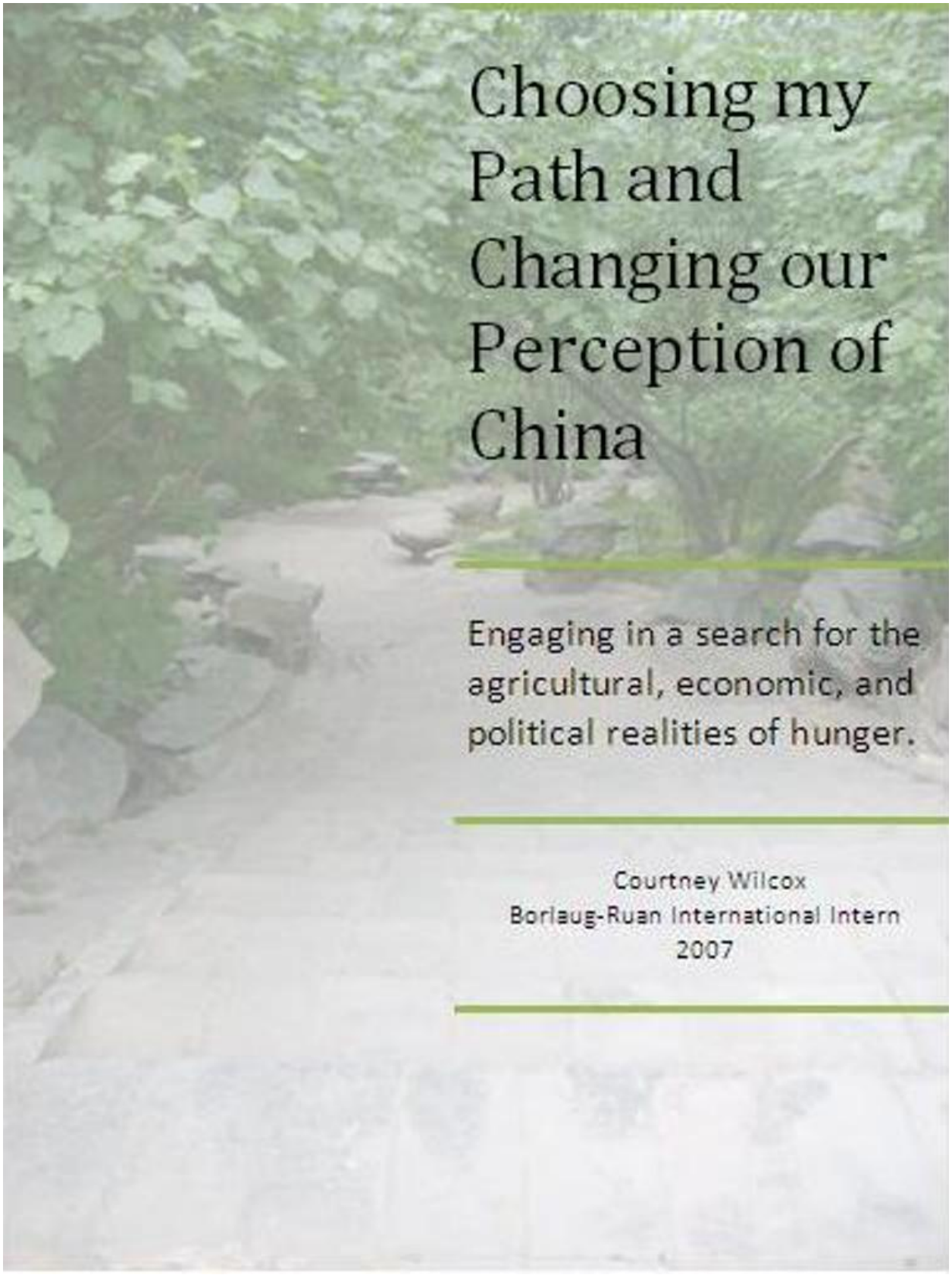

Choosing my Path and Changing our Perception of China

Engaging in a search for the agricultural, economic, and political realities of hunger.

Courtney Wilcox
Borlaug-Ruan International Intern
2007

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Acknowledgements

I would like to thank **Mrs. Cindy Garlock** for introducing me to the hard-to-face fact that there are individuals across this world, indeed millions, who do not have nearly enough to eat. Thanks, too, to **Mrs. Donna Young**, for attending the World Food Prize Symposium with me in 2005 and 2006.

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Ambassador Kenneth Quinn is a man of many hats and I thank him for making himself available to us. I thank the **Ruan Family**, for their understanding of a youth's need to see the world, to jump right into the thick of the struggle to fight hunger; their support has allowed me to see and do amazing things in my short nineteen years.

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Thank you to **Dr. Huang** and his family for ensuring that I had the time of my life in Beijing. To **Dr. Zhang** and my dear **Teacher Chen**, ayi, thank you; I sincerely hope that you will be my teachers for a long time to come. **Xiao Hu**, **Li Fang**, **Li Zuofu**, **Li Ang**, **Wan Li Yin**, **Wan Yo Hua**, **Dr. Tian Yun**, and **Dr."Julie,"** and **Wang Juan,** your friendship will always be precious to me. To all of the students I had the opportunity to know and love at CAAS—I thank you.

