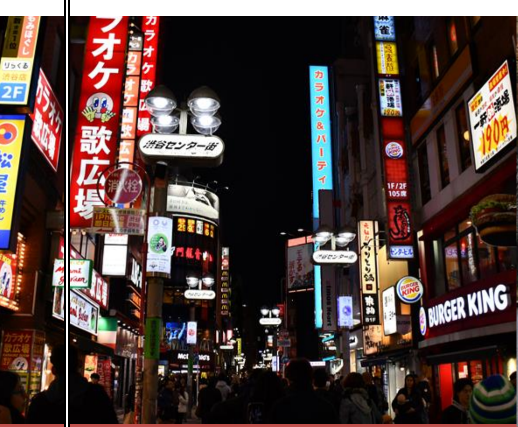
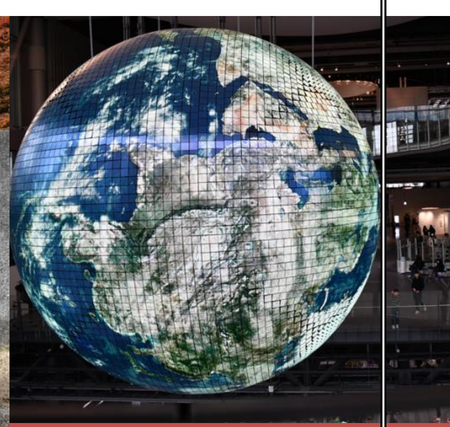
Short-Term Exchange program: Tokyo, Japan

Irrigación III

Irrigación, Generation 2019

Prof: Dr. Noé Velázquez López





Tokyo University of Agriculture | Universidad Autónoma Chapingo | Departamento de Irrigación

02 a 13 de Diciembre de 2019

UNIVERSIDAD AUTÓNOMA CHAPINGO

TOKYO UNIVERSITY OF AGRICULTURE

DEPARTMENT OF IRRIGATION ENGINEERING

IRRIGATION III

FINAL REPORT

"Reinventing Japan – NODAI – UACh 2019"

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Texcoco de Mora, Edo de México, December 19th, 2019

CONTENIDO

1. ACKNOWLEDGEMENTS AND DEDICATION

We would like to show our gratitude to Tokyo University of Agriculture (TUA) for receiving us at your prestigious institution and for providing us with accommodation during the period of the Short-Term Exchange Program.

We wish to express our warm and sincere thanks to all professors and Staff of the Department of Bioproduction and Environment Engineering. Specially to Professor Dr. Machito Mihara who received us with opened arms.

We sincerely thank all professors from Tamagawa University, and NARO researchers involved in this program. It was a pleasure to receive this knowledge and advice.

We would like to express our deep appreciation to all staff of the Center for International Programs and specially to Naomi and Azael, who were always looking after us. They have a special place in our heart and memories.

To Ph D. Noé Vázquez López, because he was the one who helped all of us to reach the goal of getting to know Japan, to expand our horizons and encourage us in terms of academic success.

To our family, because they helped and encouraged us during the last three and a half years of our college education.

2. INTRODUCTION

Getting to know other cultures, opens our mind and lets us know about the different traditions and customs in our society.

Generally. In Mexico, we are looking to adapt other countries' technologies to our conditions so we can take advantage of our natural resources in the best ways we can. That is the reason for some young people to choose environment related sciences. As engineering agriculture students, we have the goal to help our agricultural sector to optimize production, take care of our resources and have a constant income.

Japan has a millenary culture that combine ancient traditions with modern technology.

Historically, this country has gone through rough times, but this situation never stopped its development.

Tokyo University of Agriculture (Tokyo-NODAI) is an important institution that has 2 graduate schools, 6 faculties and 23 departments. All of them related to natural resources and distributed in three campuses; Setagaya, Atsugi, and Okhotsk.

Since 2017, this 10-day short-term exchange program has been taken place between Chapingo Autonomous University and Tokyo-NODAI. This international exchange has been a great experience for previous generations and the interest of visiting Japan has grown in our department.

This year, 22 students and one professor of the Irrigation Department from Chapingo Autonomous University participated from December 3rd to 13th.

3. ARRIVAL

We arrived at Tokyo Narita international airport. Then we boarded a limousine bus to Shinjuku. On the way we could appreciate beautiful landscapes, roads, and architecture. We were impressed with how big the city was and by its well-organized civilization and level of education.

From Shinjuku, we took the Odakyu line to Kyodo station and then walked to Tokyo University of Agriculture in Setagaya.

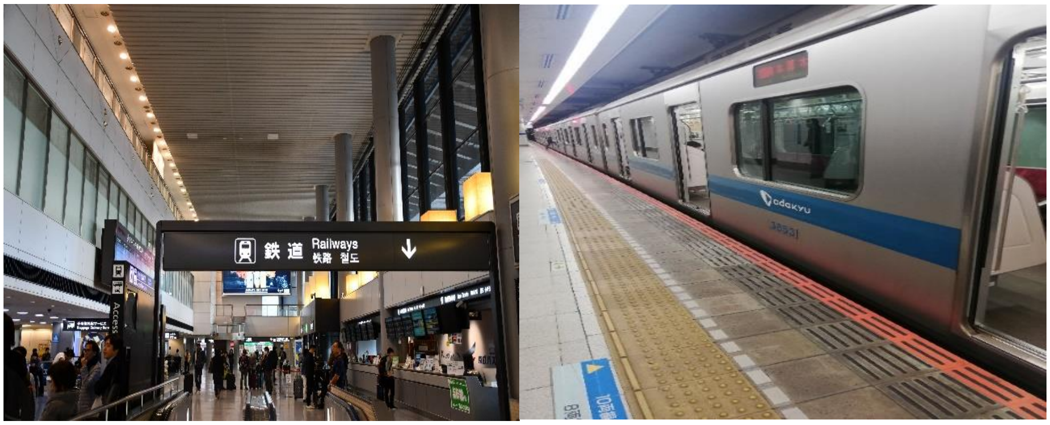


Figure 1. Arrival at Narita airport and Subway in Japan.

4. CAMPUS SETAGAYA, TOKIO NODAI.

In comparison to our university, NODAI has a much smaller area, but better facilities and buildings without deterioration and good maintenance, clean environment, and quality sports facilities.

Figure 2 Tokyo NODAI

After giving us a few welcome words, they took us to our accommodation, and explained the rules of the dormitory. The rooms were very comfortable, clean and very equipped with a kitchen and a laundry room.

5. VISIT TO SHINJUKU

In the afternoon we had some free time and we decided to visit Shinjuku. There are large buildings and shopping centers. It was a unique experience, the streets were very clean and everything was amaizing. People were very polite and friendly.

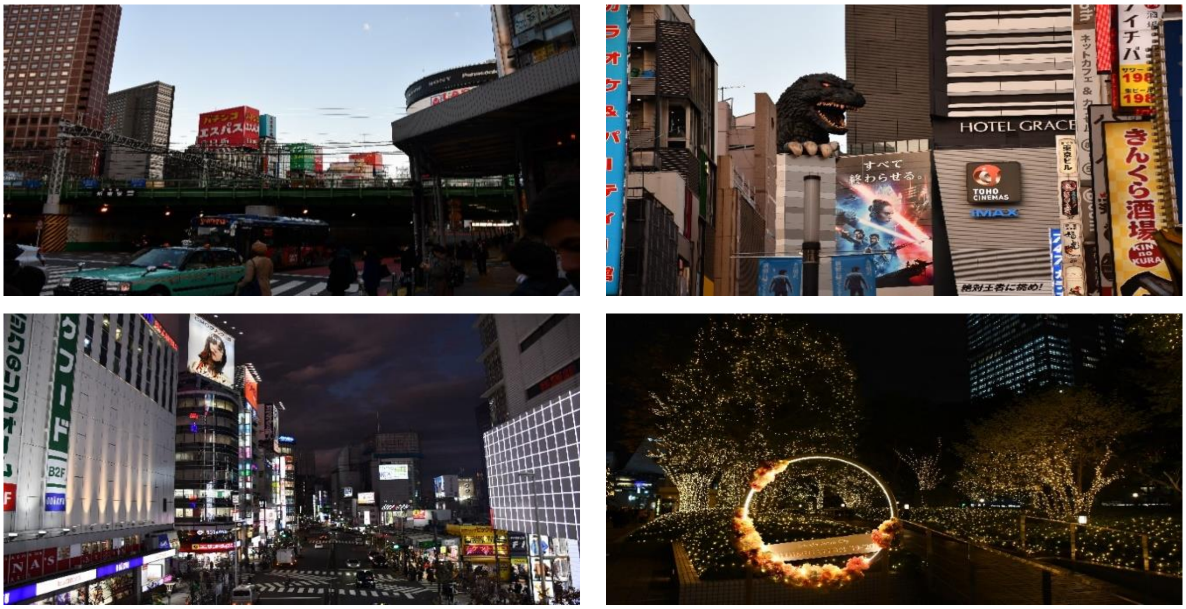


Figure 3 Shinjuku

There we had the opportunity to see Japan at night, which is full of beautiful lights and really safe also.

6. JAPANESE CLASS AND NODAI INTRODUCCION

On Wednesday December 4th we had a class of Japanese. We covered basic aspects such as greetings in Japanese, hobbies, currency, introducing yourself and asking if you are OK or full and some other topics. We played interactive games with the fun and cool staff.

We learned the following phrases:

6.1. GREETINGS (AISATSU)

English	Japanese
Good morning	Ohayo gozaimasu
Good Afternoon	Konnichiwa
Good evening	Konbanwa
Good night (go to bed)	Oyasuminasai
How are you?	O genki desu ka?
Very good, thank you	Genki desu, arigato
Very good	Genki desu
Welcome	Irasshaimase
Nice to meet you	Dozo yoroshiku
Nice to meet you, too	Kochirakoso

6.2. FAREWELLS (WAKARE)

English	Japanese
Goodbye	Sayonara
Goodbye #1 (who stays at home)	Itte rasshai
Goodbye #2 (who leaves home)	Itte kimasu
Goodbye #3 (who leaves before)	Osakini
Goodbye #4 (answer to #3)	Otukaresama
Goodbye #5 (answer to #3)	Dozo osakini
Take care	O daijini
Take care (another way)	Ki o tsukete
See you	Matta ne

At the same time, we learned how to introduce ourselves in Japanese and some numbers.

1. First Greeting - (hajimemashite).
2. I am Rodolfo - (watashi wa Rodolfo desu).
3. I come from Mexico - (mekishiko kara kimashita / watashi wa mekishiko jin desu).
4. I am 22 years old – (watashi wa ni ju nu desu).
5. I am student / my major is irrigation – (watashi wa gakusei desu/ watashi no senmon wa kangaigaku desu).
6. What is your name? – (onamae wa nandesuka).

6.3. NUMBERS

English	Japanese
One	Ichi
Two	Ni
Three	San
Four	Yon/Shi
Five	Go
Six	Roku
Seven	Nana/Shichi
Eight	Hachi
Nine	Kyu/Ku
Ten	Ju
Eleven	Juichi
Twenty	Niju
Twenty-nine	Nijuku
Thirty	Sanju
One hundred	Hyaku
Two hundred	Ni hyaku
Three hundred	Sambyaku
Six hundred	Roppyaku
Eight hundred	Happyaku
One thousand	Sen

6.4. COINS AND BILLS.

Figure 4 Japanese coins

Each coin has a meaning on the front, then they will be explained the figures.

