoon stroll down any of the several side streets close Nippori Station will attest to the abundance and diversity of craft still being produced in the area: textiles, ink prints, wood carvings, traditional cuisines, stationery, pottery, jewelry, and much more. Anyone visiting Tokyo on a quest for traditional Japan would do well to spend a day in the Yanaka area.

We also visited Asakura Museum of Sculpture, where Asakura used to live and now became a museum reserved their things and its courtyard garden (the garden has been listed as a National Place of Scenic Beauty by the Japanese government's Law for the Protection of Cultural Properties). The garden was designed by Sataro Nishikawa according to Asakura's conception, and is centered around five large rocks and water, and is intended to provide a three-dimensional aspect as befits the garden of a sculptor.

I also participated of Bioscience laboratory, where all students are really friendly and always helped me with the activities! They did an amazing welcome party when I arrived in Japan! Taji sensei received me really well and helped me during all semester, including the experiment with spinach.

In my laboratory there had lectures every week, each week at least two students presented their researches in English and we had discussion about that, it was really good opportunity to know better their jobs and also to them training English.

All of them in my laboratory were so lovely, we did a barbecue in Noborito close Tama River in July and a farewell party for me in my last day in Japan, we had dinner together in a traditional Japanese restaurant close NODAI.

I also participated in the Internacional Ryugakusei Party, where I danced with my brazilians friends presenting songs of our country and a typical sweet chocolate called "brigadeiro", it was awesome to see all countries presentations and meet more people!

In July I also I gone with Japanese friends to see some of NODAI extra activities, like Kendo and Sumo, first time that I saw in person and really impressed by their concentration and how these sports are so connected with Japanese culture.

End of July I visited Keystone vertical farming in Yokohama, it was a unique opportunity to see in person for the first time that kind of production without using sunlight and soil. I was very well received and did some questions about that technology. I will use all this information and knowledge to my final research in Brazil and in my career.

About the internship, our first visit at Granpa farm was with my sensei Taji, Naomi, Azael Mariana, Youji and Junpen, when we were very well received by Iwane and Shinnosuke. Then they both introduced to us to the concept of biological factory, that means "shokubutukojo" in Japanese. "Shoku" means "plant", a living organism that need environmental conditions to survive, while "butukojo" means "factory", something more stable and mechanical, so in first place it could be a contradiction use same words together, but not in Granpa. Granpa farm can use all intelligence of agriculture and engineering together to optimize the production according the environmental conditions from outside (sunlight, pests) with the organization inside the greenhouse (water, time of seedling and harvesting, biological control of pests, organization of workers in different activities of the production chain, nutrient solution balance and packing of products).

The most important goal is provide conditions for plants growing and reaching productions levels of harvesting, so Granpa team always studies climographs to decide where to build their greenhouses, always at places with enough photoperiod in Japan. Talking about light, there are two ways to provide light for plants during production, the first one is through artificial LED lamps (easier to provide uniform growing conditions but is too expensive) and the second one is through using Sun as energy source (Granpa's case). Then they showed us all farm's facilities, the office, greenhouses and the domes, giving an explanation of each one of them during the visit.

At July 31, Monday, Mariana and I started the internship. During the two following weeks we did different kinds of activities at farm: harvest of basil and lettuce, transplantation of seedlings to the hydroponic module, counting leaves of basil to package, biological control activity and others.

Intercalating with the works in the farm, we also had different studies with Iwane san, we did the harvest of six different species of vegetables and compared the differences between them, we saw their average weight (calculated from Mariana's harvested vegetables and mine), number of leaves (that allowed to calculate the rate of growth according the date of seedling), brix (quantity of sugar) and NO_3^- . The second study was using microscope to see the leaf primordia of lettuce, studying physiology and how the cells process occurs. It was possible to see the leaf order growing through the microscope, really interesting to observe the pattern since the beginning of cell's development.

Third study was about climograph, we read chapters three and four of book "Computerized Environmental Control in greenhouses". Iwane san explained more of the importance of climographs, that compares temperature and radiation. He showed the differences between climographs of Granpa farm in Hadano and from Rikuzen Takada city. Another study was about Entomology: First we had class about Integrated Pest Management (IPM), that means use all knowledge to implement different methods of management with the goal of decrease the economic impact of the pests in the greenhouse. The last study was about 8 topics: physiology, humidity, absolute humidity, relative humidity, Mollier graphic, water vapour deficit, dew point and water vapour pressure.

We also had lunch sometimes with Iwane san in a traditional Japanese restaurant, where he told us more about Japanese culture and cuisine, we ate soba and delicious soba ice cream, and after finishing the job in Granpa we had a trip around the farm with two Brazilians who work at the farm, Tiemi and Elizabeth, who showed to Mariana and I the Hadano Tokawa Park, where we saw an amazing landscape and a beautiful huge stone bridge.