Dongfang Pan and **Flora Wang** were irreplaceable resources in my pursuit to explore Chinese culture. I thank them wholeheartedly for allowing me to spend time with their children, who added a richness to my summer in Beijing that can never be replicated.

Thank you to the staff of CAAS, from the security guards to the professors, who were happy to return a big "Ni Hao, hello!" every morning. To the girls who worked on my floor, thank you for paying me countless kindnesses and for communicating with me when, as I like to put it, words wouldn't do our friendship justice.

I give a big thank you and congratulations to my fellow Borlaug-Ruan International Interns, both past and present. We did it!

I'd like to give a tremendous thank you to **Dr. Norman Borlaug**, whose work has inspired us all to seek to do incredible things for our fellow man. Having met him for the first time as a

sophomore in high school, I knew I had to join in his pursuit. I am grateful to you for allowing me to do so.

To my parents, **Chris** and **Kandi Wilcox**—thank you for trusting me to stand on my own two feet—in Beijing! To my twin brother, **Clayton**, thank you for letting me celebrate our birthday in China. To **Carter**, thank you for giving me hugs whenever I needed them before "the big trip." To my grandparents **Herold** and **Betty**, thank you for your unfaltering encouragement and interest in everything I do. To my Grandmother **Anita** and **Catherine** and **Carmen**—thank you for teaching me to love my heritage and appreciate diversity no matter where I find it. I am so lucky to have you for a family.

Introduction

There exists an ancient Chinese tale of a woman on her wedding day. She is said to have been beautiful beyond comparison. She wore all of her wealth in her exquisite clothing and fine jewelry; it was in this way that her marriage would unite the riches of both her father and her betrothed. While traveling to her ceremony, she saw a woman walking down the path before her. The woman was destitute, having married a poor man and relying on no prospects of her own. The sight of true helplessness broke the bride's heart. Sensing that with a little encouragement the poor woman could lift herself out of poverty, the beauty gave the ornaments that decorated her gown away. She continued to her ceremony with a light heart and determined pace, and was married as planned.

What was not planned, however, was that a flood came a few years later. The wealthy woman was forced to flee and leave all of her belongings behind. She wandered through town after town until she was hired as a maid for a well-to-do family. She lived at this residence for some time. There, she cooked, cleaned, did all of the things she had never done for herself. One day, after having become close friends with the mistress of the house, she realized that the woman who employed her was none other than the woman she had helped so many years ago. The women celebrated and grew in their friendship for one another from that point on.

Shirley, as her mother called her in my presence, was eight and a half years old. When she smiled her whole face lit up, causing all those around her to feel all the more delighted to be near. We set in on our first English lesson together. I told her about "Mei guo," which directly translates to "Beautiful Land." I showed her pictures of Iowa and my hometown of Cedar Rapids. I explained why I was in Beijing, and that I was helping the World Food Prize Foundation to accomplish the goal of ending world hunger. She became animated and, using her mother as a quasi-interpreter, she told me a story.

While walking with her mother one day she came across a beggar—a boy close to her age. As best she and her mother could tell, the boy had a blood-related disease. Shirley was upset that a boy so young should be living in the street. He didn't have enough to eat, she thought. She asked her Mom to give him some money. Her mother said that Shirley had learned the importance of helping others. It is a deeply ingrained part of Chinese culture—to share with those around you. This has as much to do with the relatively recent institution of Communism, I believe, as it does with the ancient stories that have defined Chinese history and have been passed down throughout generations.

The founders of The World Food Prize Foundation, those that attend the annual symposium, and members of the Youth Institute understand the moral behind the story of the beautiful woman's

plight. They can relate to the grief Shirley felt when she saw the boy on the street. This ability to empathize is the gift we've been given by men like Doctor Norman Borlaug, by the Ruan Family, and by countless others who have instilled and catered to the ambition to put an end to corrupted food security throughout the world. We know that by helping even one individual to better himself, an entire family, community, country, and world will benefit.

I attended the World Food Prize's Youth Institute as a high school junior, having written a research paper about the prevalence of malnutrition in Somalia. A few months later, I moved to Washington DC where I made friends with many students from Ethiopia—a neighbor to the country I thought I knew so much about. They taught me more than I could have ever known about the realities in Somalia and in their homeland. Through stories of their childhoods in East Africa, I learned that, while many people are poor, hungry, and currently unable to escape the cycle of poverty-induced hunger, they are not unhappy. People are people, no matter where they are. We make the most of what we have, no matter how limited our incomes and resources may be. I got a face-to-face education with this concept as I explored Beijing, China.

My internship experience on the other side of the world cemented my desire to spread an understanding of the essential link between the agricultural sciences and the betterment of mankind. It elevated my passion for helping others to help themselves. Most importantly though, it taught me what to *do* with my passion. As a nineteen-year-old, I took the first steps in what will be a lifetime committed to furthering Doctor Norman Borlaug's mission to elevate global food security.

