

# My Summer in China

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## MY BACKGROUND

I am Courtney Taglauer, daughter of Brian and Sherry Taglauer. I was born and raised on my family farm outside of Fairfield, Iowa. In May 2006, I graduated from Fairfield Christian School. I am currently attending Iowa State University, majoring in agriculture education and international agriculture.



I attended the Youth Institute in October 2005, with my agriculture teacher and FFA advisor, Mr. Wittrock, from Fairfield High School. From the start, I was interested in this program because I wanted an overseas internship. When I first found out about the World Food Prize, I knew little about the symposium. I really enjoyed attending it once I got there though. It was a great chance for me to meet other high school students from Iowa, and a few other states, plus a great chance to be able to interact with the 2005 interns. The symposium not only made me more excited about applying for the internship, but it also sparked my interest in world hunger and obesity, which was the topic of last year's symposium.

I have always wanted to travel abroad. My grandparents were missionaries to China, and I have always felt a longing in my heart to go there since I was very young. I was also interested in this internship through an agricultural perspective. Growing up on a farm, I love plants and animals. I

have always been interested in the way other people do things, so going to view another culture was something that I thought would be good for me. This internship will also be very valuable to me in my future career as an agriculture teacher.

## CHINA BACKGROUND

I spent my summer internship working at the China Agricultural University (CAU) in Beijing. More specifically, I worked in the College of Agronomy and Biotechnology, under the direction of Dr. Zhaohu Li. I was assigned to assist Jin Qing, who was a graduate student majoring in Plant Physiology.

China Agricultural University was founded in October 1905. CAU consists of 14 colleges. Approximately 14,000 undergraduate students and 3,000 graduate students attend CAU each year. CAU places a high significance on international exchange. Almost 300 foreigners visit CAU each year for conventions, trips, or teaching, and while I was at CAU, I was able to meet some



and conventions.

of these foreigners. Approximately 400 students and staff members of CAU take trips abroad each year. Dr. Li also travels quite frequently around China for visits

## MY EXPERIMENTS

Upon my arrival at CAU, I was asked to assist Jin Qing. She is studying for her master's degree and will be performing many experiments over the next two years dealing with the licorice plant. I knew little about the licorice plant, however, so the first thing I had to do was research about it.

The licorice plant is an important medical herb in China. It has been used since ancient times in treating ulcers and wounds. The main ingredient used from the licorice plant is glycyrrhizic acid which is found in the root of the plant. In the past, the main uses of the licorice plant were: as a demulcent, a medicine used for the treating of irritated skin or membranes; as an expectorant, a medicine used for treating coughs by stimulating the production of phlegm; and also as a laxative. Now in modern medicine, there are many more uses being discovered for the licorice plant. In more recent times, research done on the licorice plant for medical purposes has emphasized the use of flavonoids. Flavonoids are beneficial to the human diets, in that they act as an antioxidant. New research also shows that the licorice plant may also exhibit anti-inflammatory, anti-hepatotoxic, anti-bacterial, anti-viral, and anti-cancer effects. The licorice plant is also used in making licorice candy.

Prior to my arrival, Jin Qing had already performed many various experiments. Her experiment for the summer was to figure out a way to reduce the oxidative stress that is put on the licorice plant, in order to improve the growth of the plant. When water with a high salinity content is absorbed from the soil, it will leave behind salt deposits, which cause oxidative stress. Oxidative stress causes an increased production of reactive oxygen species (ROS), such as

superoxide radical, hydrogen peroxide, and hydroxyl radical. ROS can cause damage to the DNA, proteins, lipids, and chlorophyll of the plants.

Our hypothesis was that when the licorice plants were sprayed with abscisic acid (ABA) and salicylic acid (SA), the plants would increase their levels of superoxide dismutase, ascorbate peroxidase, glutathione reductase, and catalase as compared to the control group. We also hypothesized that ABA and SA would decrease the levels of hydrogen peroxide and lipid peroxidation over the control group. We hypothesized that the lower quantities of acid would be the most effective.

The first experiment we performed was to test the effects of the salicylic acid. The experiment started by growing the seedlings. Jin Qing had already planted them before I arrived in China. She grew the seedlings in pots of sand and vermiculite mixed in a 1:1 ratio. She grew 70-75 pots of seedlings, as we would need to have 60 pots to work with. The seeds took about one week to germinate. After they had germinated, she picked out the 60 pots that had the most seedlings and got rid of the left over pots.

After she had picked the 60 pots that we would use, she labeled the pots, randomly putting them in 12 groups with each group containing 5 pots. The 12 groups of seedlings were: CK, CK100, CK300, 0.05SACK, 0.05SACK100, 0.05SACK300, 0.5SACK, 0.5SACK100, 0.5SACK300, 5SACK, 5SACK100, and 5SACK300. CK was our control group. [The number preceding (i.e. 0.05, 0.5, and 5) stands for the concentration of the salicylic acid, and the number following (i.e. 100 and 300) stands for the concentration of salt in the soil.] We watered the plants a fixed amount weekly throughout the experiment.