Coins	Explanation
1 yen = 0.18 pesos	On the front, a seedling.
5 yenes = 0.90 pesos	On the front, ears of rice and a cogwheel (center).
10 yenes = 1.8 pesos	On the front, Byodo-in of Uji Fenix Lounge and rainfed alfalfas.
50 yenes = 8.97 pesos	On the front, chrysanthemums.
100 yenes = 17.94 pesos	On the front, cherry blossoms.
500 yenes = 89.69 pesos	On the front, paulinia flower.

Figure 5 Japanese bills

Bills	Explanation
1000 yenes = 179.04 pesos	Noguchi Hideyo (1876-1928), Physician and natural bacteriologist from Fukushima Prefecture. Traveled to the United States as a medical researcher. Did a work that focuses on bacteria. He is known for his findings on yellow fever and syphilis. During his research work in Africa, he contracted it and died at age 51 in the British colony that is now Ghana.
5000 yenes = 895.2 pesos	Higuchi Ichiyo (1872-1896), Novelist, among her works are Takekurabe and Nigorie. Died of pulmonary tuberculosis at 24 years. She is the first woman to appear on Japanese bills.
10000 yenes = 1790.4 pesos	Fukuzawa Yukichi (1835-1901), Illustrious philosopher and educator who contributed to the modernization of Japan at the end of the Tokugawa shogunate and during the Meij era

7. CAMPUS TOUR

After the class of Japanese, we were given a tour of the University's facilities, we went to its museum, where we observed the school’s foundation and much of the history of the university. We also visited the buildings where the classes are taught and finally we visited the museum of agriculture.

Figure 6. Campus tour and University´s Motto.

8. MUSEUM

The Tokyo University of Agriculture Food and Agriculture Museum opened in April 2004 in cooperation with Tokyo University of Agriculture Education Corporation and Research Institute of Evolutionary Biology. The origins of the museum are traced back to the specimen room established in 1904 by Yoshio Tanaka, who is known as “the father of the Japanese museum”.

In the spirit of “Returning to the Field,” Tokio University of Agriculture has taught “Practical Science,” which both the university´s founder,Takeaki Enomoto, and the university´s first president, Tokiyoshi Yokoi, valued the most. Since its establishment in 1891, the university has accumulated a great amount of research and educational achievements as well as collections. The museum offers the visitor the opportunity to learn about them and the university itself through exhibitions, seminars, and experimental learning programs.

Figure 7 The Tokyo University of Agriculture Food And Agriculture Museum

9. WELCOME AND CONFERENCES (ENGINEERING DEPARTMENT IN BIOPRODUCTION AND ENVIRONMENT)

Department of Bioproduction & Environment Engineering

- Machito Mihara PhD (Advisor)
- Maskey (Nepal)
- Marisol Terashima (Buenos Aires)
- Muyleang Kim (Cambodia)

History of bioproduction worldwide and in NODAI School of Agriculture

1905 Reclamation
1940 Second War. Reclamation of land
1949 The University was established
1990 The masterclass was established
1992 Big convention in Rio de Janeiro. Measures to conserve the natural environment.
1992 United Nations Conservation on Environment and Development

The focus of the school is not only technological or oriented towards money. But philosophical and carrying for the environment.

9.1. SUSTAINABLE AGRICULTURE (MACHITO MIHARA PHD)

Interested in Latin America and the conservation of soil and water for the future generations. Global climate change is severe; there is an increase in temperature of about 1.5 °C and has increased over the years.

The most important factors in sustainable agriculture are soil and water factors, economic factors.

Focusing points in this lecture:

- Importance of conserving soil and nutrients
- What is compost and granular compost
- How to evaluate watersheds

After WW2 was Japanese farmers were forced to only own 1ha of land (1950) and all land was released to all the farmers. This was good for the efficiency of the farmers.

There are many study cases of land erosion and soil loss such as the case in Doitung, Thailand caused by the increase of fertilizers use. There are other cases like eutrophication from dead body of plankton.

There are two soil conservation strategies: mechanic ones and agronomic ones. For example, the planting of vertiver or counter strips which has a very long roots that can protect trees planted between. Also, there is the use of mixing compost into chemical fertilers in Cambodia.

Ammonium nitrate can be capture, however nitrite and nitrate can´t be captured. Three key factors in agriculture production are: economic, social and sustainability. Enhancing Better Quality Farmyard Manure in Mid - hills of Nepal (-Sarvesh Maskey)

Introduction and backgrounds

- Mountains 35%, hills 42% and lowlands 23%
- Total agricultural land 2357 thousand ha (CBS, 2002)
- 37% of total farmlands lies in mid-hills (CBS, 2002)
- Agriculture is subsistence type and is mainly done in sloped terraces being intensively cultivated.

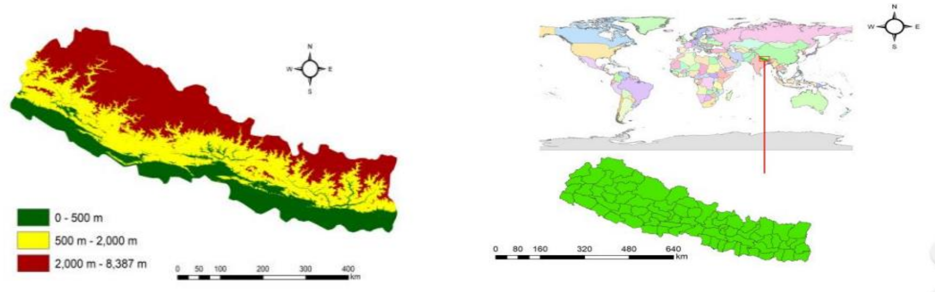


Figure 8 Physiographical map of Nepal

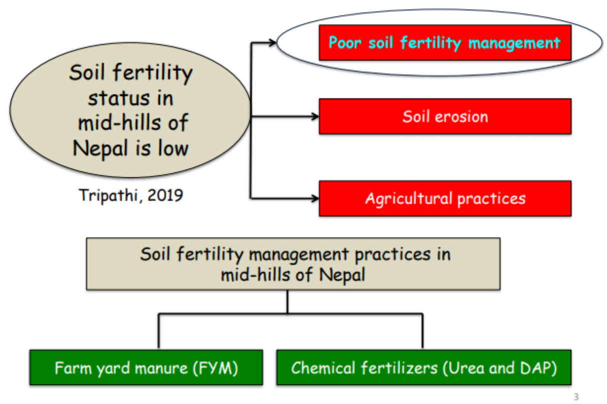


Figure 9 Soil fertility status in mid-hills of Nepal is low

Farmers in mid-hills of Nepal have been depending on locally available manure for maintaining soil fertility where 85% of farmers use it, Maskey et al.,2002.

The farmland manure is mostly used. The quality is not very good.

The rain removes nutrients and the heat gets lost.

Object of study: Better the compost & free of pathogenic bacteria. This study aimed to evaluate different factors, conditions and constraints existing in organic manure production and application to understand the maturity, nutrient contents and pathogenicity of organic manures.

First, we need to know the problems on the fields through a research site description

Figure 10. Preparation and application of FYM.

- Dhankuta District lies in Eastern Development Region
- 2 municipalities and 28 Village development communities
- Topography – hilly region
- 83.45% population engaged in agriculture (national average 61.6%)

Maturity test (Dewar self-heating test)

Compost are classified into three categories

- Matured compost
- Mesophilic or active compost
- Thermophilic or very active compost

Laboratory tests of manure samples

The manure samples were tested for them

1. Nutrient content (C, N, P and K)
2. Pathogenicity test for E. coli

Carbon	Nitrogen	Phosphorus	Potassium	Pathogenicity
Combustion method using N/C coder	Combustion method using N/C coder	Absorption spectroscopy	LAQUA twin potassium ion meter B-731	Stamp method using Petan check 25 ESCM from EIKEN chemicals

-Results and discussions

- The farmers used farmyard manure with chemical fertilizers, with increased use of chemical fertilizer in recent times
- Application rate, frequency and period of composting depended on number of cultivations

- Heap method was preferred to pit method. Use of enhancing composting agents was very low

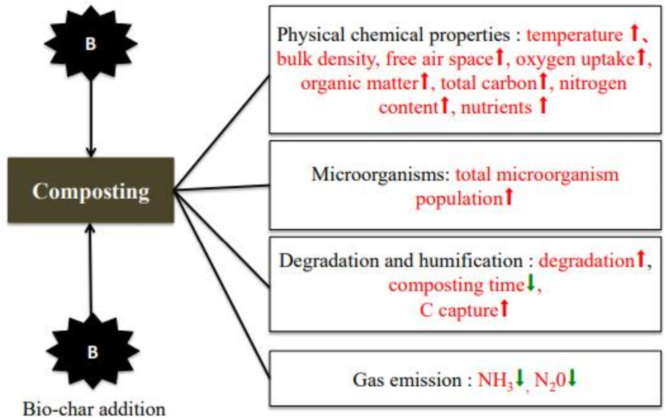


Figure 11 Expected results of bio char addition and composting

A small-scale composting experiment will be conducted adding rice husk biochar to see its effect in minimizing nutrient and heat loss

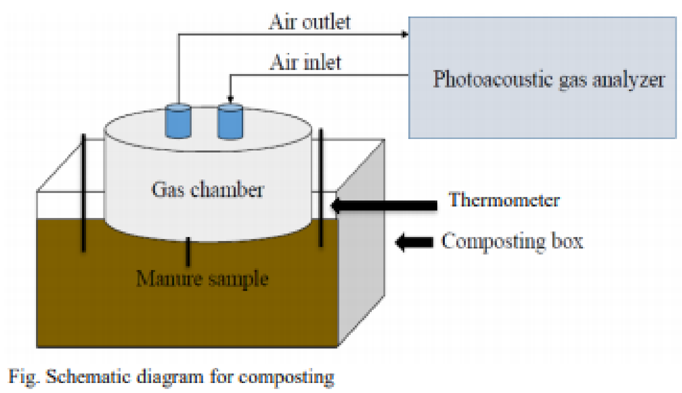


Figure 12 Schemic diagram for composting

9.2. COMPARISON IN SOIL PROPERTIES OF FARMLANDS APPLIED ORGANIC AND INORGANIC FERTILIZERS IN KAMPONG CHAM PROVINCE, CAMBODIA. LABORATORY OF LAND AND WATER USE ENGINEERING MUYLEANG KIM (D1)

1. Geographical view of Cambodia

- Cambodia is in the Indochinese mainland of Southeast Asia
- Cambodia shares its borders with Thailand, Laos and Vietnam

- Cambodia has tropical climate which is affected by monsoon
- Total land area of Cambodia is 181,035 km^2
- Current population of Cambodia is 16.21 million (UN, 2018)

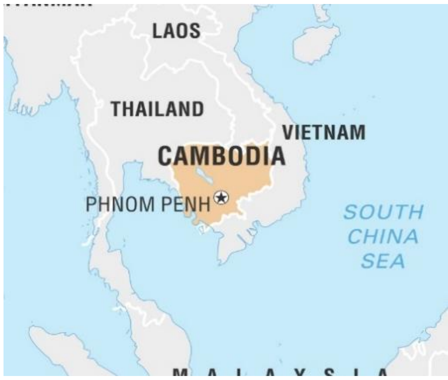


Figure 13 Geographical view of Cambodia

2. Agriculture

- Cambodian agriculture is during a rapid transformation. Agricultural growth averaged 5.3 % during 2004-2012
- Growth was driven by a combination of increased yields, more productive use of labor due to mechanization and the expansion of farmland
- Paddy rice is a main crop and covers 68% of total cultivated agriculture land in Cambodia
- Vegetables were also grown in some areas of Cambodia and its known as the most profitable crops to produce in Cambodia