Beijing's Crucial Role in Elevating Food Security

Upon explaining the purpose of my internship to my acquaintances in China, a common reaction was, "Beijing has few hungry people. Rural China has more poverty." I found this to be true. In fact, during the two months that I was working in Beijing, the need for tightened food security in the Chinese countryside was put into context through two major agricultural crises that damaged the agricultural integrity of the Jiangsu and Henan provinces **(Kahn)**. Flooding and mice infestation forced widespread evacuations of once productive agricultural regions. Northern provinces in China were subject to drought conditions, which affected the agricultural sector throughout the month of June **(Reuters)**.

Through updates from home, where access to information is relatively immediate, and an English news channel I was able to access, stories of this nature prompted me to learn as much as I could about the barriers China faces in promoting adequate food security throughout the country. With a population more than 1 billion **(CIA)**, such a mission is a task beyond tasks. The relevance of my internship to solving current problems was highly motivating; my lab mates and I were having a direct effect on raising the agricultural capabilities, and thus the quality of life, of the Chinese people.

As the cultural and political capitol of China, Beijing has the resources to further Dr. Norman Borlaug's dream of ending world hunger, and it has an academic community that works to this end. However, as the reaction to the explanation of my internship demonstrates, few people are aware of these facts. Beijing does tremendous things on the front of fighting hunger, and if more Beijingers were aware of what their city does for the rest of the country, their capacity to help could be expanded in incredible ways. I've come to the conclusion that hunger needs to be *seen* in order to be *felt* by those who have enough food. A greater awareness of the problems faced throughout all of China is necessary in order for the work in Beijing to be effective.

China's former head of the State Food and Drug Administration, Xiaoyu Zheng, was executed on July 10th of 2007, a day before I celebrated my nineteeth birthday. He had taken bribes from pharmaceutical companies. In many cases these medicines harmed individuals, and even caused fatalities **(Barboza)**. The government put this official to death in the hope of increasing food security; however, with recent reports of tainted dog food and dangerous toothpaste crossing the US borders, the Chinese government must do more to improve food security.

In the largest sense, promoting food security involves agricultural, economic, and political questions. How can we increase crop yields at an affordable cost? What agrarian parameters exist within specific provinces? What collective steps can be taken in order to circumvent these limitations? How is resource inequality preventable? With the help of supportive international organizations like The World Food Prize Foundation, Beijing can hope to have these questions answered. Contributing to and thus encouraging CAAS' development is one area where the government is improving food security in a lasting way.

The mission of CAAS to improve food security necessitates greenery in the world's largest city

The Chinese Academy of Agricultural Sciences

I was afforded the incredible opportunity to work at The Chinese Academy of Agricultural Sciences (CAAS) in the Research Institute of Biotechnology (BRI) under the direction of Doctor Huang and Doctor Zhang. There, I became familiar with not only my own project concerning the interaction of hormones ethylene and abscisic acid, but also the work of other students. Throughout the summer of 2007, I was inspired by the interconnectivity of all of my coworkers' projects. The need to solve problems in agriculture transcended the language barrier we sometimes came across. My colleagues, advanced in their schooling and very skilled in the lab, taught me why my research was relevant to furthering their work. I felt depended upon; responsible not only to my lab mates, to Dr. Huang and Doctor Zhang, but to The World Food Prize and to people that are struggling to put food on the table throughout the world. This responsibility, I suppose most of which was self-imposed, was not a burden. It was what motivated me to learn something new and to do my best to contribute to the academic excellence of CAAS each and every day.

The Biotechnology Research Institute of CAAS

This facility housed top of the line equipment. Most of which was so new that I had little or no familiarity with it. The Biotechnology Research Institute at CAAS has been committed to exploring new agricultural avenues for over twenty years **(Research Fields)**.The leadership of BRI is highly accessible, lending to the efficiency and structured character of the programs it promotes. My first week at the center, in fact, as I was heading to lunch with one of my lab mates, a man who I later found out was a higher-up in the BRI Administration said "You seem very happy." I said, "I am very happy! Happy to be here. Are you having a good day?" He smiled a half-smile and nodded.