When the seedlings were 3 weeks old, we counted the number of seedlings in each pot and thinned them down to 20. When the seedlings were 6 weeks old, we would water them with a salty solution, hence making the salt deposit from the water

to test with. We watered the seedlings with different amounts accordingly: the CK, 0.05SACK, 0.5SACK, and 5SACK received no salt; the CK100, 0.05 SACK100, 0.5SACK100, and 5SACK100 received a solution with 100mg of salt; and the CK300, 0.05SACK300, 0.5SACK300, and 5SACK 300 received a solution with 300 mg of salt solution. We watered them with the salt solution again, after 5 days.

When the seedlings were 8 weeks old, we would spray them once with the appropriate amount of salicylic acid. The CK, CK100, and CK300 received no salicylic acid; the 0.05SACK, 0.05SACK100, and 0.05SACK300 received 0.05mg of salicylic acid; the 0.5SACK, 0.5SACK100, and 0.5SACK300 received 0.5mg of salicylic acid; and the 5SACK, 5SACK100,



and 5SACK300 received 5mg of salicylic acid. Three days later, we repeated this process, and three days after that, we repeated the process again.

Four days after the last time we sprayed the plants, we began to take samples. We took the samples by first pulling out four seedlings from each of the



pots. We removed the root from each seedling and cut off 4 leaves from each seedling. We then cut the leaves into 2 pieces, keeping the leaves from each group separate.

The first experiment we performed was to test electrical conductivity of the seedlings. The electrical conductivity gives the leaf relative water content. Jin Qing weighed out the leaves and placed 0.3g of each sample into a test tube. We added a chemical solution to each test tube and placed the test tubes in boiling water for 15 minutes. We removed the tubes from the boiling water and placed them in a lukewarm water bath to cool them off. We poured half of the liquid from each test tube into a second set of test tubes. We tested each of the second set with a conductivity bridge to find out the electrical conductivity of each of the samples.



After this test, we had to collect more samples. We did this the same way we did for the previous experiment. However, this time we took all of the

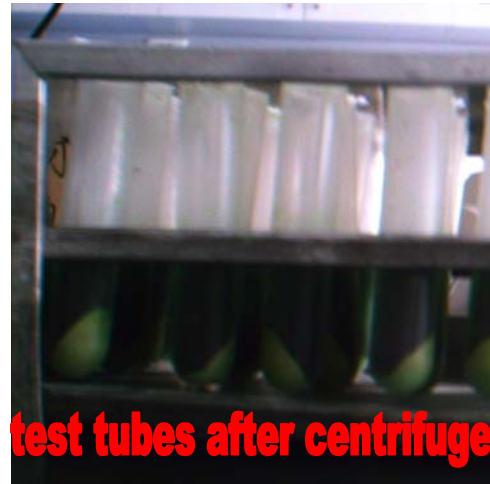
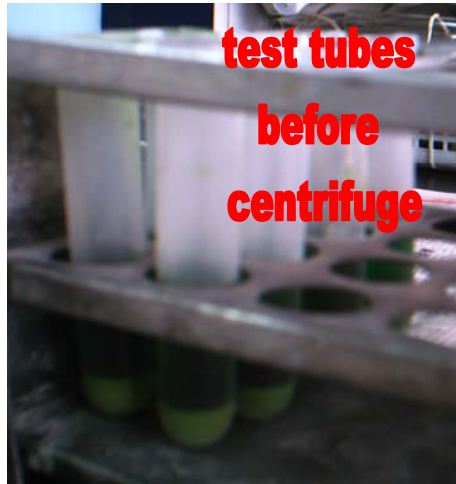


remaining samples from the pots. After I had cut them apart and Jin Qing had measured out the leaves and put them into bags, we put the bags in a tank with liquid nitrogen to preserve them until it was time to perform the tests.

The second set of tests was to test the level of hydrogen peroxide. In order to test the level of hydrogen peroxide, we crushed the samples with a small amount of silicon dioxide and 2mL of acetone. When the sample was crushed to a green liquid stage, we would dump the liquid into a test tube. We would rinse the bowl with 2mL of



acetone and dump the liquid into the test tube; and then, we would rinse the bowl with 1mL of acetone and dump the liquid into the test tube. When we had done this with all of the samples we were testing, we would weigh the test tubes and add silicon dioxide to them until they were equal in weight. We would place in the test tubes in the centrifuge for 20 minutes at 10,000 RPM. When the test tubes came out of the centrifuge, the liquid and solid had separated, and we would pour off the liquid into a second set of test tubes. We then poured the liquid from the test tubes individually into a square cup and tested the liquid with a spectrophotometer.



