

An evaluation of the Triticeae Coordinated Agricultural Project (TCAP)

Results from the 2012 Undergraduate Student Survey

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Introduction

The Triticeae Coordinated Agricultural Project (TCAP), funded by the United States Department of Agriculture (USDA), is an effort to improve the quality of wheat and barley breeding and increase the number of plant breeders, especially from racially and ethnically diverse backgrounds. TCAP's educational component consists of providing education and research opportunities for graduate students in plant breeding programs and partnering with faculty from minority serving institutions (MSIs) to promote the plant breeding field.

An evaluation with multiple components is being conducted to assess the progress of TCAP. One of the evaluation components is a yearly survey to assess undergraduate students' perceptions of their participation in TCAP. This report summarizes the survey responses from those undergraduates who participated in TCAP as research interns in the 2011-2012 academic year.

Methods

The evaluation team worked collaboratively with members of the TCAP educational committee to develop the survey. A survey think-aloud was completed with an undergraduate student the Plant Sciences Department at Montana State University. Both the faculty member and student were not part of TCAP.

Surveys were administered online to undergraduate students in late April to early May 2012. The survey assessed students' mentoring experience, research experience, and interest to pursue graduate studies in plant breeding. Undergraduate students include both those attending TCAP institutions, as well as those attending minority serving institutions (MSIs). Data tables are provided in Appendix A. Results are report separately for TCAP and MSI students, as well as for all students. Due to the low response rate and small sample size, only frequencies are reported.

Demographics of survey respondents

Of a total of 20 TCAP students, 8 students completed the survey, while 5 of 15 MSI students completed the survey.

TCAP students

There were equivalent numbers of females (4/8) and males (4/8) among TCAP students who completed the survey (Table 1). Students ranged in age between 18 and 23 years old (Table 2). Most students identified as White (7/8) and no students identified being of Hispanic ethnicity (Tables 3 & 4). Most students (5/7) reported majoring in Applied Plant Sciences (Table 5).

MSI students

All, but one MSI student was female (Table 1). Students ranged in age between 20 to 23 years old (Table 2). Three of four MSI students identified as Black or African American, while one student identified as White (Table 4). Two of four MSI students reported being of Hispanic descent (Table 3). Of the five MSI students, only three students reported their major – which was Biology (Table 5).

Key findings

Summarized by Mao Thao, BS, BA

The following summarizes key findings by topic area. As stated earlier, data tables are provided in Appendix A.

TCAP participation & educational processes

- Of the 13 students completing the survey, most students (4/5 MSI students and 7/8 TCAP students) know “a little” about the goals of TCAP (Table 6).
- Half of the students have participated in a research project developed by others (6/12, three MSI and 3 TCAP students) and a mentoring experience (6/12, four MSI and two TCAP students), while only a few students (3/12, one MSI and two TCAP students) have participated in an independently developed research project (Table 7).
- The activity that students reported participating in the most is participating in research in a laboratory setting with 9 of 13 students (all five MSI and four TCAP students) responding with “very often”. The activity with the least participation is participating in a research experience at another institution, where 10 of 13 students (three MSI and seven TCAP students) reported participating “not at all”. Many students (9/13, two MSI and seven TCAP students) also reported low participation in a community of researchers online (Table 8).
- Overall, most students generally saw value in the listed TCAP activities. Being mentored was rated as “very valuable” by 9 of 12 students, all five MSI and four TCAP students. The activity that several students viewed as least valuable was participating in a community of researchers online, in which 5 of 10 students (one MSI and four TCAP students) rated as “not at all” or “somewhat” valuable (Table 9).
- Most students felt the educational processes were at least “somewhat” important. Almost all students (11/13, four MSI and seven TCAP students) felt laboratory experience was “extremely important”. The lowest rated items where several students rated as “a little important” was collaboration with other students at other institutions (Table 10).

Mentoring experience

- Almost all students (10/12, four MSI and six TCAP students) reported that there is someone involved in their research experience that they consider as a mentor. Five of nine students (two MSI and three TCAP students) reported having more than one mentor (Table 11).
- All MSI students reported that their primary mentor was a faculty member, while only one of six TCAP students reported similarly. Four TCAP students reported having a graduate student as their primary mentor, and one student reported that their primary mentor had some other role (Table 12).
- Students reported many things that they liked about their mentoring experience. Most comments were about having a personable and knowledgeable mentor. Students also were very appreciative of the helpful guidance that their mentor provides them personally and professionally (Table 13).

- Only a couple students provided feedback about what could make their mentoring experience better. One student felt clarifying expectations would be helpful, while another student wanted more resources to better understand plant breeding (Table 14).