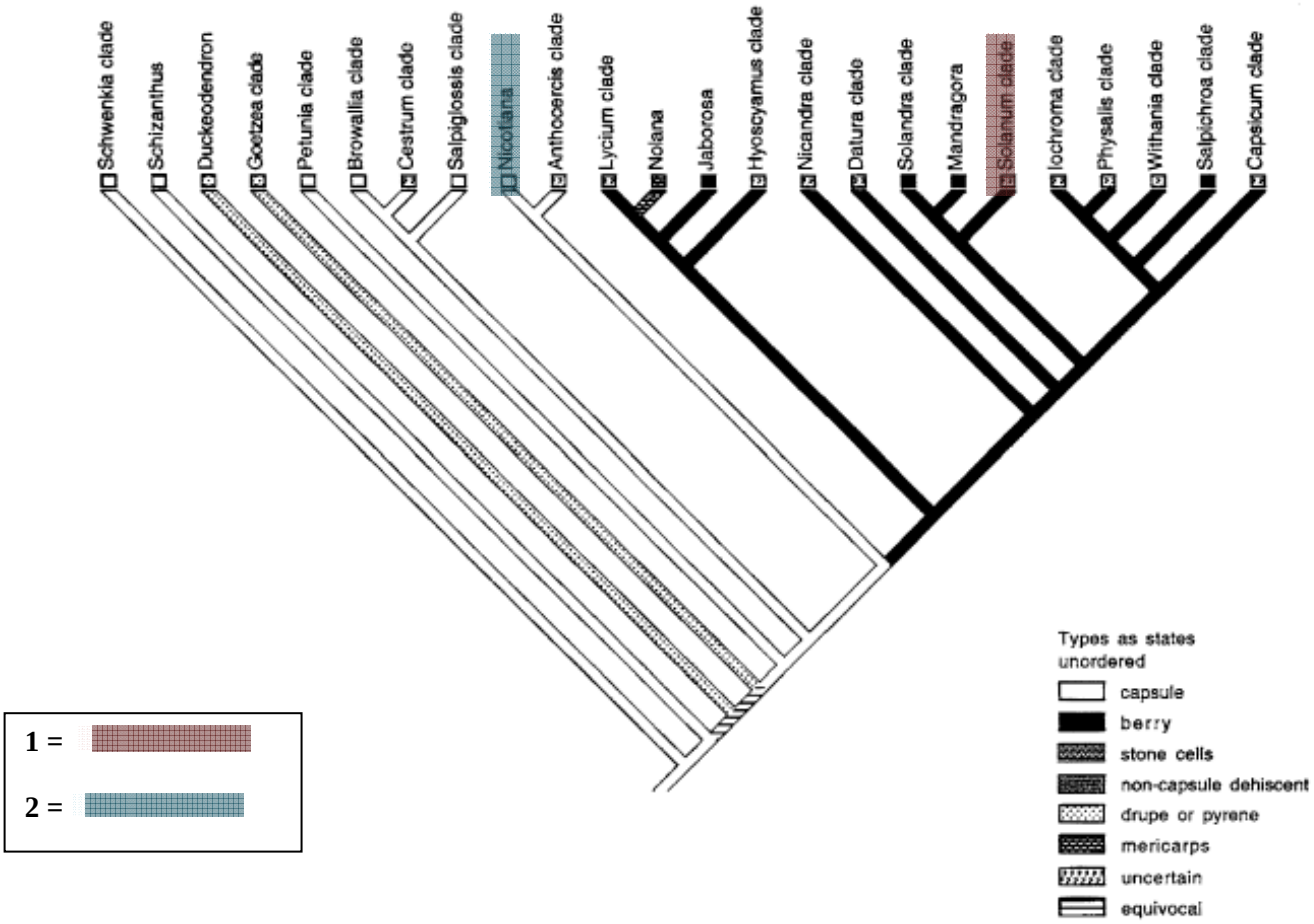
Promoting fields which concern everything from plant nutrition to environmental protection, BRI continues to expand its research fields in ways that benefit the global agrobiological community. It was an honor to work at such a magnificent facility with individuals who, I am convinced, are some of the world's brightest professors and students.

Yancao Meng Fa: Why tobacco?

"Tobacco Germination"

As a young woman who has spent most of her life in one of the most productive agricultural states in the country, I envisioned that only research concerning crops that directly fed people could have implications concerning food security. At the WFP's Youth Institutes in both 2005 and 2006, I learned that this was not necessarily the case. Still, after having been briefed on my experiment design, I wondered how tobacco related to The World Food Prize Foundation's goal to alleviate hunger.

The tobacco plant, among many of its species, has several key physiological and structural characteristics in common with plants that produce agricultural products. Both tobacco1 and the tomato2 are members of the Solanaceae family **(Knapp)**. Additionally, because it is a readily available organism, tobacco was a cost effective material with which to complete my experiment.



Fruit type classification relative to molecular phylogenic map of the Solanaceae family, which contains tobacco and tomato specie (Knapp, 2002)

Abscisic Acid inhibits Ethylene-induced processes for transgenic variety of tobacco coded for over expression of TSRF1

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Abstract
Hormones abscisic acid and ethylene interact to promote seed germination. Through this experiment design, the interaction between the two hormones was examined. The results yielded the conclusion that the absence of abscisic acid does not influence the efficacy of ethylene for transgenic varieties of plants that are coded for the over-expression of TSRF1, as was evidenced by normal germination rates amongst transgenic plants exposed to an abscisic acid inhibitor. These conclusions suggest that transgenic varieties of plants that already have an intensified response to ethylene do not need ABA to promote ethylene production in order to germinate at a normal rate. Furthermore, it can be concluded that ethylene and abscisic acid are not dependent on one another in their respective roles concerning the promotion of seed germination.

Keywords Ethylene, ABA, TSRF1, ERF Protein, germination

Abbreviations ABA: Abscisic acid – ERF: Ethylene Response Factor

Introduction

Ethylene and Abscisic Acid (ABA) are two hormones that regulate a plant's ability to resist pathogens, promote seed germination and plant development, and elevate tolerance to a number of other abiotic stresses. Understanding how these two hormones interact with one another throughout a lifecycle is an essential step in recognizing how several phases in plant development are facilitated.

Working with three lines of tobacco, two transgenic and one wild type, the relationship between ethylene and ABA will be better defined. Characterizing this relationship and taking the necessary steps to make use of this new knowledge will have implications concerning the betterment of food security by way of enhancing the germinability of a wide variety of seeds, thus potentially increasing crop yields for many agricultural production centers.

