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<u>1. INTRODUCTION</u>

First agriculture university in India, Govind Ballabh Pant University of Agriculture and Technology Pantnagar was inaugurated in 1960 by Jawahar Lal Nehru. This university is regarded as the harbinger of Green Revolution in India. We had the chance to discover this university and all the different Colleges. We spent some days in the college of agriculture, community science and basic science and humanity. We are eight french students from different sectors selected from all the country. This travel was possible with the partnership between India and France : the DEFIAA Programme (Developing French Indian exchanges in Agrofood and Agronomy). This project allows students from different agricultural sectors to have the opportunity to expand their horizons.

This internship permitted us to spend a month in India and to be totally immersed in this culture.



statue of Govind Ballabh in NAHEP

2. DETAILS OF THE PROGRAMM

Department of Food Science and Technology, College of Agriculture

We stayed for 6 days at this Department. The Head of this Department is Dr. S.K. Sharma.

The Dean of this College is Dr. S.K.Kashyap.

The first day we visited all the labs and the plant procession lab in the morning. We saw some new equipment like the extruder and the soya milk machine. In France, we don't drink vegetable milk that much so we don't have this kind of machine in our school. We had the presentation of all the doctors and a video for the department. In the afternoon, we had to make extruded snacks but, due to a lack of electricity, we met the students of the department and talked a lot.



soya milk machine

The second day, we made soya milk, litchi and lemon juices, extruded snacks, and tofu. The tofu was made with the waste of the soya milk's process. We boiled the soya milk and we added lemon juice to coagulate the proteins. For the extruded snacks, we took wheat flour, salt brought by an endless screw. The product is brought in a depression and it puffs when the product enters in contact with the ambient air after being cut. Then, we met the vice-chancellor at the Administrative Block. Afterwards, we finished all the processes. It was a little bit impressive because we didn't know we were going to see him. We were happy to talk with him and take a picture.



Visit of vice chancellor with Dr. Kashyap

The third day, we went to the P.G Lab to make garlic bread and dalgona muffins. For the muffins, we had to adapt the recipe because our preparation wasn't good before the baking. Then, we realised a sensorial analysis on the juices made the day before, the garlic bread and the muffins with the students. It was the first time for some of us to make a sensorial analysis, the student in food processing already did it. The attributes we evaluated were the appearance, the taste, the texture, the after taste and the overall acceptability. It was the first time for us to eat muffins without eggs, in France we put eggs in a lot of our sweet dishes. We were pleasantly surprised by the result.



Muffins with coffee and chocolate

The fourth day, we visited 2 industries : Parlé and Roquette. Parlé's factory that we visited is specialized in biscuits and sweet productions like the famous "Hide and Seek". They even sell their products in other countries. In the morning, we saw a movie about the history of Parlé and after that we saw the production line. Roquette makes cereal refining with, for example, wheat. They also do a lot of analysis on the cereals that they receive and for private individuals. We were a little bit sad because we couldn't take pictures. The fifth day, we welcomed two new french girls : Brunissande and Cynthia. Then, we went to the Department of Food Science and Technology and made a sensorial analysis on the extruded snacks, the soya milk and cookies which were prepared by the students. In the afternoon, we talked with the students about our

countries like festivals, traditions, the habits of each one. We learned the place of traditions in Indian culture and especially the Uttarakhand traditions like the white and red painting, the kind of houses whe find here... We spoke about 8 french traditional festivals like Pâques, Noël or a Chandeleur.

The last day, to celebrate our departure, we separated the French students and the Indian students. Each group had to prepare dishes for their country. We made crêpes, brownies and gratin dauphinois (with potatoes). The Indian students made raita, puri and Aloo-Chole. We shared lunch together for a good moment. It was a good idea to mix the Indian and the french dishes. To close the day, we danced and sang all together and we learned Indian dances.



Group picture of the last day at Department Of Food Science and Technology, College Of Agriculture

College of Community Sciences

We stayed 6 days. The Dean is Dr. Alka Groel.