In one of the days after finishing the work in the farm, we all did a barbecue where Mariana and I did a PowerPoint presentation about São Paulo, we talked about our culture, food, cities and our country, our Japanese friends from the farm really enjoyed and was interesting to exchange cultural knowledge.

At last day of internship, August 11, Mariana and I did a PowerPoint presentation of a climograph that we did about Brazilian weather and talked about the differences of temperature and photoperiod between Brazil and Japan and how it interferes in agricultural management. After that, we worked all morning at the dome.

All days during these two weeks of internship were a unique opportunity to learn how a biological factory works, we worked a little in different parts of the process and it was possible to understand better a holistic view of this agricultural process.

It was an amazing experience to meet wonderful people in the farm that really helped us and gave all attention becoming friends that I will miss a lot. Hope that some day I can use all this practical knowledge to contribute for the development of agriculture in my country and I'm really thankful by the opportunity!

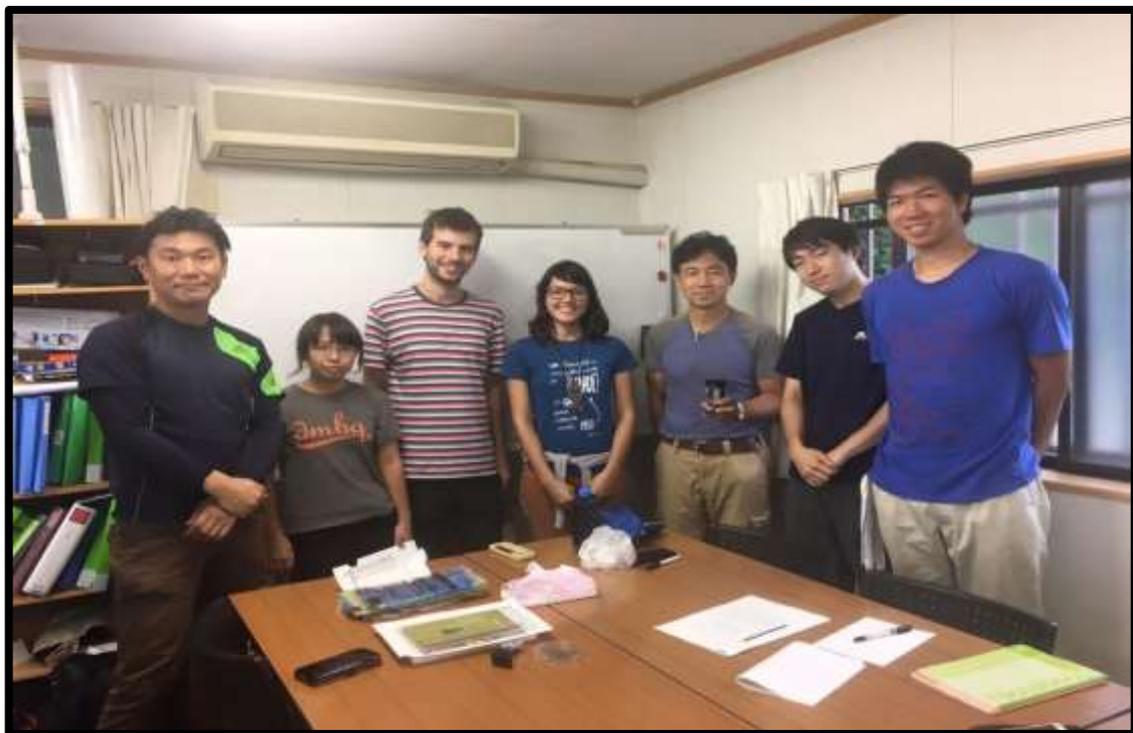


Image 2: Granpa farm team.

After these two weeks of internship at Granpa farm, I had my last days in Japan and free time to travel outside Tokyo. So I traveled with my friends by bus from Tokyo to Kyoto.

In Kyoto we visited lot of gorgeous temples and it was amazing to visit the heart of Japan, where it was possible to understand better the tradition and millenarian history. The most impressive construction to me was the Golden Temple! We also spent a morning in Nara, where we saw dears and the huge Buddha, the size was so huge and marvelous.

Last day of trip we traveled to Hiroshima, where I visited Miyajima island during morning and the nuclear bomb memorial during afternoon. It was a really sad experience but I think was an important visit to pray for people who suffered in that day and do the possible to my generation don't repeat the mistake.

All these months in Japan were the best experience in my life, It was possible to me change my view of culture, technology, agriculture and make lot of friend that I hope I can keep in touch in the future. I'm really thankfull by this opportunity and hope I can use all this knowledge to aply in my country to development of a better world.