Different environmental factors such as poor soil quality, inadequate rainfall, extreme temperatures, and elevated salinity can hinder a seed's ability to germinate. These problems can be countered from a biotechnological standpoint. Elevating the efficacy the relationship between hormones ethylene and ABA can potentially promote germination despite adverse growing conditions. In order to begin experimentation concerning the manipulation of the interaction between these two hormones, the relationship that exists must first be better understood.

As an Ethylene Response Factor (ERF) protein, TSRF1 mediates ethylene-induced changes in gene expression (McGrath et al. 2005, Zhang et al. 2004). In this experiment design, the germination rate of seeds under different ethylene and abscisic acid inhibitors was observed to note the presence of TSRF1

Previous work with this topic has lead researchers to conclude that both ABA and Ethylene are vital to plant maturation, from the germination stage to seedling development (Zhang et al. 2004). With this understanding, it can be determined that the seeds subjected to inhibitors of either of these hormones' acceptors or synthesizing elements will not germinate or not germinate as readily as those seeds that are grown under control conditions.

The role of abscisic acid is to encourage ethylene production during the germination phase (Cracker et al. 1969). Ethylene, in turn, prompts all of the plant responses noted above.

Previous experiments concerning hyponastic growth of a model plant indicate that, largely due to ABA, ethylene can be over effective, initiating unwanted growth patterns (Benschop et al. 2006).

This experiment is to be followed with an observation of ethylene and ABA inhibited seedlings. From those proceedings more will be elucidated about the relationship between the two hormones.

Materials and Methods

Plant Material and Growth Conditions

Approximately 50 seeds of the wild type variety, 50 of the transgenic line 3-1, and 50 of the transgenic line 3-2 were placed in each of twenty dishes. Transgenic lines 3-1 and 3-2 are coded for the over expression of the TSRF1 gene, the 3-2 variety being most sensitive to ethylene. Using these two varieties was imperative to maintaining the integrity of the experiment design, as previous experiments concerning the analysis of the role of TSRF1 made use of these lines specifically. All seeds were grown at 24ºC, under continuous light.

Seed, Filter, and Plate Sterilization

To prevent the growth of bacteria, the seeds of the three lines of plants, wild type, 3-1, and 3-2, were sterilized through a number of steps. First, each variety of seed was given solar treatment for twenty-four hours, each variety separated from the others, then the seeds were rinsed in 15 % NaClO for 7m. After a short interval, the seeds were doused in 75 % ethanol for 1m. Subsequently the seeds were rinsed in double-distilled water three times or more to ensure that the germination rates would not be affected by the ethanol treatment.

The plates and filter paper were sterilized using heat treatment; each was placed in 121ºC heat for 20 min.

Preparation of Ethylene inhibitors. ABA inhibitors and control

To prepare the chemicals which are known to inhibit ethylene synthesis, at a concentration of 100 M, 1ml of CoCl2 was measured into each of three dishes, over two sheets of sterilized filter paper. The same action was taken with a 5M concentration of AgNO3. The same steps were taken for ABA inhibitor Na3WSO4, with a concentration of 5M. Mixtures of the same concentrations of Na3WSO4 and AgNO3, as well as a combination of Na3WSO4 and CoCl2, both of which inhibit the functions of ABA and ethylene, were applied to the dishes in the same way. Five dishes of double distilled water were also prepared in this way.

Results

A $CoCl_2$

Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	4.895105	4.511278	2.290076
2	6.293706	5.263158	6.870229
3	9.090909	6.766917	12.9771
4	13.28671	9.774436	16.03053
5	15.38462	11.2782	17.55725
6	20.97902	15.78947	24.42748
7	32.16783	16.54135	29.00763

B $AgNO_3$

Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	3.870968	4.109589	9.243697
2	12.90323	8.90411	15.96639
3	21.93548	15.06849	23.52941
4	27.74194	26.71233	34.45378
5	32.25806	35.61644	43.69748
6	38.06452	43.83562	52.94118
7	45.16129	54.10959	53.78151

C Na_3WSO_4

Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	18.79195	12.65823	26.47059
2	31.54362	21.51899	36.76471
3	33.55705	25.94937	42.64706
4	38.25503	32.91139	44.85294
5	41.61074	35.44304	49.26471
6	50.33557	44.93671	61.02941
7	51.00671	51.26582	68.38235

D Na_3WSO_4 + $AgNO_3$

Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	0	0.70922	1.492537
2	2.142857	2.836879	4.477612
3	7.142857	4.964539	10.44776
4	18.57143	12.76596	28.35821
5	23.57143	14.89362	35.8209
6	28.57143	17.02128	36.56716
7	29.28571	20.56738	38.80597