At the beginning, we met the Dean and the teachers during a ceremony and we received a rose in a gift of welcoming. We also visited all the departments of the College. We met the students and danced with them. Finally, we had a video-conference with the French organizers of DEFIAA to talk about the trip and how we felt. After this, we visited the other department in the college, like the textiles, the museum of the creations of the students. We also saw the art department.



First day in community science college

The following day, we had a great presentation about Indian food in each part of the country. Then we saw an experiment about binding anti-nutrients. In the afternoon, we made 4 preparations : chapati with wheat flour, chapati with finger millet flour, paratha and puri. We learn the different techniques of kneading and baking. After finishing the recipe, we made a sensorial analysis where we tasted everything with a chutney.

The next day, we prepared idli (rice dough which was fermented all night), and chutney with mustard, roasted coconut powder and peanut. This dish requires fermentation. It's an interesting process, it's a healthy product allowing it to be metabolized by the body. We tasted all of this for a sensorial analysis. After, we prepared a french dish : crêpes. It is a very quick and simple recipe. For making this recipe, we used eggs, wheat flour, milk, water and sugar. We have a liquid dough that we baked in a pan to have a thin and round dish.



Idli



Veg momos

The fourth day, we made cheela. The cheela is similar to one of the french dishes we made ; the crêpes. The shape and the appearance are similar, it's flat and round but there are differences in the taste. In crêpes there are eggs, not in cheela, the flour is different. We used wheat flour while the Indians used chickpeas flour. In France, crêpes are usually sweet but cheela is salty.

We made veg momos from vegetables and cheese. We made the dough with wheat flour, salt and oil. For the stuffing, we used cabbage, carrot, cottage cheese, ginger, salt, black pepper, and coriander leaves. After that, we made different shapes and we cooked it with steam. The sensorial analysis was very positive for both of the products. The fifth day, we cooked biryani which is made of rice and a lot of spices like cardamom and coriander. It was quite different from what we can find in France. We also made kheer with rice, milk, almonds, sugar and a little bit of cardamom. It was very sweet when we did the sensorial analysis. At the end of the day, we prepared a global presentation about french food for the teachers. Unfortunately, we couldn't put all the dishes we wanted because there are too many specialties in our country.

The sixth day, the students asked us which dishes we wanted to learn about, so we chose to cook egg curry because we liked it in the guest house. We had to fry in oil the hard-boiled eggs and prepare the sauce with tomatoes and garlic. The recipe was quite simple and the results were conclusive. In the afternoon, we cooked sooji halwa, a very sweet dish made with sooji, ghee, sugar, almonds, cardamom and cashew nuts. We tasted it with and without water. These dishes were very tasty.

On the 19th, we returned back to the Community Sciences College to participate in a competition. In the competition, there were three representatives of the association "Suvernada Foundation" : Dr Sarita Srivastava, Mr Rohit Goswami and Ms Shefali Srivastava. Each French student had to pair up with an Indian student. We had to prepare a recipe with millet. The goal of the competition was to sensibilize the public to the millet's use. One of us won the third prize and another one won the fourth prize.



Millet recipe competition

College of Basic Sciences & Humanities.

We stayed 3 days. The dean is Dr. Sandeep Arora.

On our first day, in the morning, we visited the various laboratories of the Department of Biochemistry and Physics. In the afternoon, we went to visit the microbiology department, where we were able to perform a Gram staining. Gram staining is a differential staining of the cytoplasm (purple or pink color) that highlights a different chemical composition and structure of the bacterial wall (Gram+/Gram-).

The second day we went to the biochemistry department. The students explained the principle of the spectrophotometer as well as the electrophoresis gel. The spectrophotometer makes a measurement of the intensity of the light it receives, once it passes through a transparent container (bowl whose material must be adapted to the wavelength), containing the solution to be studied.

Electrophoresis gel allows to separate molecules according to their charge, their size (called molecular weight) or both at once by making them migrate through a gel by applying an electric field.