For the third set of experiments was to test for the enzyme activity. This test was very similar to the test we did for hydrogen peroxide content. We did this by taking the samples and crushing then with a small amount of silicon dioxide and 2mL of a mixture of equal parts of disodium hydrogen phosphate dodecahydrate ( $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ ) and sodium dihydrogen phosphate dehydrate ( $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ ). When the sample was crushed to a green liquid stage, we would dump the liquid into a test tube. We would rinse the bowl with 2mL of the mixture and dump the liquid into the test tube; and then, we would rinse the bowl with 1mL of the mixture and dump the liquid into the test tube. When we had done this with all of the samples we were testing, we would weigh the test tubes and add silicon dioxide to them until they were equal in weight. We would place in the test tubes in the centrifuge for 20 minutes at 10,000 RPM. When the test tubes came out of the centrifuge, the liquid and solid had separated, and we would pour off the liquid into a second set of test tubes. We then poured the

liquid from the test tubes individually into a square cup and tested the liquid with a spectrophotometer.

If this experiment works as planned, it should increase the enzyme activity in the plant and decrease the stress caused by salt, which will be reflected in that there is an increase of chlorophyll, water content, and leaf area in the plant as compared to the control plants. The abscisic acid and salicylic acid should decrease the amount of hydrogen peroxide and lipid peroxidation in the plant over the amount found in the control plants. The lower concentrations of abscisic and salicylic acids should be the most beneficial. I do not know the specific outcome of this test though because in order to do so, we had to test two sets of plants after treating them separately with salicylic acid and abscisic acid. About three weeks after I arrived in China, Jin Qing and I planted the seedlings to test with the abscisic acid. We did this the same way that she had planted the earlier seeds. We also cared for them and watered them in the same way. They grew, and we added the sulfuric acid to them, just as we did the seedlings that we were treating with the salicylic acid. They ended up being infested by small, white bugs though and died. Jin Qing was going to regrow them and test them after I had returned. She was not going to figure the results until then. However, the plants that I was able to test seemed to follow our hypothesis.

## **EXPERIENCES**

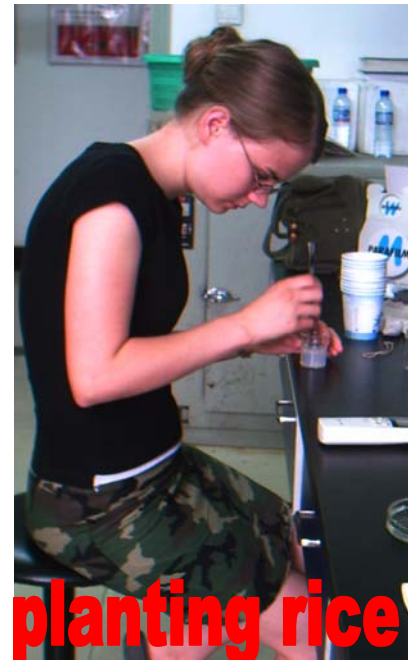
Going to China was a very special thing for me because not many people in my community get to travel abroad frequently or for extended periods of time, especially not as far away as China. While I was in China, I got to

experience many things that I had not experienced before and will possibly not experience for a long time, if ever again. My trip to China was my first plane ride. China was the first country I had ever been to outside of the U.S. While I was there, I got to experience my first subway and taxi rides. I definitely got to try many new foods! In the U.S., I was a very picky eater, but being in China made me keep an open mind about new foods and allowed me an opportunity to try new foods that I otherwise probably would not have.



I never had the opportunity to work in a lab before I went to China. My high school was very small, so we did not even get to do experiments there. My first few weeks in the lab at CAU were pretty overwhelming, because I did not even have a basic

knowledge of lab procedures. I caught on quickly though, and my experience in China is helping me now with my labs at Iowa State. Besides working on my experiments with Jin Qing, I also helped other students grow bacteria and grow rice in agar.



Most mornings, I would meet Jin Qing in the lab at 8:00. We would spend until noon working in the lab or the greenhouses. Some days we were working on our experiments, and other times we would just do general lab work or assist

other students. We would usually eat lunch in the dining hall. After lunch, we would all go back to our dorms or apartments to rest until 2:00 or 3:00. We would return to the lab to work until 5:00. We would go to the dining hall for supper. Afterwards, we would sometimes work more in the lab or just hang out talking. Every Tuesday and Thursday night, I went to my professor's house to give his six-year-old daughter English lessons. I also helped many of the CAU students with speaking English and with some of their English papers and presentations. If we

would run out of things to do during the day, the students would start asking me lots of questions about the English language and grammar.