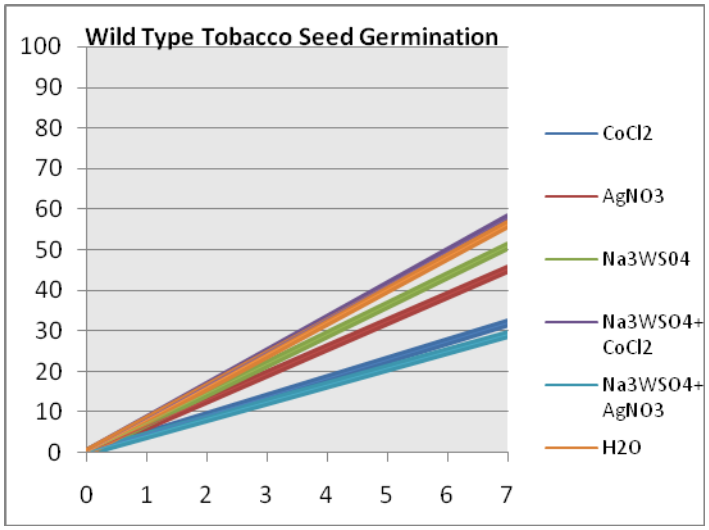
Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	12.85714	10.56338	21.67832
2	22.14286	15.49296	27.97203
3	26.42857	17.60563	30.76923
4	35.71429	19.71831	34.26573
5	40.71429	23.94366	38.46154
6	49.28571	31.69014	41.25874
7	57.85714	39.43662	46.15385

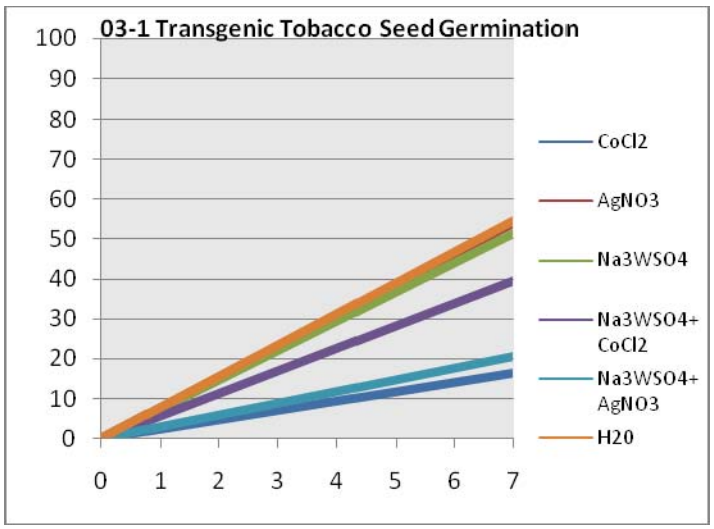
E Na3WSO4+$CoCl_2$

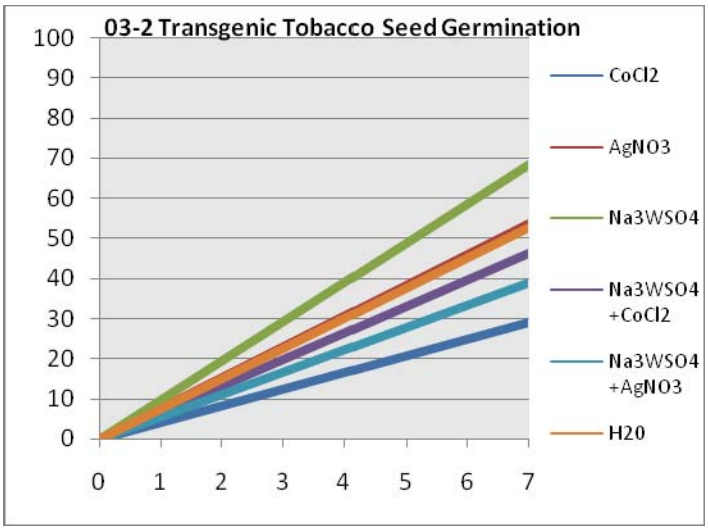
Day	Seed Type		
	Wild	03-1	03-2
0	0	0	0
1	7.826087	10.16949	7.346939
2	13.04348	15.25424	13.06122
3	20.86957	20.76271	17.55102
4	30.43478	29.23729	27.7551
5	39.13043	37.28814	36.73469
6	48.26087	44.49153	42.85714
7	56.52174	54.66102	52.65306

F Double Distilled H2O

Figure 1. Percentage of seeds germinated for wild, 3-1 transgenic, and 3-2 transgenic varieties of tobacco under ethylene synthesis inhibitor (1A, 1B), ABA inhibitor (1C), inhibitors of both ABA and ethylene (1D, 1E), and germination rates for seeds of three types under control conditions (1F).




03-1 Transgenic Tobacco Seed Germination
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7
CoCl2
AgNO3
Na3WSO4
Na3WSO4+ CoCl2
Na3WSO4+ AgNO3
H20


03-2 Transgenic Tobacco Seed Germination
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7
CoCl2
AgNO3
Na3WSO4
Na3WSO4 +CoCl2
Na3WSO4 +AgNO3
H20

Discussion

The ABA inhibited transgenic variety 3-2 of tobacco germinated at a higher rate than the transgenic variety 3-2 under control conditions. This suggests that the over expression of TSRF1 increased seed sensitivity to ethylene; higher levels of ethylene, induced by ABA, prevented normal plant growth. In summary, ABA rendered ethylene detrimental to the growth of the highly ethylene-sensitive transgenic variety.

Further trials are needed to prove this conclusion's applicability to other types of plants. This knowledge could potentially change agricultural approaches in areas that are concerned with increasing the germinability of seeds.

Acknowledgments

I am grateful to Dr. Zhang and Dr. Huang for their invaluable insight concerning every point of this experiment. I also thank Mrs. Cindy Garlock and Mrs. Heidi Andre for their support.