3. Challenges of Agriculture sector in Cambodia

- 80% of Cambodia's population resides in rural areas, and around 37% of the total workforce was directly engaged in the agriculture sector in 2017 Cambodia traditionally has produced only one rice crop per year because it has lacked the extensive irrigation system for double cropping
- Cambodia has an abundance of fertile agricultural land accounting for about 4 million ha in 2012, of which 3 million ha is under rice crop production
- Most of the soil used for crop cultivation are commonly described as lowly fertile, and contain low levels of the major nutrients such as (N), (P) and (K) and low levels of organic matter

4. Objectives

The objectives of this study are:

1) To calculate organic fertilizer dependence

2) To compare the soil properties applied organic and inorganic fertilizers in Samraong and Baray Communes, Kampong Cham Province, Cambodia

Discussion

- There were positive relations between OFD (%) and soil physical / chemical properties. Soil EC, O.M, O.C, K^+ and Ca^{2+} increased with OFD (%) in Baray Commune.
- More importantly, the trend observed in Baray Commune with 10 years experiences applying organic fertilizers was not observed in Samraong Commune, where organic fertilizers have been applied only for 3 years
- When organic fertilizers have been applied for many years, like Baray Commune, the trend was clearly detected. So, it was considered that the trend is related with **clay-organic complex forming** in soils. Clay-organic complex may be formed by bonding between clay particles and organic molecules.

Recommendation

- It's suggested that for successful soil quality management, the input of organic materials is major importance towards a better land-use, minimize the production input costs, and improve the agriculture economy
- Application of organic materials such as cow manure and compost together with mineral fertilizer is recommended to local farmers, as well as introducing proper education on sustainable farming will be consider
- Since *E. coli* contamination known as harmful to human health. In order to eliminate the pathogenic bacteria from organic material such as compost and cow manure, the attention should be given on the treatment of material, the process of de-composting, and the maturity of compost manure before applying to field

Fig. Activities during the project implemented in Samraong Commune

Fig. Agricultural land in Samraong Commune

Fig. Compost box in Baray Commune

Fig. Agricultural land in Baray Commune

Figure 14 Soil conservation solutions

9.3. MARISOL TERASHIMA. ARGENTINA. MASTER DEGREE STUDENT

Objective of the study:

Study the biodiversity and interaction between soil fauna and microorganism of the soil in different farming systems. It is important to understand the potential effects on the edaphic environment and crop production.

Figure 15 Conventional farming system

9.3.1. PITFALLS FOR ARTHROPODS

It is used to sample populations of terrestrial arthropods from the soil surface. It is an effective and simple method.

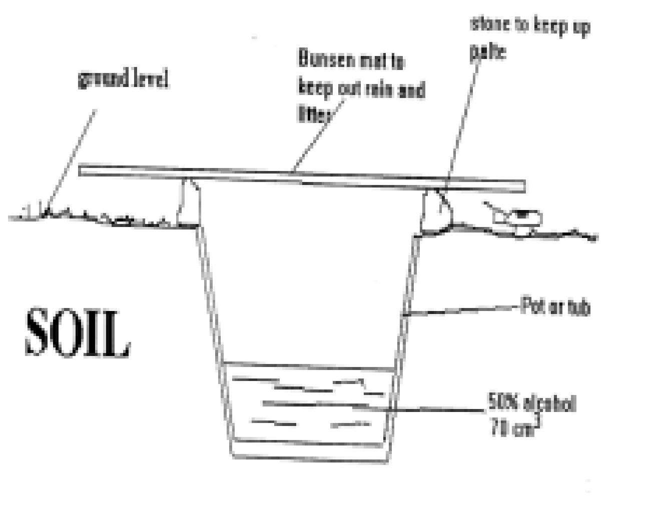


Figure 16 Pitfall trap

9.3.2. MICROORGANISM

（spread plate method ）

Fungal “trap” for nematods: Dactylaria Related with the decomposition of organic matter and disposition of nutrients for the plants: Pseudomonas (bacteria), Bacillus (bacteria) and Penicillum (fungi)

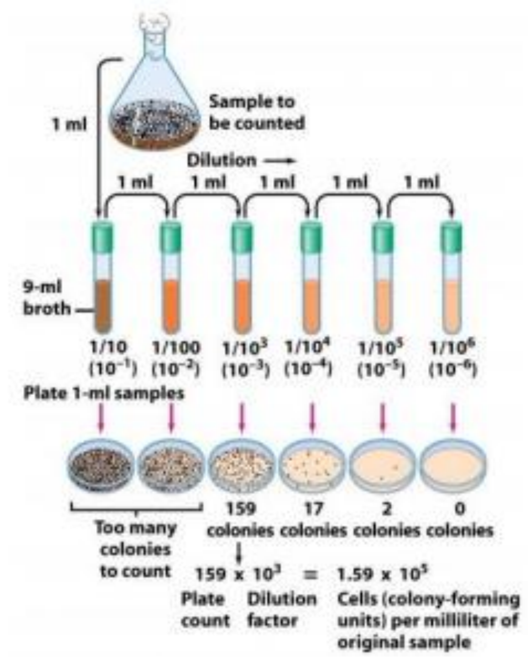


Figure 17 Brock Biology if microorganisms

9.3.3. SOIL RESPIRATION

The respiration of a soil gives us the measure of CO2 emissions, mainly from the decomposition of organic matter through the aerobic pathway (microbial respiration), that derived from plant roots and soil fauna.

10. WELCOME MEETING

At the end of the day the staff of the University prepared us an amaizing dinner with lots of types of traditional food from Japan. We introduced ourselves saying our name, age and our experience so far in Japan. Then we started eating.

Figura 18 Welcome Meeting Dishes

We enjoyed spending time in Japan, eating their traditional food, and meeting people. We made new friends and new friendships in our journey and learned several things about culture, food, irrigation, and many other topics. We are extremely grateful with Tokyo University of Agriculture and we hope come back in the future.

11. MIYAGASE DAM AND SOLAR ENERGY PLANT

On Thursday December 5 we visited the Miyagase Dam located in Kanagawa Prefecture. We were given a lot of information about it.

It was built in 1998 in the Nakatsu River. Its construction lasted 50 years from its planning and 3 years only in the curtain. It was designed for 100 years of useful life. It is not supposed to have problems with sedimentation because it is constantly cleaned. The excesses of sand are removed and taken to the sea. It was built to be able to resist an earthquake of 8.2 in the Richter Magnitude Scale. 1136 people from 281 houses in the villages of Kiyokawa, Atsugi and Aikawa were evicted for its construction, as the area where they lived would have been flooded when the dam was built.

Figure 18: panoramic of the dam

The dam has four functions:

- Flood control or flood protection.
- Storage. Used during the dry season.
- Human consumption. The water is treated and distributed through urban pipelines.
- Electricity generation.

This dam is also a very visited touristic place. In the last year it has received about one and a half million tourists. Making it the dam with more tourist. There is a

Figure 19: landscape appreciated from the dam

lakeshore area in a town close by with different attractions in December, such as the Christmas tree of Miyagase and the lighting attractions. In the summer the dam drains water through the orifices in its curtain and this is a spectacle for many people.

The curtain has a height of 156 m, considered the 6th highest dam in Japan (the highest have a height of 186 m). Its length is 400 m, which places it in number 42 (the first is 605 m long). For its construction, material that was removed to build it was used, as well as concrete. It has an approximate of 6 million m^3 of concrete, which is the dam with more volume of concrete used for its construction.

The curtain has three holes through which water discharges to generate electricity. It has a storage capacity of approximately 20,000 tons of water, which supplies a third of the prefecture of Kanagawa. It generates approximately 25,000 KW in one year. The basin area is 4.6 km_2 (100 times the stadium in Tokyo). Emergency discharge has not been used in the last 20 years. When we visited the water was greenish due to the typhoon that had just passed through Japan, the water will return to a clear color in about a month.

Figure 20: dam curtain

Figure 21: color of leaves in the fall

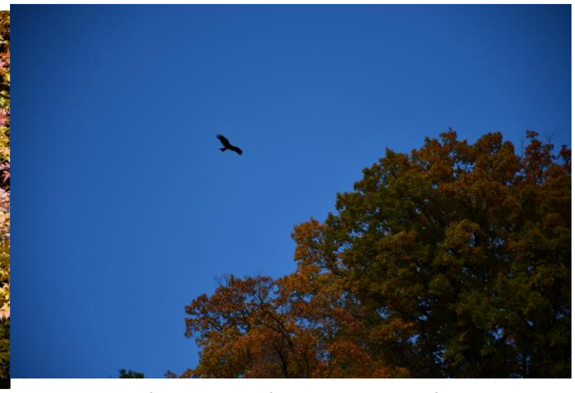


Figure 22: Miyagase Dam sky

After the explanation we took the tour. We witnessed endless spectacular views, beautiful and colorful trees that change color in the fall and incredible structures.

Figure 23. Small waterfall.

12. SOLAR ENERGY PLANT

After the visit to the Miyagase dam we went to a solar panel plant; on arrival we could see the large number of panels that are held and used to generate electricity. In this place we were also given an explanation regarding the entire operation of the solar plant.

Figure 24: plant view

It has an area of 30 000 m^2 with a maximum energy production of 1896 KW, when the days are cloudy this production reduces to 382 KW. It has 1574 solar panels at the top and 6328 panels at the bottom, resulting in a total of 7902 panels. This solar plant belongs to Kanagawa prefecture. It was built 8 years ago (2011), with a cost of 6.8 million dollars, this investment was covered with the sale of electricity in approximately 17 years. The use life of this solar plant is 20 years. For its construction 88 people each contributed 10,000 yen and left a message for the future on a plaque.

Figure 25: Plant location

Each panel produces 240 Watts, working at an efficiency of 15%. These are oriented towards the south with 10° of inclination. However, the recommendation is an inclination of 30°. It is not used because maintaining this inclination generates shade. So panels require to be more separated. For this reason the inclination of 15 ° is maintained to have more panels and to take advantage of the area.

The panels do not have a concrete base, they are screwed into the ground. This is why they want water to infiltrate the soil and have environmental benefits. However, this generates more costs, because grass grows and requires labor for cleaning. The place is also used as a recreation park.

Figure 26: group photo with the plant authorities

13. ILUMINATION

After finishing the visits we went to see the lighting near the Miyagase dam.

It was really interesting to visit the dam and have the opportunity to learn about its construction. As future irrigation engineers we may work in the construction of a dam or other type of hydraulic project.

This visits help us to see other countries' ideas and be able to apply some of this ideas in our country.

13.1. PHOTOGRAPHIC ANNEX 1





TAMAGAWA UNIVERSITY

Tamagawa University (玉川大学 Tamagawa daigaku) is a Japanese university in Machida, Tokyo, Japan. The university consists of 16 departments in seven faculties (undergraduate), as well as seven programs leading to a master's degree and four programs leading to a doctorate degree. Part of the Tamagawa Gakuen campus was founded by Japanese education reformer Kuniyoshi Obara.