The gel is filled with a saline aqueous phase, most often buffered, whose ions play the role of electrolyte and conduct the current. This technique is mainly used to separate amino acids, proteins or nucleic acids (DNA or RNA).



Electrophoresis gel of DNA

Afterwards we went to the Agroforestry Research Center supervised by Dr S.K Dube and Dr A. Dube . The center is enriched with a great wealth of trees such as bamboo, eucalyptus, poplar, teak, shisham, etc. The center has its own nursery. Most of the research at this center is access to bamboo as well as plant combinations. This research center also serves as a biodiversity hotspot due to its location and management.



Plantation of bamboo

In the second part of the day we went to the microbiology department. We did a dilution range that we seeded. We learned how to identify different microorganisms. For this, various tests are performed, such as Gram staining, glucose degradation, as well as DNA sequencing through PCR. PCR is a replication technique. It makes it possible to obtain, from a complex and sparse sample, large quantities of a specific DNA fragment of defined length. The purpose of DNA sequencing is to determine the linear succession of bases A, C, G and T involved in the structure of DNA.

In addition, we were able to see the room reserved for the cultivation of seedlings in optimal conditions. We were able to carry out an in vitro culture from a bud of the plant.



In vitro culture

Its principle is based on plant cell totipotency . The technique of in vitro culture therefore consists in placing in artificial and controlled conditions plant organs, sometimes very small, in order to reproduce faster or in greater quantity whole plants.

The plants are placed in a growing medium that contains water and mineral elements necessary for any plant, a gelling agent (to give a firm texture to the middle), sugar, vitamins and plant hormones. On the third day we went to the chemistry department. We met Dr. Srivastava, and in the morning we did a thin-layer chromatography to extract and separate the chlorophyll. Chlorophyll, due to its green color, is the main pigment contained in plants. It is found in the chloroplasts of plant cells. It is essential for the photosynthetic activity of the plant which consists in producing chemical energy (ATP) from the light energy of the sun. Indeed sunlight is captured by chlorophyll. Thin layer chromatography allows separation of pigments for analysis. The fixed phase consists of a solid layer on which is deposited a silica gel serving as a support and the liquid phase consists of an eluent that separates the different pigments.

Several drops of chlorophyll solution are deposited on the fixed phase using a capillary to form a stain. The silica plate is put in contact with the liquid phase that will migrate and cause the chlorophyll pigments by capillarity. Once the migration is complete, several coloured spots are obtained on the silica plate corresponding to the different components of chlorophyll. In the afternoon, Mohit, a PhD student in green chemistry, conducted two thin-layer chromatographies, one to observe the different pigments contained in a felt and the other to observe the amino acids contained in a solution.



Chromatography for separate pigment

Afterwards, we will visit the pesticide laboratory where we could see different machines such as HPLC and GC , and thus understand their

principle.



Chromatography of chlorophyll

Discovering Various Culture

<u>On August 4</u>, we went to a shopping center, a mall, in which we could find the major global brands as well as more local ones. We were positively surprised because there were only a few people contrary to what we had imagined of the mall.

<u>On August 6</u>, we went to NAHEP to exchange with the students of the college of agriculture around traditional dances. We were able to learn some basic movements of traditional Indian dances and taught them some French festive dances.

During the afternoon, students came to join us to do henna on our left hand, we all wrote on the side of our hand the #DEFIAA.



Henna time

<u>On August 7</u>, students came to join us at the Lambert Square Guest House to give us Kurtas and jewelry for the last day in their college. We were able to spend the day in traditional dress, during the morning we had a culinary exchange with the students and after the meal we were able to learn new dance steps again and practice those learned before. In the evening we went to Dr Kashyap's house to discuss with him, meet his family, and see the organization within an Indian house.



Girls with traditional Kurtas

<u>On August 8</u>, we changed College and took time for cultural exchange again, we were able to learn new dance steps, and we were also able to exchange around traditional or famous music in our respective countries.