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Negotiating the Cultural Divide

In preparation for what would be the most educational, challenging, and incredible two months of my life I read as much as I could about the Chinese culture. With thousands of years of history to catch up on, becoming learned on the subject in a matter of a few weeks was a lost cause. I did learn, though, that some behaviorisms of citizens in modern day Beijing are, despite an increasingly globalized society, as strikingly different from those of my hometown as they were thousands of years ago. What was almost unbelievable to find, however, was how much I could relate to my Chinese friends and how much can be communicated when two people do not have the comfort of a shared culture.

In a matter of three days I knew that I could call my lab mates friends. Before I left home I had thought there would be certain "Americanisms" I had to get rid of, and quickly. I had read that American girls were watched very closely by the Chinese government, which, my book said, positioned armed guards at every corner. The author wrote that American women are seen as too open to the rest of the world. This news worried me; I was preoccupied with the thought that my outgoingness would be misinterpreted as obnoxiousness.

Thankfully, my book turned out to be a highly unreliable source of information. I found that it was fine to wave at perfect strangers, employ my newly-learned Mandarin at every corner, and make small talk with anyone I met in the elevator. At first, those on my floor in BRI would merely nod their head in my direction at one of these inquiries for conversation. In a couple of weeks, however, everyone including students, professors, guards, and other staff had warmed up to me. It was in this way that walking the hallways at BRI became the best and easiest way to make friends.

The students and staff at CAAS taught me how to use lab equipment, how to speak Mandarin, how to prepare traditional dishes, and most importantly how to laugh freely!

Teaching English: Learning More than Language Can Express

When I arrived at the Chinese Academy of Agricultural Sciences in early June of 2007, I was thrilled to find a great number of children always on campus; walking with their parents, toting their backpacks home from school, or grabbing some ice cream before they ran to play in Beijing's ever-present summer sun. After familiarizing myself with the CAAS layout, I discovered the primary school associated with the Academy. Taking a walk during my two and a half hour lunch break each day, I would pass the little building where kids were enjoying recess. Missing my seven-year-old brother, and enjoying the interactions with children I had already had, I asked Ms. Pan if I could somehow become involved with observing or teaching the children. Within two weeks, she put me in touch with Mrs. Flora Wang.

Flora, who became a great friend of mine, teaches English to middle-school aged children. I remember approaching the West Gate of the Wan Quan Hu Chou Nan Middle School for the first time, unsure of how I'd be received by the students and not entirely certain of what my role would be within the classroom. Upon meeting the students, I immediately understood that this endeavor was the most rewarding task I could have possibly undertaken with my free time in Beijing.

A Student's Student

It was an unforgettable experience to meet the bright students in Flora's classroom. There, I got an education in lessons of humanity; the impression I got from the students has led me to believe that there are universal traits that define a middle-school aged student's interactions. I can only relate the evidence of this conclusion through example: when I stepped into the classroom that afternoon, any shuffling of papers or quiet chatting was put to a halt. Smiling my biggest smile, I wondered what was so imposing about me that should provoke such a reaction; Flora summed it up for me. "The boys will be shy," she said. I had learned so far that, in Beijing, my blue eyes and large nose were cause for notice. I was tickled by this thought when I considered that those features are not uncommon in the United States.

Flora announced that I was there to answer any of their questions about America. I took a seat at a desk in the front corner of the room. No sooner had I taken a notebook and pencil out of my purse, when a boy motioned for me to stand and introduce myself. I was fine with doing the talking at first—I pondered what they'd want to know most anxiously, how they felt their experiences differed from mine growing up, and what their impressions were of my homeland.

I told them my name, described where Iowa is on a map; an explanation that I live half way in between California and New York sufficed. I told them that I was only a few years older than them so they didn't have to worry about what kind of questions to ask me. Relief washed over them when they realized I wasn't an authority figure to answer to—I was, and continue to be, a friend.

Over time, students got up the courage to ask questions. One that I'll never forget was, "Do you speak that slowly in your hometown? I think you *must* speak quicker." I replied, with a rapid speech that I was not accustomed to using in Beijing, "Yes, in-America-I-speak-much-quicker-but here-I-prefer-to-speak-slowly-so-that-everyone-can-understand-me." The students laughed when I suggested that teenage girls throughout the world speak quicker than average.

Not only did Flora invite me to interact with her students, but after a couple of weeks she invited me to her home. I met her daughter, Shirley, who became like a little sister to me throughout the summer.

Kids will be Kids

It was within an hour of meeting her for the first time that I learned Shirley's father was a party member. Shirley proudly showed me a toy that he had bought her in celebration of the anniversary of the advent of Communism in China. As we tried to communicate, with a lot of miming and speaking slowly at first, I wondered how different her life must be from my little brother's. They are the same age, she and Carter, but I imagined that was about all they had in common. I couldn't have been more wrong.

Lydia, Shirley and me aking a break from our English lesson to play outside

Shirley and I spent every succeeding weekend together. I met her father at the bus stop on the day of our second lesson. American history has given the world "Communist" a bad connotation, but I found that politics and how we perceive China has nothing to do with the shaping of a family. Mr. Wang is just as close with his daughter as my father is with me, in spite of the fact that the two men have completely opposing philosophical and political ideologies.