Figure 27. University of Tamagawa.

Tamagawa Academy (K-12) was founded in 1929 as an elementary education organization. Later a secondary education division was added, and in 1947 Tamagawa University received approval for establishment as an "old system" (pre-war) university. It is an academy (gakuen) which encompasses all school grades (TAMAGAWA ACADEMY AND UNIVERSITY).

13.2. VISIT TO BEE FARM.

The investigation of the bees at the University is divided in two parts: in one they reproduce them and let them live normally producing honey and in the other they are observed to study how their natural behavior can help our agricultural environment.

Figure 28. Wasp beehive.

In the laboratory there are two species of bees, the Japanese ones (small and intelligent, and the big, predators, wasps), and the European ones (small and not yet adapted to the conditions in Japan). The big Japanese bees eat the small bees and kill them so that the hive is empty and they can eat the eggs of the small bees, these small bees have developed some characteristics that allow them to survive such aggressions. For example: they join to place themselves around the body of a predator bee and raise the temperature of its body and kill it. European bees do not yet show signs of adaptation to this common activity.

It was interesting to see the importance that these insects have. Because, they are an important step in the reproduction of plants.

Figure 29. Japanese wasp.

Figure 30. Pollinator beehive in detail.

Figure 31. Harmless pollinator bee.

13.3. FIELD LANDS

In the greenhouse where they have strawberry beds, there was an investigation on the production of strawberry under a layer and with a fan to lower the temperature in summer.

Figure 32. STRAWBERRY CULTIVATION UNDER PLASTIC.

Figure 33. CULTIVATION OF CITRUS FRUITS UNDER GLASS.

Figure 34. TAMAGAWA STUDENTS WITH THEIR HARVEST.

Next to this place, there was a large warehouse in which there were agricultural implements such as a sowing machines, plow, and harrow, which were used by one person.

Figure 35. WAREHOUSE OF AGRICULTURAL IMPLEMENTS.

On the other hand, the greenhouse where the ornamental flowers were growing is large and much ventilated. The product of this greenhouse is intended for the students of the University of Tamagawa to place in the gardens of the school.

Figure 36. GREENHOUSE HORN PLANTS.

Figure 37. MODIFIED CHRYSANTHEMUM.

It was surprising to see a greenhouse where avocado and mango were cultivated (because in Japan the weather conditions do not allow that) and to observe the production of small trees. Due to the fact that they are under cover, the product (fruit) is very expensive. This is because all the heating that is used and to the handling dedicated for the production. The greenhouses are for academic purposes only.

Figure 38. GREENHOUSE HANDLE.

Figure 39. AVOCADO IN GREENHOUSES.

13.4. PLANT FACTORY

As part of the tour of Tamagawa University and after the tour in the university's fields, we were taken to what is known as the plant factory.

Figure 40. Laboratory where the plant factory is located.

First, we were introduced the topic. Receiving an explanation of applied principles and how the facility works. After this we were taken to observe the production. The plant factory represents an innovation in agriculture. It is a crop production system that is very efficient. LED lights are used and the wavelength to which the plant is exposed is controlled. Red and blue lights are used because these are the ones that the plant adsorbs, as opposed to the green color which is a color reflected by the plant.

For production an aquaponics system is used, which consists of the absence of some type of substrate and the plant absorbing the water directly. The nutrients are provided to the plant through this water. There is no use of pesticides, mainly because plants do not have disease and pests due to the care and isolation of the system.

The permanence of each plant in the place of cultivation is short and requires little labor. The harvest is carried out by lowering batches of plants with a machine and taking them to the packaging site, where eight people are working on the packing.

The sales are quite favorable. 300 lettuces are harvested a day which are marketed in the surroundings and quickly sold out.

The cost of production under LED lights is higher than the cost of production under conventional means due to the energy costs that must be covered. But the plant produced is way higher because plants are placed on several levels in small spaces.

Research takes place in the simulation of production in space. The desire of the human being to extend domains outside the planet seeks the forms of food production under zero gravity conditions. It is here where difficulties in the development of the plant are observed.

Figure 41. Group photo outside the place of production and packaging.

13.5. ROBOTICS LAB

At the end we were taken to the robotics laboratory where two students (one of them Mexican) presented us their programming work with robots. Programmed robots are for the purpose of support.

The first program has the robot look for a marked object and if it finds it, it carries out the programmed actions.

Figure 42. Robot show.

The second program, makes the robot with the help of a camera see those who is in front of it and marks the lines of motion to know how people are moving. It can also follow a person.

Finally we witnessed a written explanation based on the statistic and location of an object with respect to the possibility that the object has to be in that place according to pre-programmed characteristics.

Figure 43. Presentation of the robot that can detect motion by statistical methods.

Figure 44. Goup photo in the robotics laboratory.

14. MIRAKAN MUSEUM

The Miraikan (or to give it its full name the National Museum of Emerging Science & Innovation) in Odaiba, Tokyo is a science museum established by Japan's Science and Technology Agency. The Miraikan opened in 2001.

The Miraikan appeals to families with young children, who flock here especially at weekends and public holidays, drawn by the various educational and fun activities the museum offers.

Figure 45. Miraikan museum.

The Miraikan has three main floors of exhibits on the 1st, 3rd and 5th floors. The 5th floor has a family-friendly cafe, the 6th floor the 112-seater Dome Theater Gaia. A new restaurant with fine views will open on the 7th floor.

The first floor "Symbol Zone" gives a first view of the large high-resolution globe, the Geo-Cosmos, which projects various screenings that have changed over the years. In the present it is featured cities and their populations, temperatures, global weather systems and human movement in continuously changing displays.

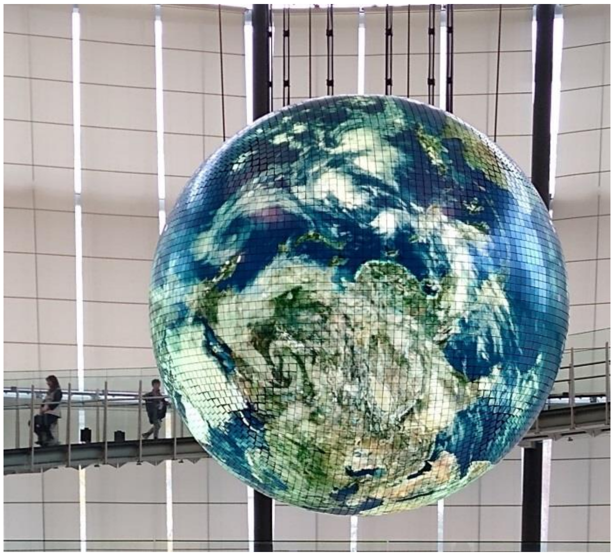


Figure 46. Geo-Cosmos, Miraikan, Odaiba, Tokyo.

The Special Exhibition Zone located on the first floor has staged a number of top class exhibitions over the years: The World of Manga Experienced Through Science (2012), Toilet!? - Human Waste & Earth's Future (2014), Pokémon Lab: You do it! You discover! (2015) and Game On: Why are videogames so interesting? (2016).

The first floor also has the museum shop selling a variety of science goods and souvenirs, Asimo robot goods and science-related books.

Figure 47. Realistic human robot.

Visitors can ascend a curved ramp to the 3rd floor with various interactive exhibits divided into themes of Art, Information, Lab and Robot. The Information section includes the large mechanical Hands-On Model of the Internet while the Robot section includes performances by an Asimo robot.

The 5th floor has more themed sections: The Earth, Lab, Life and the Universe. The Universe sections contain a scale model of the ISS living quarters and another scale model of a neutrino detector (Super-Kamiokande) buried 1,000 meters underground in a mine near Hida in Gifu Prefecture.

The Earth section looks at natural and man-made disasters including earthquakes, epidemics, volcanic eruptions, nuclear accidents and extreme weather.

The Lab section looks at the scientific exploration of the world's oceans and of outer space. There are models of the Subaru Telescope in Hawaii operated by the National Astronomical Observatory of Japan and Chikyu, a research drilling ship working in the world's oceans and operated by the Japanese research organization (JAMSTEC).

The Life section has exhibits on medicine and cells in the human body including new research on stem cells.

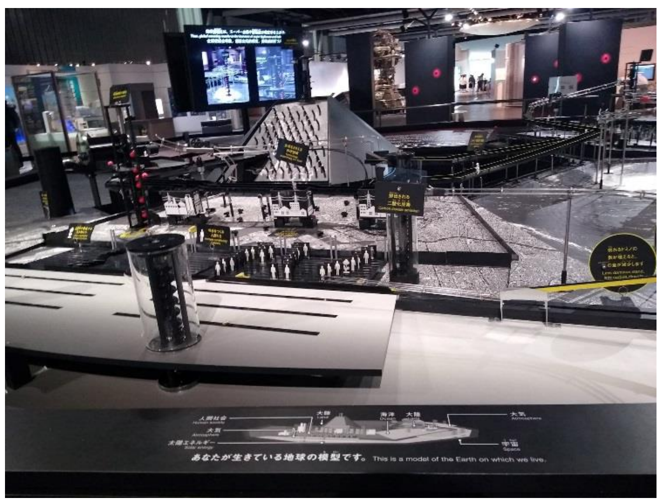


Figure 48. Scientific exploration of outer space.

In the afternoon we visited Shibuya, one of Tokyo’s neighborhoods that sets trends. It has large shopping centers and countless fashion stores. We were at the exit of the station called Hachiko and at the Shibuya crossing.

Leaving the Shibuya station by the exit called "Hachiko" we arrived at the square center where the Hachiko dog statue is located.

The statue was erected in the presence of Hachiko in 1934 to commemorate his faithfulness. Hachiko was a dog that, since the death of his master in 1925 and for 10 years, continued to go to the station every afternoon to await the return of his master from the university.

Figure 49. Hachiko statue

An image known to most people interested in Japan is the Shibuya crossing, also called Hachiko crossing.

The intersection of Shibuya consists of five synchronized crosswalks, which means that every time the traffic lights go on a human tide invades the asphalt making the place the busiest crossing in the world.

Figure 50. Shibuya crossing.

15. SENSO-JI TEMPLE AND TOKYO SKY TREE.

On Sunday morning we went to Asakusa, where the Senso-Ji Temple is located. Dedicated to Kannon. It is a beautiful ancient Buddhist temple and the oldest in Tokyo. Also one of the most important ones in the city.

There we walked thought the commercial street Nakamise where we saw a lot of traditional crafts such as candy, clothing and food. Then we found the Hozomon Gate that is the principal entry of the temple. It is a red big construction that is conformed by two levels. In the first level we found two big guardian statues made in 1960.

In the middle we found a big red lantern with the name of the building that has a big dragon carved in the bottom. All this accompanied by a beautiful architecture.

Figure 51. Hozomon gate located at the entry of the Senso-ji Temple.

Later we walked through the Hozomon Gate and found a Kouro in the middle of the plaza. This is a container used for burning incense. People go there to be purified with the smoke. They direct the smoke to the parts of their body that they want to purify.

Figure 52. Kouro, recipient used to burn incense.

To the left of the entrance we could find the Pagoda Tower. It was constructed in the 10th century.

Figure 53. Pagoda tower..

At the end of the way we found the principal temple of Hondo, this is the principal salon and it is considered a national treasure, it has an area of 1150 m^2.