We were able to discuss with the students who spent the evening with us (Khaba and Anubhav), around various card games, with the different variants of each country and region. <u>On August 10</u>, we participated in a culinary exchange around sweet dishes, from preparation to evaluation. For dinner, Dr. Kashyap and some students joined us (Khaba, Anubhav, Chaitanya and Ashish), and we ended the evening playing cards.

<u>On August 11</u>, after lunch, we gave our money to exchange to Dr. Premlata, which she brought back to us in rupees the same evening at NAHEP. Before dinner Anubhav taught us some yoga movements (to promote digestion, manage stress....), it was very pleasant, we really enjoyed it.

<u>August 13</u>, we are out all day at Nainital. We had breakfast on the road, and we stopped at a restaurant called "Nanak's Sweet". We arrived in Nainital at the end of the morning and were able to walk along the riverbank, take many photos, Dr Premlata and Khaba were with us. We went for a boat trip on the lake, visited the market (and bought some souvenirs) and visited the temple, with explanations from Dr Premalta. At noon we went to eat in a restaurant and had good food to taste. We left Nainital early because it started to rain and, in case of too much rain, the road could be closed. When we arrived at the University, we went to eat at Dr Archana Kushwaha, the Dean of Community Science College.



Trip in Nainital with Khaba and Premlata

<u>On August 14</u>, today was our last day in community science college. Two students who came to France joined us for lunch (Mansi and Atchala). At the end of the day, a nutrition student (Jyoti) offered each of us a self-made bookmark with little phrases of encouragement.

<u>On August 15</u>, for the 77th Independence Day of India, we went with Dr Kashyap and Dr Premlata at the Delhi Public School, where we attended the raising of the flag, the parade, many artistic performances (dances, acrobatics, yoga, singing...) and speeches. When we got back to University, some students (Khaba, Anubhav and Ashish) joined us ; they brought momos with them. Then, we went for a walk to the bookstore and to the graduation center. In the evening, we played card games.



Independence day in DPS

On August 16, for dinner Dr Pradja and her husband Mr Rohit Goswami came to eat with us and talk about India and France.

On August 19, due to the heat, the visits to the research centers were canceled so we went to NAHEP to watch a film. The only film available in French version in their stock was Kung Fu Panda 2, two of the French students hadn't seen it yet, it was a great discovery for them and good childhood memory for the others. Dr. Pradja explained to us that this projection room was used to sensitize students on various subjects through shorts and feature films. <u>On August 20</u>, in the afternoon, we went to the permanent market of the university with Charu and Yugal, we bought saree and kurta, dupatta, bracelets, spices and incense there.

Every day, we go to NAHEP to describe our days spent on the campus, in the diaries given by the university.



Committee room in NAHEP

3. LEARNING

- Be more patient
- Respect the elders
- Learn about local religions and traditions
- Be more social
- Hospitality
- Cooking skills
- 4. APPLICATION / UTILITY IN FRENCH CONTEXT

We will remember these words when we go back to France : excellence, consistent, memorable, joyfull, generous and humble. Those words are the base of Indian education and we learned a lot about this. We learn a lot of new techniques, like chromatography, making soya or potato milk, extruded snacks, new techniques of coagulation, InVitro culture and a lot of new knowledge.

We thank the DEFIAA program and all the representatives. Especially the deans, doctors and professors for allowing us to live this experience. This internship was a good opportunity to develop our skills and some new techniques that can be useful in France. During our stay, we had a lot of good moments of conviviality, some good meetings. Some strong friendships get created and the distance will not erase it.

Created by, BASQUIN Clémentine / DELGADO Cynthia / DESSEAUX Edouard / FLOTTES Nicolas / FROBERT Marie / FUJOL CAYROCHE Maïlys / GONZALEZ Brunissande / MOREIRA FERREIRA Lola.



- New ways of fermentations like the Idli
- Take time to make things right
- Rigor
- Have a better english
- Learned some words in Hindi