The weekends were when I was able to do most of my sight-seeing; however, if I was not sight-seeing, I would just spend the weekend working in the lab. In Beijing, I was able to see the Great Wall, the Ming Tombs, the Forbidden City, the zoo, the Summer Palace, the Temple of Heaven, Tiananmen Square, the China Nationalities Museum, and Beihai Park.

During the week of the Fourth of July, I was given the opportunity with Deepa Joshi, the World Food Prize Intern to Peking University, and her professor, Dr. Kong, to travel by train to Xian in the Shaanxi province, home of the world-famous Terra Cotta Soldiers. Besides seeing the soldiers, I was also able to see the Shaanxi museum, the Wild Goose Pagoda, the Hot Springs, several famous

towers, and a dinner show with traditional Chinese dancers and instrumentalists. I was also able to go tea-tasting while I was in Xian. This was a very interesting experience for me. Xian was the old capital of China for many years, during many of the dynasties. Seeing these things helped me to understand the Chinese culture much better.

China has many cultural traditions that are very different from the U.S. Every afternoon, we would nap after lunch. At first I was not used to this, but I grew to like it very quickly. Because China was so different from the U.S. and I was in so many different situations and doing so many different things, I was very tired at first in China. There is also a 13 hour time difference from our time here in Iowa.

In the lab, we often had difficulties with the electricity. Sometimes it would go out two or three times a day. This made it very difficult when we were trying to do our experiments and very frustrating as well. When it would go out, we would all just sit around until the electricity would come back on.

The language barrier was very difficult for me at first. It was hard to get used to everybody around speaking a different language and trying to guess what was going on around me. The language barrier also made me gain much more patience. I had to be paying attention to people all the time when they were talking to me, and I had to listen very intently to try to understand what I was supposed to be doing. Some of the students tried to teach me a little Chinese, but of course, it is very difficult. They gave me the Chinese name *NiNi*. 妮妮 (Ni Ni) I started to get very confused when they used my Chinese name, but eventually I got used to it. They had a lot of fun getting me to try to

talk to taxi drivers in Chinese. It was also fun to see the reactions on Chinese people's faces when they would hear me greet them in Chinese.

## **REFLECTIONS**

Before my trip to China, I had never been on an airplane before, and I was very scared to do so! Traveling to China helped me to overcome this fear. I have always been and still am very close to my family. Even though it was hard for me to leave them, this internship helped me to become more independent and taught me to do things for myself and not to always rely on my family when something goes wrong or I need help.

Being in China helped me to appreciate more the things that I have at home, especially my freedom. At home, I was used to having a car and being able to go wherever I needed to whenever. Transportation in China was slow. Not many people there own cars, so whenever I was traveling with the students, we would have to go by taxi, subway, or bus. The roads were always crammed with traffic, something that I was not used to either.

I have always lived in a rural community, so living in Beijing was very different for me. Beijing has a population of 14,930,000 people, as compared to New York City, which has 8,104,079 people. It took me a long time to get used to seeing so many people, and I think I still was not comfortable with it after two months. China really made me appreciate living on a farm.

While life is very different in China, it is also very similar to life at home. The people there are just like the people here. They are trying to do the best they can to get good jobs and provide for their families the best that they can. Since I have never lived in a town before nor have I been to a very large city in the

U.S., I cannot say for sure, but I imagine that Beijing is very similar to a large city in the U.S.

While I was in China, everyone was very eager to speak with me in English, even though it was their second language. They never once were mad at me for not knowing Chinese. I think that in America we tend to center ourselves and think that everyone who comes to our country needs to be able to speak our language, and we are not so eager to use theirs. As time goes on, the world is going to become more globalized. People are going to need to start thinking outside of their town, state, and nation, and start looking at what is going on all over the world. I think that in time America could fall behind as a country if we keep focusing on ourselves. I think that high schools in America should have tighter restrictions that require students to learn a foreign language. In China and many other countries, students are required to learn English for many years in school. The students in China told me that they really did not enjoy learning English, but that it has been very beneficial to them. Some of the students who did not care to take the time to learn English very well in school were very sad, because they had no way to communicate with me and the other students could.

Going to China definitely left its mark on my life. While sometimes it was a struggle and I would think to myself, "Why am I here?" it was definitely an experience I will not forget anytime soon. I am now not scared to travel abroad. I am going to try to pursue a secondary major at Iowa State in International Agriculture. I am also currently looking at studying abroad next year.



Looking at the poverty in China made me very thankful for the background that I came from. It made me think more about others than myself. Life is too short to just live for yourself when there are people in the world who cannot even survive.

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**Forbidden City**



**dinner party at CAU**



**Terra Cotta  
Soldiers in Xian**



**silk street  
in Xian**