As we climbed the stairs we could see a container where people threw a coin and made a wish. Inside the building we saw a lot of beautiful old paintings of dragons and a large altar in the middle of the temple decorated with golden colors.

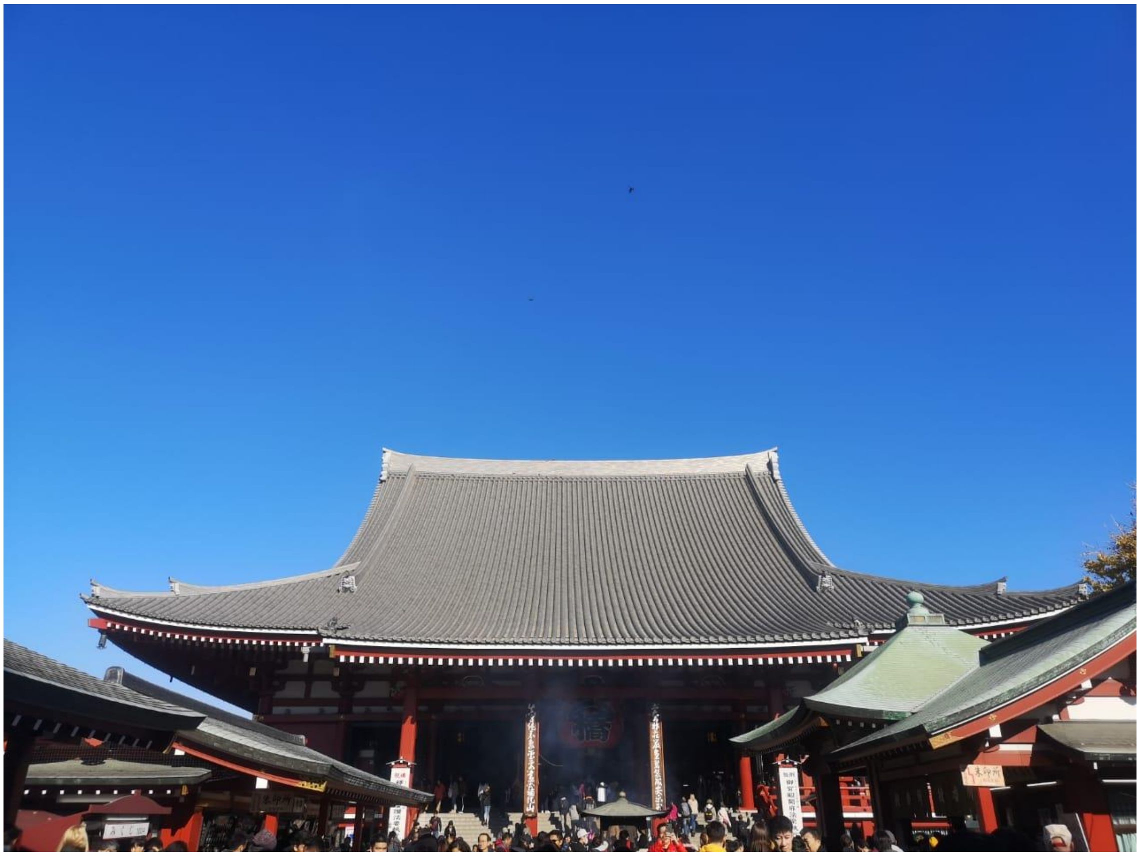


Figure 54. Principal temple Hondo.

We went to a Temizuya, which consists of a tub of water with ladles to wash your hands and mouth in order to purify yourself.

Then we met at the first entrance of the temple called Kaminarimon. In the center of the entrance there is a huge red paper lantern with the Kaminarimon letters written in black. On both sides of the lantern, we can see the two deities that guard the entrance to the temple: Fujin, the god of the wind and Rajin, the god of thunder.

After that we walked to the Tokyo tower, a big telecommunications tower used for tourism inaugurated on May 22, 2012. It is 634 meters high and it is considered the tallest tower in Japan.

Skytree has two viewpoints, the first is 350 meters high and the second 450 meters high. From the two viewpoints you can see the general view of the city of Tokyo. Especially we can observe the organization of the city and the large number of rivers and canals in it.

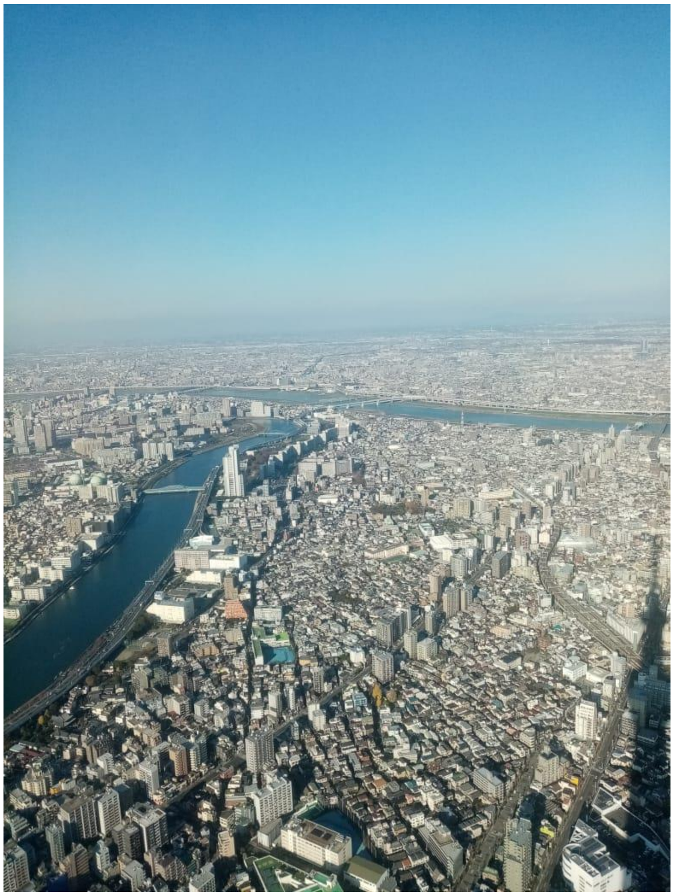


Ilustración 1.Tokyo view from Skytree.

Finally we visited areas of particular interest to each member of the group and returned to NODAI.

16. GOTOKUJI TEMPLE AND CLASES

This day Dr. Azael May accompanied us to the Temple that is near the University. The Gotokuji Temple (豪 徳 寺), which is a Buddhist temple located in the area of Setagaya, Tokyo. Famous for being considered the place where the well-known maneki-neko amulet originated. This is the amulet of a cat that has the upper right leg raised as saluting. There are many legends about the origin of the maneki-neko, but the best known is precisely related to the Gotokuji temple. Legend has it that during the seventeenth century in the Edo era, the temple was very poor and had serious economic problems. The monk who inhabited it, already old, shared the little food he had with his cat. One day, a feudal lord and a man of great fortune named Li Naokata, was surprised by a storm while hunting. The man took refuge in a tree near the temple and, while waiting for the storm to subside, he saw a white, black and brown cat beckoning him to approach the temple door. It seemed to be raising one of the legs and shaking it. The man was so surprised that he left the shelter from the tree to get closer to the cat and see it better. Just when a lightning bolt fell on the tree that had given him shelter. Grateful for having saved his life, the man donated rice fields and farmland to the temple, financed the temple repairs and it prospered. So, thanks to the cat, the temple became very rich and acquired fortune and prosperity. As an annex to this temple, there is a Buddhist cemetery, where the remains of the Clan Li family are found, who, during his reign, expanded the temple.

After the visit to the Temple, we attended two presentations in the 111th hall of the University which were exhibited by Ph.D. Narong Touch and Shinji Suzuki.

16.1. CLASS: "MICROBIAL FUEL CELL TECHNOLOGIES". PH. D. NARONG TOUCH

The presentation was made by Professor Narong Touch, who belongs to the Laboratory of Rural Environmental Engineering, which studies consisted of microbial fuel cells or MFCs (Microbial Fuel Cells) by its acronym in English and especially in the sedimentation batteries of microbial fuel or SMFCs (Sedimental Microbial Fuel Cells). MFC´s technologies are bio-electrochemical systems capable of digesting a wide range of organic substances, including different types of wastewater, and generating electrical energy in that digestion process. In the case of wastewater this is equivalent to saying that the MFCs can reduce the chemical oxygen demand of the water while producing electricity from that contaminated matter removed. The reactions that take place in the system are the oxidation of organic matter in the anode and reduction of an oxidant (e.g. oxygen) in the cathode. In the anode chamber all organic pollutants present in the wastewater can potentially be oxidized by the microflora present and act as electron donors for the battery circuit.

Professor Touch's job is to make a simple MFC device, but the problem is the high cost of the membrane that is needed to carry out this technique, which are usually made of carbon or graphite. The solution to that problem was the Sedimental Microbial Fuel Cells where it is not necessary to use a membrane, so the device costs are reduced.

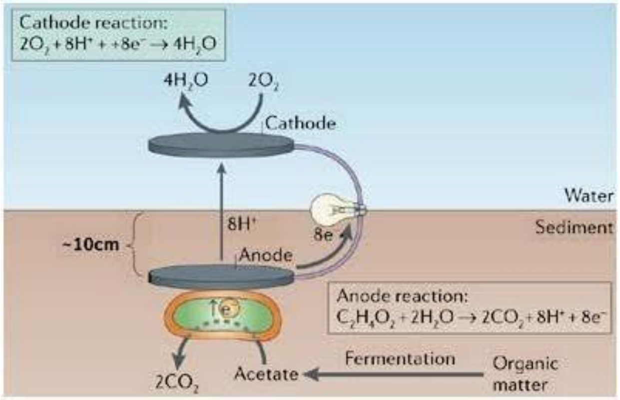


Figure 55. Operation of SMFC technology.

The benefits of these technologies are varied, including that we can produce electricity and at the same time treat some wastewater. Other applications are soil bioremediation, compound synthesis or desalination of water coupled with waste purification. An example presented by the professor was that of a water with high phosphorus and ammonium contents, this technology can reduce that concentration.

The most notable disadvantage is that it has a low yield, since the production of electricity is low. But one way to increase performance is to increase the potential difference with an external energy source, which, in the case of the teacher prototype, is a solar cell. Here the two technologies are combined to have 100% clean electricity.

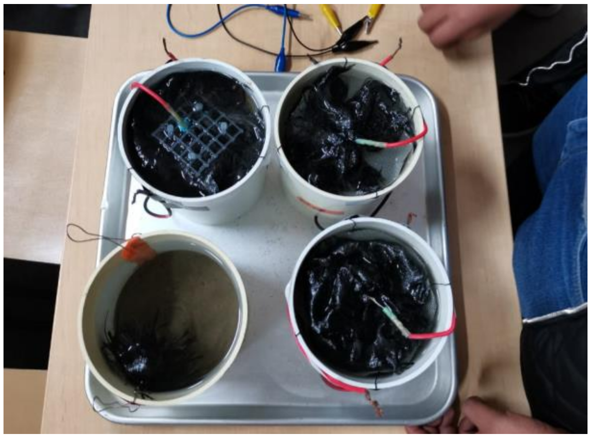


Figure 56. Simple SMFC prototype made by Professor Narong Touch.

Figure 57. Students from the irrigation department connecting the SMFC prototype.