Each weekend another student would join in on our English lessons. It was in this way that I came to meet several of Shirley's friends and classmates. I learned that, despite all the differences these students had with my brother and his friends – their urban upbringing, being only children, being exposed to so much less through media and the unfortunate consumer culture that defines America – they vividly reminded me of my brother. They laughed, told each other jokes, took turns climbing and biking in the park, and held my hand. The girls, in fact, held my hand even more readily than Carter would.

Let's Recycle, Beijing!

My lab mates told me that plastic bottles are thrown into the garbage. I wondered how, in a city as large as Beijing, the local government could possibly afford to *not* implement a recycling program. A large part of promoting food security is, after all, making use of the limited resources we have, globally. I found that 78978798 plastic bottles are manufactured every year…that's 98798 tons of plastic; throwing away that much recyclable material is like trashing an Olympic stadium.

Shirley and I decided to do something about this. I began to collect discarded bottles around CAAS. Luckily a group of American students lived one floor below me, and they loved the slightly sweeter taste of Chinese Coca-Cola. I collected countless bottles from them. I drank as much orange juice as I could throughout the week so that I could do my part, too. I knew that the cleaning staff at the CAAS guesthouse must have thought I was strange for hoarding bottles in the corner of my room. I did my best, using my Mandarin phrase book, to explain our recycling project. After that, I had enlisted the help of the 7th floor cleaning staff, and my bottle collection grew at a phenomenal pace. Each Saturday I washed the bottles, put them into big plastic bags and toted them seven bus stops to Shirley's home. I had always received surprised looks for being foreign and taking the city bus, and with bags of bottles in my hands, the looks intensified. I merely smiled at the bewildered looks and tried to blend in.

Shirley counts bottle after bottle in perfect english

There was an added bonus to our recycling project: I told Shirley that she was welcome to have every bottle in my bags—every bottle that she could count, in English. We began our lessons this way, counting bottle after bottle, then recounting them as we put them back in the bags. She was proud to be able to count so high, and happy to have the potential to earn much more money!

Satellite Classroom

Saying goodbye to my students was one of the hardest things I've ever had to do. Not only because I would miss them terribly, but because if I showed how saddened I was I would have upset them. I put on a happy face, told them I'd see them again—in five years or less. Shirley, being the highly intelligent little girl that she is, calculated almost instantly how many days are in five years—she was devastatingly sad at the figure. As I walked up the pedestrian bridge to cross the street and take the 651 bus for the last time, I wondered if we'd ever be able to communicate in the same way. When I return to them, I will have studied Chinese for five years, and they will have studied that much more English. We would have many more words in common—so our interactions wouldn't call for nearly as much as the miming and bilingual chatter that I had come to love so much.

I exchanged addresses with each of my students. They will write me letters in English, to keep their skills sharp, and in pinyin, to get me started on the long road to developing a fluency with the Chinese language. In return I will send them a letter in English, and a commemorative United States quarter dollar. I gave them a book with which to collect these special coins; it will be their job to learn about each state—when it was founded, and how to spell it's name. I have no doubt they will make a success of this last assignment. An ocean of separation can't stop us from learning from one another.

Joe and me posing for our last photo together.

Shirley and me smiling our biggest smiles

The Illimitable Power of Hunger

It was one of my last meals in China. As two of my closest friends and I sat around the table, Wan Juan said "You use chopsticks very well."

I clicked my utensils twice, laughed, and responded “I *had* to learn—I was very hungry for the first few weeks here!”

Wan Juan smiled and said “Hunger can do anything!” I forced myself to commit that moment to memory, above all my other experiences in China.

It’s been months since Wan Juan made that poignant remark and I still can’t break away from analyzing the implications of what was said. *Hunger can do anything.* I repeat this phrase to myself daily. Indeed, want of food drives desperate individuals to beg, steal, and kill. It forces Iowan girls to learn to use chopsticks. Governments go to war over agricultural resources. Hunger motivated the coming of the Green Revolution. Hunger does unimaginable things, be they horrible, wonderful, disturbing, or inspiring. Can the pursuit to end to world hunger halt the devastating effects of poverty and malnutrition? It is my unwavering belief that yes, the work of individuals across the globe can amount to the alleviation of hunger.

For the past two years, I’ve been coming familiar with the fact that hunger is not an issue that can be singularly debated in a political arena. It can’t be solved instantly in a laboratory, either. Rather, the marriage of science and humanity is the best way to conquer this threat to our globe. Similarly, one nation cannot hope to provide the be-all, fix-all solution for other countries. As a political science and international studies major at the University of Iowa, I intend to discover how we can put aside our countries’ competitive natures, and work together to solve problems that reduce the quality of life for global citizens. There’s a lot to be done—and it is for that reason that I’m thankful to be young, and to already have been exposed to the often cruel realities of hunger, ineffective international policies, and the promise of learning from other cultures.

While my work in Beijing has drawn to a close, I will make sure that the life experience I gained there is just the beginning of many experiences that contribute to attaining the goals of The World Food Prize Foundation and the Prize’s Laureates. I consider myself incredibly lucky to have been given such a tremendous start on the path to promoting global food security.

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