16.2. CLASS: "THE IMPACT OF CLIMATE CHANGES ON ARABLE LAND IN JAPAN". SHINJI SUZUKI

The presentation was made by Professor Shinji Suzuki, who belongs to the Laboratory of Environmental Technology of soil and water. He spoke of the impact of climate change, mainly with the rain. Throughout the year the intensity has increased, causing many soils to remain without rainwater for many days and creating a water deficit. So the soil begins to have considerable changes reaching erosion and having problems with lands not being able to produce.

So a solution is needed where the soil is able to resist these climatic changes. Studying the structure of the soil and trying to increase the infiltration coefficients can help to reduce the abrupt changes. It is known that high infiltration coefficients are related to the amount of macro pores in the soil, so this could help reduce erosion.

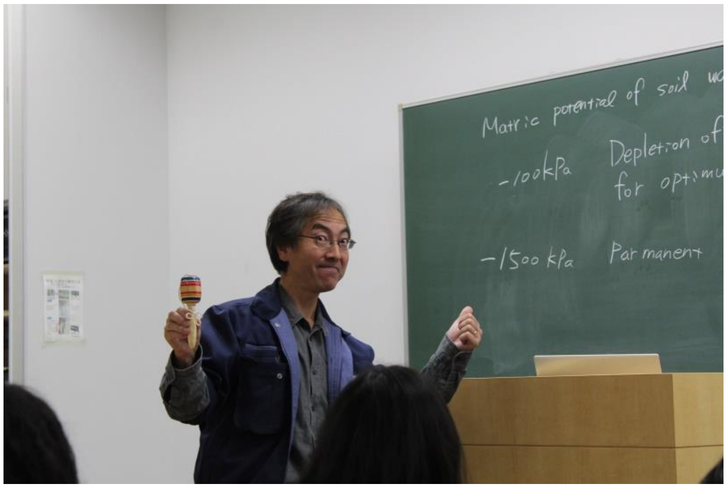


Figure 58. Professor Shinji Suzuki with Mexican toy.

17. SHUKUGAWARA DIKE

A brief explanation was given to us about the history of the Shukugawara dike:

Figure 59: dike explanation

The Shukugawara dike was built 400 years ago by students. At the time Japanese students reached their fourth year of elementary school they started to study about dikes. Shukugawara was built on the river called water of life. At that time, the most important thing was agriculture for consumption, so water represented a way to survive.

The elevation of the dike in the northern part is of 20 meters above sea level and has a decline of 1 m in 1 km (Along its 22km in length there is a slope of 21 or 22 meters).

At that time the construction was complicated. There were no buildings, no electricity and no theodolites. In spite of that, they could give it the required slope. What they did was climb the trees to observe where the lowest and the highest part were by seeing two candles swinging them at night. In the rainy season they used firewood similar to the Ocote that didn't turn off with moisture.

Another curious fact is that the builder was 60 years old (400 years ago) when construction began and surely with a great convincing power to invite so many people to work in a construction of this magnitude.

Thanks to the effort of their ancestors, it was possible for Japanese people who lived in this area to have water from these dikes.

Figure 60: dike view

They have continuous visits of kindergarten students to learn about the history of Shukugawara and see the turtles that they have here.

Figure 61: visit of children to the dike

Figure 62: species conserved in the dike facilities

17.1. LABORATORY OF HYDRO-STRUCTURE ENGINEERING

Study of the design and construction of agricultural facilities for conservation of water environment and bioproduction environment.

Professor: Hiromu Okazawa

Assistant professor: Yuri Yamazaki

Figure 63 Hydro-structure Engineering

Practice (Flow rate measurement)

Chapingo Students carried out a practice about different ways to calculate the flow rate. The laboratory has a channel which has several weirs, limnimeters and a tank at the end that receives all the water the flows in it. In this channel the practice was carried out.

Figure 64 : rectangular channel

Triangular Weir

The following formulas and data were used to calculate the flow rate that passes through the triangular weir.

$$Q = Kh^{5/2}\ (\theta = 90°)$$

$$K = 1.354 + \frac{0.004}{h} + \left(0.14 + \frac{0.2}{\sqrt{Hd}}\right)\left(\frac{h}{B} - 0.09\right)^2$$

$$Hd = 0.3\ m$$

$$B = 0.6\ m$$

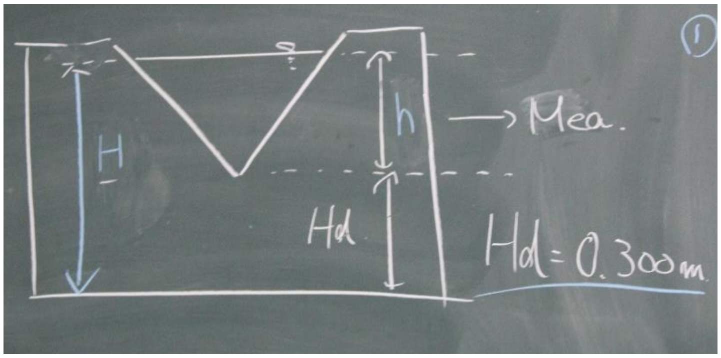


Figure 65: calculating the flow

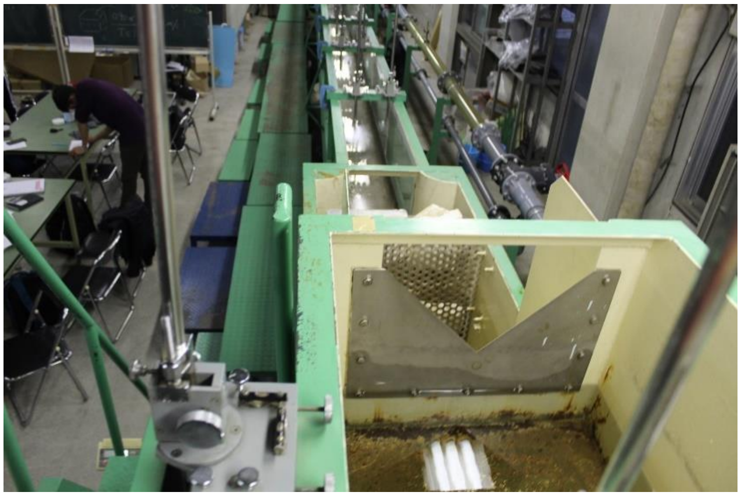


Figure 66: triangular weir

First the channel depth was measured, then the water level and with these two data, h was calculated. Subsequently, the formulas for K and Q were applied. This process was repeated for 3 different flow rates.

Rectangular Weir

In this case, instead of calculating Q, C was calculated first by using the following formulas and data. (For 3 different weirs)

$$Q = 1.7CbHo^{3/2}$$

$$C = \frac{Q}{1.7bHo^{3/2}}$$

$$b = 0.3$$

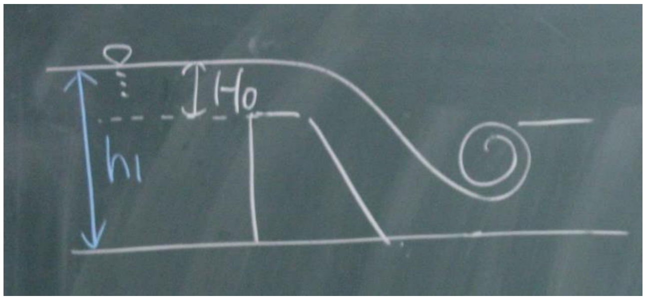


Figure 67: expense calculation

To do this, the measurement of the upstream head was taken. After that, D was subtracted to obtain Ho. Subsequently the formula was applied to obtain C. This process was repeated 3 times for each weir.

Volumetric method

Then the flow rate of the channel was calculated using the volumetric method. Measuring the time it took to the tank to fill and applying the following formula.

$$Q = \frac{V}{t}$$

$$V = 0.9\ m^3$$

This process was repeated 3 times for each weir.

Finally, an analysis of the data was made where the flow rate of the triangular weir was compared against the flow rate of the volumetric method.

Figure 68: Group photo with Okazawa Sensei

17.2. LAND AND WATER RESOURCE USE ENGINEERING

Planning the sustainable use, conservation and maintenance of land and water resources in watersheds, evaluation of the role of agroforestry and agricultural water for the rural and hilled rural environment, study of engineering techniques for reclamation, improvement and conservation of farmland on the basis of land investigation and rural planning.

Professor: Machito Mihara

Professor: Tomonori Fujikawa

Associate professor: Takahiko Nakamura

Associate professor: Toru

Practice (Stoke´s law)

Chapingo Autonomous University students carried out a practice about the Stoke´s law. Before starting the practice, the teacher explained a little about what is the Stokes´ law.

In 1851, George Gabriel Stokes derived an expression, now known as Stokes' law, for the frictional force (also called drag force) exerted on spherical objects with very small Reynolds numbers in a viscous fluid. Stokes' law is derived by solving the Stokes flow limit for small Reynolds numbers of the Navier–Stokes equations.

The force of viscosity on a small sphere moving through a viscous fluid is given by:

$$Fd = 6\pi\mu Rv$$

Where:

Fd is the frictional force (known as Stokes' drag) acting on the interface between the fluid and the particle μ is the viscosity (some authors use the symbol η)

R is the radius of the spherical object

v is the flow velocity relative to the object.

The practice consisted of the following:

First the diameter of a glass particle and one of Ottawa sand was measured using a Bernier.

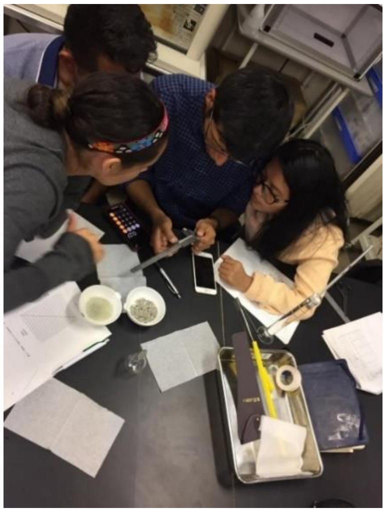


Figure 69: diameter calculation

Subsequently known distances were marked on a test tube with glycerin. After that the particles where introduced into the test tube and the time was taken to calculate the sedimentation rate.

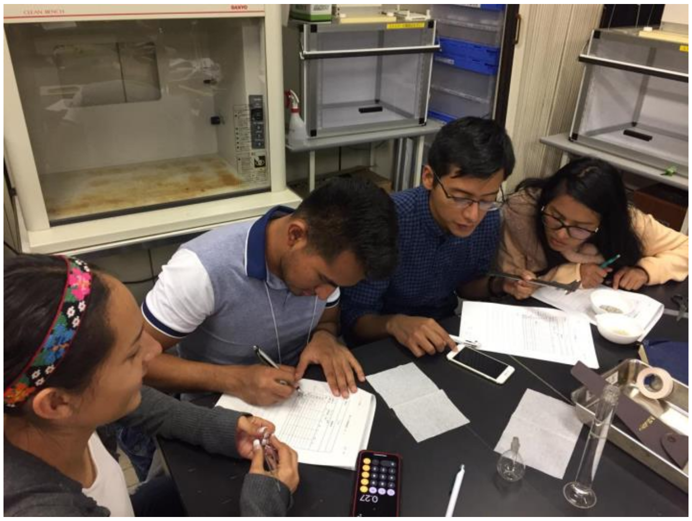


Figure 70: record of the results

17.3. ENVIRONMENTAL INFORMATION.

Professor: Sawahiko Shimada

This laboratory is focused into spatial information and its relation with environment. It was hosted by Ph. D. Sawahiko Shimada on the Department of Bioproduction and Environment Engineering.

The activities consisted into taking part of a practice with the students and take a full class with them. The practice was called “Remote sensing Measuring Experiment using Spectroradiometer”, and the goal was to see which sample had the highest Reflectance and to learn how we can get the Normalized Different Vegetation Index (NDVI), using the near infrared band with remote sensors.

It consisted into using a device called spectroradiometer to take samples of the intensity of an electromagnetic wave that an object emanates, and a GPS, to take the information of the place from where the sample was taken and to georeferenced the points into the map. The samples were: a plant leaf, soil, artificial grass, concrete, and the calibrating surface (white paper).

After taking the samples, we returned to the lab, downloaded the data from the GPS and spectroradiometer and processed them with Google Maps and excel.

With the processed data we could note, that the plants had the highest and most accurate reflectance and NDVI, and that demonstrated, that with those sensors and the knowledge of the light waves we can know the state of soil, plants, so we can manage if they need a treatment, its health state, etc.

Figure 71. Group photo

18. AGRICULTURE AND FOOD RESEARCH ORGANIZATION (NARO)

The National Organization for Agricultural and Food Research is a center for agricultural research and development. Being part of its objective to contribute to the development of society through innovations in agriculture and food.

The focus of the organization is the technological development that contributes to generate an intelligent agriculture using robotics, artificial intelligence and genetic improvements to make agriculture a competitive and attractive industry through the employment of rural development policies by increasing productivity and the decrease in production costs in a conscious relationship of climate change with sustainability of natural resources to ensure Japan's food security.

Figure 72. National Organization for Agricultural and Food Research.

It was built in 1893 by the government of Japan and in 2001 the National Organization for Agricultural Research was established based on research institutes and experimental stations of MAFF. It was merged with a research institution in 2003 and with two other research institutes in 2006, and then renamed the current name, National Agriculture and Food Research Organization.

We had a tour where we saw the advances that have been generated as an organization. Within which were some related to the history of Mexico, the so-called "Green Revolution" was mentioned, the pioneers in the development of wheat genetic improvement and rice, among others.

Figure 73.Improved rice varieties.

In this tour, some problems presented in Japan were raised, as well as their research to solve them and their innovations. For example, phosphorescent silkworm, which adds a market value to the product generated by this arthropod.

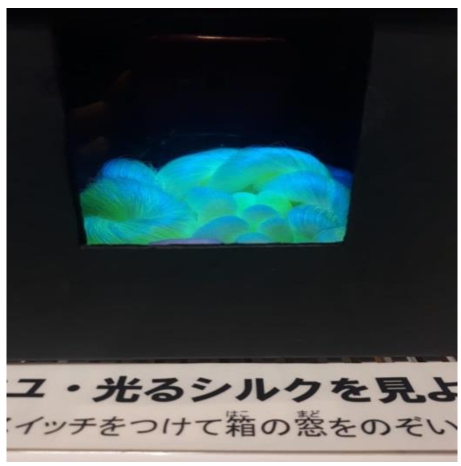


Figure 74. Silkworms.

Some of the innovations are generated to create new ornamental varieties such as the Chrysanthemum (Chrysanthemum) of blue color. Being the first in the world and showing the advances of genetic technology.

Figure 75. Blue chrysanthemum.

Mechanization and automation of agricultural processes through agricultural machinery in Japan is a clear example that shows the technological development in great strides. Mechanization emerged in the 60's as a national plan for growth. In addition to the fact that migration of people to cities implied greater efficiency and less labor as well as simplified agricultural work without the use of human effort.

Figure 76. Seed drill in the 60s.

Currently, machinery is searched to comply with various processes "Combined Machinery" as well as being automated by artificial intelligence.

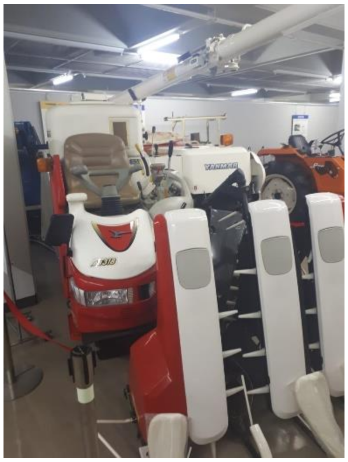


Figure 77. Current machinery.

The tour was carried out in the experimental field, where we saw an automatic weather station with sensors that measured the climatic variants, the implementation of organic coal for the fertilization of the arable soil in greenhouses heated by soil temperature, irrigation and drainage methods through the same buried pipe and giant lysimeters connected to experimental plots to determine the water balance.

Figure 78. Experimental field.

The weather station was an automatic station with very precise sensors, with real-time data. Very specific agricultural sensors that measured evapotranspiration, evaporation, radiation (Light hours), temperatures, precipitation, wind speed and direction.

Figure 79. Automatic meter station.

We were told about the production and experimentation with Biochart, made with charcoal of potato, sugar cane, garbanzo, wood and others. It increases the hydraulic and electrical conductivity, which implies water retention in the soil. Tests are currently carried out to determine the condition, temperature and origin of the Biochart to be generated for greater agricultural production.

Figure 80. Biochart generating device.

There was a heating system that transmitted heat from the ground to a greenhouse, which is used in the winter to maintain a constant (warm) temperature inside the greenhouse. The system consists of a buried pipe 1.5 meters deep and along of the field in which special antifreeze is circulated by means of a pump. The function of the antifreeze was to extract the soil temperature and deliver it to the extractor that maintained the temperature regulated in the greenhouse.

Figure 81. Greenhouse with heater.

The irrigation and drainage system was very peculiar because it performed 2 functions at different times of the year. The irrigation is performed by a buried “sub-irrigation” pipe that is also used to generate the drainage. The pipe is grooved and there is a hole which is blocked so that its function becomes irrigation or it is opened to drain the water from the field. For its operation there is a water outlet which is regulated with a valve that operates with one buoy that regulates the amount of water. When it reaches a certain height of water, it closes the access to it. This has an expense constant, in addition that this is automated and controlled from an App.

Figure 82. Water intake for the plot.

19. VISIT TO LANDSCAPE

Dr. Irie Teruaki Conference and Visit to emblematic gardens.

This day Dr. Irie Teruaki called us at 9 am to the university library to give us a talk about his research entitled "A Study on Improvement of the Value of Hedgerows of Green Infrastructure in Denmark based on Simulating Wind Dynamics by Meteorological observation".

Dr. Irie is a professor at the University of Agriculture of Tokyo from the Faculty of Regional Environmental Sciences of the Department of Regional Regeneration Sciences. He has specialized in Town planning, Rural environmental engineering, Green infrastructure, Heat Island, Landscape Planning and Regional Regeneration.

To begin, Dr. Irie presented us with a video describing the gardens of Koishikawa Korakuen in which he mentioned their origin and history and about the Shinjuku Gyoen National Garden, which we visited once the talk was finished, accompanied by Dr. Irie who served as our guide.

19.1. HEDGEROW HAS MULTIPLE BENEFITS

■ Microclimate and Yields:

The primary effect of a hedge is a reduction of wind speed. About 2-12h from the hedge is an area of increased yield. The soil levels of the finer fractions and organic matter content are higher in the sheltered field than in the unsheltered field.

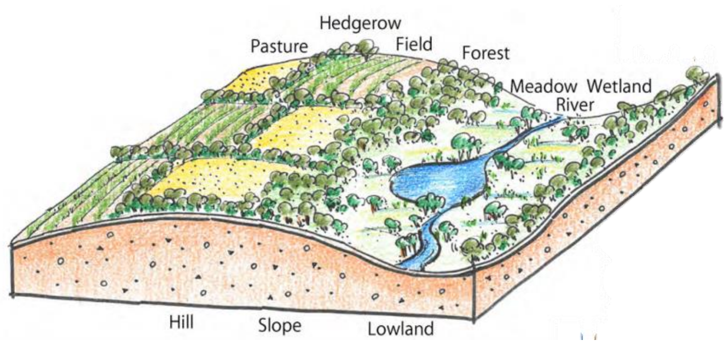


Figure 83. Characteristic Agricultural Landscape in Denmark (Drawing: Teruaki Irie).

■ Biodiversity and Habitats, Corridor: Hedgerows are important habitats which provide bird species with nesting, roosting and foraging sites and act as refuge for small mammals on arable land post-harvest. In addition, hedgerows may often provide the only element of biodiversity and structure in a landscape of intensive agriculture.

■ Landscape and Ecosystem services: Hedgerows on agricultural land improve amenity and recreational value of cultural landscapes. Hedgerows can contribute to prevent soil erosion, resulting into market benefits for the agricultural sector but also to costs savings for other sectors, due to sediment control in rivers and reduced flood damages.

19.2. CHALLENGES AND OPPORTUNITIES FACING HEDGEROWS

■ Decrease of Hedgerow by intensive agriculture and enlarged field size: The Danish Nature protection Agency estimates a 40% decrease in dikes and hedgerows during the last 100 years.

During the last decade increasing proportions of large farms were accompanied by increasing mean field sizes in Denmark. Enlargement of farms and fields does not necessarily lead to decrease in overall hedgerow density, but very large farms seem to be most active in both establishment and removal, which could be due to a rationalization of farm layout.

■ Standardized hedgerows planting: The bottom-up and collaborative aspects were common for Danish subsidies related to agricultural expansion in the late 19th and early 20th century.

In recent years, however, the scheme has become more top-down oriented and targeted towards single farms and has been criticized for simplistic standard models.

19.3. THIS STUDY PURPOSE

1. Improvement of the value of hedgerows in the catchment.

2. Proposing visualized hedgerows planning method based on simulating wind dynamics by Aerial sensing and GIS.

Concluding the talk, the doctor commented that hedgerow improvement has an important role in mitigating soil erosion in places where it is not irrigated. He also showed us a simulation of wind dynamics used in order to make a proper planning of the orientation of the live fences with respect to the wind.

Once his presentation was finished, we headed to the bus from the university, which took us to the first stop at Koishikawa Korakuen Garden.

19.4. KOISHIKAWA KORAKUEN GARDEN.

The Koishikawa Korakuen garden was originally built by the legendary Tokugawa Mitsukuni of the Tokugawa Yorifusa clan, as their second residence in the early phase of the Edo period, in 1629. It was made a garden during the reign of the second Daimyo, Mitsukumi, aka Mito Komon. Its style is Kaiyu-Shiki (circuit style) with man-made shelves and hills, centered on the pond. To create the garden, Mitsukuni, received advice from Zhu Zhiyu, a former Mien dynasty. Some sites of interest in China were reflected as they were seen by Engetsu-Kyo and Seiko-No-Tsusumi, and even, the name of the garden was given by Zhu Zhiyu, which turned out to be a garden full of Chinese tastes and flavors.

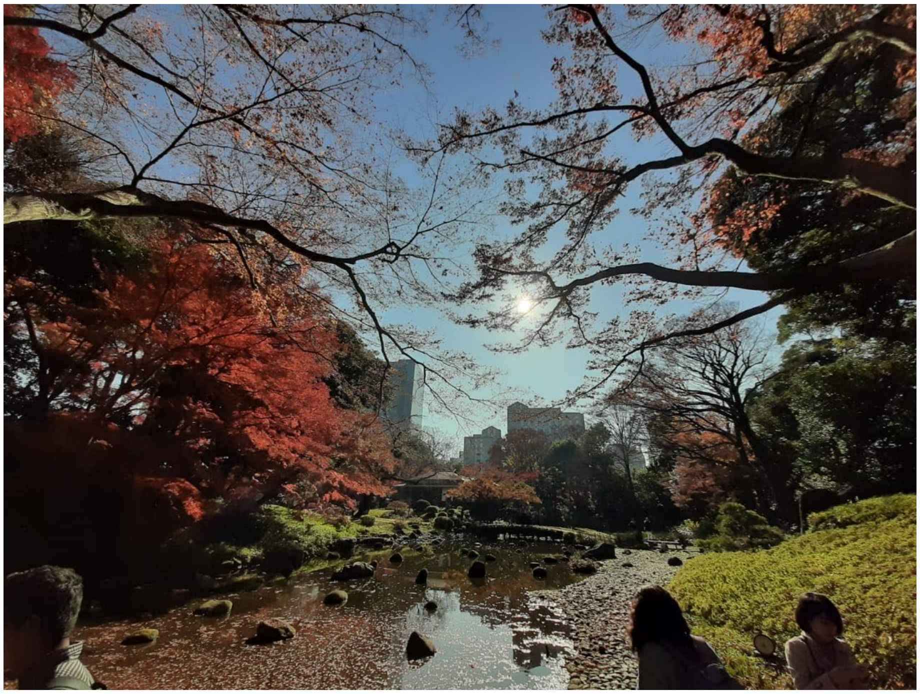


Figure 84. Koishikawa Korakuen Garden.

The name "Korakuen" derives from the Chinese text "Gakuyoro-Ki" by Fan-Zhongyan, which means "worry before all the worries of the world and enjoy after all the pleasures of the world."

The Koishikawa Korakuen garden is designated as "Monument of historical interest" and "Special places of pictorial beauty of the country" by the Law of Preservation of Cultural Property.

During our visit, Dr. Irie gave us a guided tour of the garden explaining each of the areas. He began by mentioning the history of the place, then he talked about the plants that were in the garden, and the existence of a calendar that mentions in which season each one blooms. He also mentioned some practices that they perform for the protection of their trees. Such as a net that retains snow in the winter time that can be used to avoid direct contact with trees as well as a cover based on rice plants that retains insects. We went to eat at a rest area before continuing with the tour. After finishing the meal we made a tour of the lake and headed towards the exit, ending the tour at the Koishikawa Korakuen garden to go to the Shinjuku Gyoen National Garden.

Figure 85. Floral Calendar.

19.5. SHINJUKU GYOEN NATIONAL GARDEN

Shinjuku Gyoen is a botanical garden of 58.3 hectares, located between the neighborhoods of Shinjuku and Shibuya. It offers an oasis of peace and tranquility in the most massive and stressful Japanese city.

It is administered by the National Ministry of Environment, and presents works for the International Agenda Registration- (International Agenda for Conservation in Botanical Gardens).

Shinjuku Gyoen Park was, since 1772, in the middle of Edo (1603-1868), the residence of the daimyō Naitō family. With the opening of Japan abroad and the end of feudal Japan, the park passed into the hands of the imperial family. Although during World War II it was almost completely destroyed, like so many other things in the Japanese capital. Later it was rebuilt and reopened in 1949 as a public park for the use and enjoyment of all citizens.

Shinjuku Gyoen combines three different types of gardens: traditional Japanese, formal and landscape, with extensive gardens and quiet groves. In the spring you can admire more than 1,000 cherry trees that stain the rose park with its delicate flowers. During the fall, you can see some of the best autumn colors in central Tokyo. Although the variety of plants in the gardens and the greenhouse make the Shinjuku Gyoen National Garden worth visiting any time of the year.

The Japanese garden is full of ponds, islets, mounds and stone bridges. Here we also find the Kyu Goryotei pavilion or the mount of the maples. Momijiyama is an ideal place to enjoy momiji or the change of the color of leaves in autumn.

The English garden, with large lawn esplanades reminiscent of English parks and gardens. In spring, it is one of the best places in Tokyo to enjoy hanami or the contemplation of cherry blossoms, since it has about 1,500 cherry trees (400 of the Yoshino somei variety in this area).

The French garden has beautiful rose gardens and flower beds symmetrically, following the style of traditional French gardens.

In addition to these three environments, the park has a greenhouse with about 1,700 flowers and tropical plants, an art gallery and a restaurant.

On our visit, Dr. Irie gave a small explanation of the place and recommended a route which he would follow, but on this occasion, it was decided that we could choose our own route. Citing us at a starting point to return to the University of NODAI.

Figure 86. Group photo on the ginkgos road.

The Koishikawa Korakuen Garden and the Shinjuku Gyoen National Garden are cultural heritage gardens. Each Tokyo metropolitan garden is designed as a cultural legacy of the state or Tokyo; combining history, culture and nature. Which prevails from the Edo, Meiji and Taisho ages.

These gardens are valuable properties that have survived disasters: the great Kanto earthquake, the damage of the war, and also the progressive urbanization process.

19.6. FAREWELL PARTY

As the last activity in NODAI, we shared our experiences during the trip. Mihara Sensei gave some closing words for the activities and we proceeded to make a small traditional Japanese toast before starting dinner.

During dinner, we spent time with the staff that supported us during the stay. We ate traditional Japanese dishes and the director of the university sent us high quality apples grown by students graduated from NODAI.

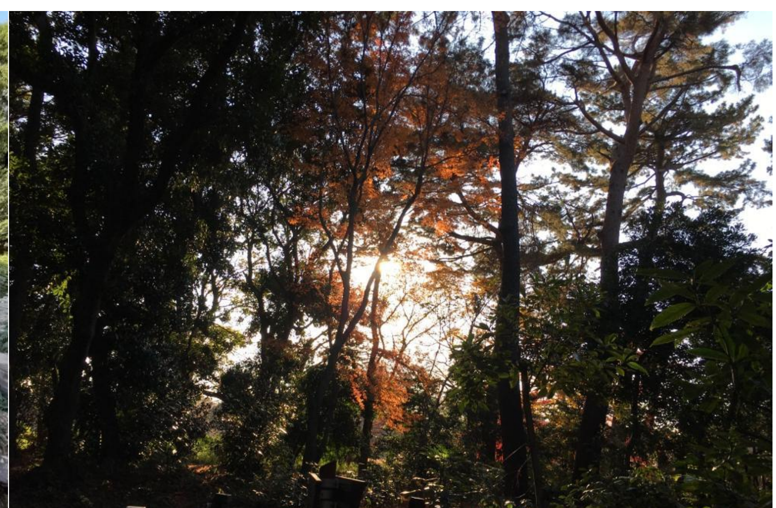
As Mexicans, we added a little spicy attitude. Showing them our traditional music and teaching some students to dance.

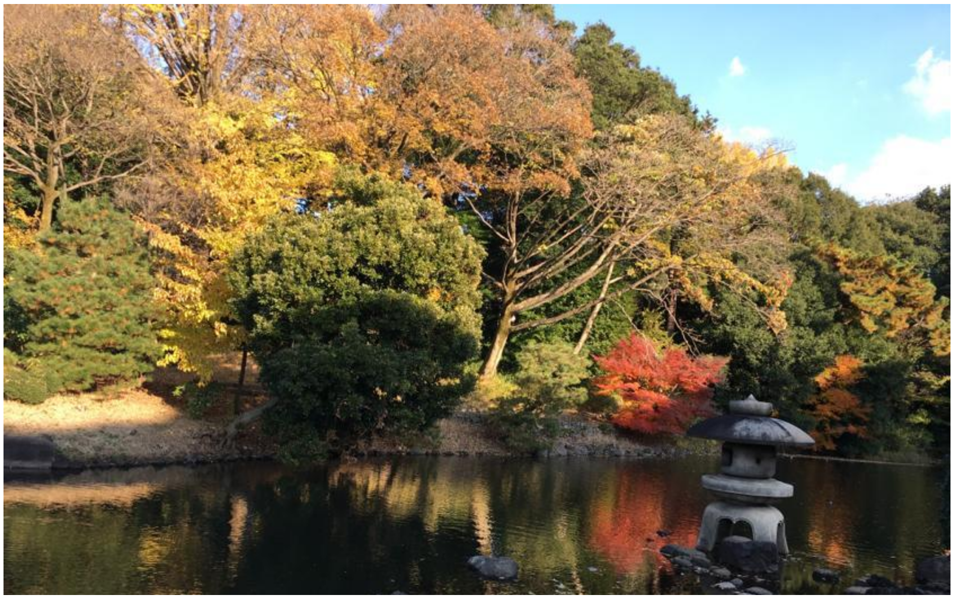
Figure 87. Farewell party.

20. PHOTOGRAPHY ANNEX.









21. FAREWELL PARTY




22. DEPARTURE FROM THE UNIVERSITY TO NARITA AIRPORT.

To conclude the trip, Dr. Azael along with Dr. Irie and some students from the university went to the dormitory to give us a few words of farewell. They said they hoped that our stay at the university had been pleasant and encouraged us in the future to go back to NODAI and study a master's degree or a PhD.

Finally, we took our last photo in the university and we were given a little souvenir from NODAI. They accompanied us to the entrance of the campus. Full of gratitude and looking forward to one day return and further our education, we said goodbye to the staff of the University of Agriculture of Tokyo.

Figure 88. Farewell and Return to Mexico.

23. CONCLUSION.

After ten days in Japan, we learned a lot of things. Here we mention some of them in a list:

- Japanese food is amazing.
- The drinks machine can save you in a thirst or cold emergency situation.
- Always carry your PASSMO.
- Public transport can be the most comfortable and quiet experience.
- Taking a picture with Hachiko requires full group organization.
- You can eat ANYTHING with chopsticks.
- Technology evolves every day.
- Learning two languages or more is a must.
- Agriculture has a scientific pathway.

Getting to know another country from the agricultural academic point of view can show you the reason of its evolution and development. This is a special case for Japan. With a history of many hardships; both natural and man created catastrophes. In spite of this its habitants have been able to work together in order to create an advanced and really organized society. Japan sets an example for other countries to follow.

Getting to see the academic life of foreign and Japanese students in NODAI as well as sharing lectures, laboratory practices and field trips with them was the perfect way to expand our knowledge. Especially to reinforce the knowledge acquired during the three and a half years of our bachelor studies in the Irrigation Department of Chapingo Autonomous University and as a way to see other applications of the courses that we are taking or have taken.

In one hand. We look back at the technologies we saw in the trip and hope we keep on discovering and developing new ones to apply in Mexico. We learned the improvement and application of the Irrigation technologies and how they had evolved in different situations (For example; how Miyagase dam helps the environment and the NARO has innovated drainage and irrigation). It was comforting to feel confident about the topics explained since everything we learned in our studies in irrigation was reflected on the comprehension of the technical language presented in the activities in the short term exchange.

On the other hand. This trip encouraged all of us to learn more languages, to improve the ones that we have learned and to reach the possibility of studying a Master´s degree abroad.

Finally, we conclude that agriculture has evolved along history depending on the situation people are involved and that it doesn’t matter how advanced technology is. It is a must to preserve the origin and the traditional ways and just improve them along with the evolution of new ideas, always preserving our natural environment.