Research experience

- Students' participation as a research intern ranged between one to nine months, with most students (5/11, two MSI and three TCAP students) having been a research intern for three to four months (Table 15).
- Students reported wanting to gain a variety of skills, knowledge, and experiences from their research experience, including laboratory and field experience, research skills, independent development of research ideas, communication and interpersonal skills within a research setting, and more science knowledge. Several students commented that they wanted to further their education and future (Table 16).
- As research interns, students reported conducting skilled lab work duties the most with 8 of 12 students (four MSI and four TCAP students) reporting they do this "very often". The research activity that most students (7/12, one MSI and six TCAP students) reported not doing often at all was teaching someone else how to perform skilled lab work (Table 17).
- MSI students were asked additional questions about their research experience given the partnership and collaborative work between their institution and a TCAP institution.
 - When asked to what extent MSI students felt comfortable approaching faculty members and students at their partner TCAP institution, three of four students reported feeling at least "moderately" comfortable doing so (Table 18).
 - None of the MSI students reported having spent time working at their collaborators' institution. Given this, a set of questions about students' perceptions of their collaborators was not asked (Table 19).
- There were many things that students' liked about their research experience. Many students liked the opportunity to learn, do research, and get hands-on experience. One student commented that she/he liked being mentored by a faculty member and graduate student (Table 20).
- Students had several suggestions for improving their research experience, including collaborating with other people, labs, and universities; doing more lab work, lab techniques, and data analysis; exploring additional research topics; communicating more with professors on the project; and having more time to do their work (Table 21).

Interest in graduate school and plant breeding

- All 13 students reported being at least "somewhat" interested in graduate school, with 6 of 13 (three MSI and three TCAP students) being "extremely interested" (Table 22).
- About half of the students (5/11, two MSI and three TCAP students) felt their research experience has impacted their interest in graduate school (Table 23). They felt their research experience increased their awareness and desire to go to graduate school. One student reported that it made her want to go to graduate school rather than dental school (Table 24).
- Seven of ten students (three MSI and four TCAP students) felt their research experience has contributed at least "a little" to their ability to succeed in graduate school (Table 25).

- MSI students were asked whether they would consider going to their partner TCAP institution for graduate school. Three students felt they would consider attending their partner TCAP institution (Table 26). Reasons for considering partner TCAP institutions include having a program of interest, furthering current research interests, and getting experience at a different institution (Table 27).
- When asked about the top two potential barriers to graduate school, most students said money or funding/finances as the first barrier and finding a job/career as the second barrier (Table 28). Students reported needing a variety of financial support if they were to pursue graduate school (Table 29).
- Before participating in their research experience, most students did not think about or knew very little about plant breeding as a career. Only a couple students reported having high interest in plant breeding before they began their research experience (Table 30).
- Most students (11/13) reported being at least “somewhat” motivated to pursue a plant breeding career (Table 31).
- Most students (10/13, four MSI and six TCAP students) reported that their perceptions about plant breeding have changed since starting their research experience (Table 32). Students commented that they have learned more about plant breeding – both as a research area and career option. One student commented that plant breeding is “not as interesting” as she/he thought it was (Table 33).

Issues to consider

The following are some issues for consideration based on the survey results:

- The survey response rates for the two groups of undergraduate students were very low. In future survey administrations, consider notifying principle investigators of the timing of the survey and recruit their partnership in emphasizing the importance of TCAP and TCAP evaluation activities. Additionally, consider offering incentives to students who complete the survey such as a drawing for a monetary gift card or a small TCAP keepsake.
- Consider and promote opportunities for undergraduate students to independently develop research designs and projects. Very few students have had this opportunity before participating in TCAP and most students felt this was important.
- Continue to promote and build mentoring opportunities for undergraduate students. Students reported positive perceptions about their mentoring experience and being mentored was highly rated as valuable by most students and. Most students also regarded someone involved in their research experience as mentor; however, there were a couple students who did not feel there was anyone involved in their research experience that they would consider a mentor. Furthermore, consider whether it is important for students to be mentored by both faculty members and graduate students. MSI students tended to have a faculty member as their primary mentor, while TCAP students tended to have graduate students as their primary mentor.
- Continue to promote collaboration. Undergraduate students did not seem to have a lot of opportunities to collaborate with others at or outside of their institution. This is particularly important for MSI students as they have yet to spend time working at their partner TCAP institution – likely due to the limited breaks throughout the academic year. As summer break approaches, ensure that there are opportunities and funding for MSI students to spend time at

their partner TCAP institution working with and getting to know faculty and graduate student collaborators.

- Continue to provide students with a variety of research and learning opportunities. Students generally had positive comments about their research experience and enjoyed learning new skills and knowledge. Consider students' feedback for what they hope to gain from their research experience and what could help improve their experience.
- Continue to promote graduate school and the plant breeding field. Many students reported that their research experience has increased their awareness and interest in pursuing graduate school and considering plant breeding as a career.

Appendix A: Data Tables

Table 1: Respondents' gender.

What is your sex?	Female	Male
MSI students	4/5	1/5
TCAP students	4/8	4/8
Total	8/13	5/13

Table 2: Respondents' age.

What is your age?	MSI students	TCAP students	Total
17 or younger	—	—	—
18 to 19 years old	—	2/8	2/13
20 to 21 years old	1/5	5/8	6/13
22 to 23 years old	4/5	1/8	5/13
24 to 25 years old	—	—	—
26 years old or older	—	—	—

Table 3: Respondents' ethnicity.

Are you of Spanish, Hispanic, or Latino/Latina origin?	Yes	No
MSI students	2/4	2/4
TCAP students	—	7/8
Total	2/12	8/12

Table 4: Respondents' race.

What is your racial background?	MSI students	TCAP students	Total
American Indian or Alaskan Native	—	—	—
Asian	—	1/8	1/12
Black or African American	3/4	—	3/4
Native Hawaiian or Pacific Islander	—	—	—
White	1/4	7/8	8/12
Mixed race	—	—	—

Table 5: Respondents' major.

What is your major?	MSI students	TCAP students	Total
Applied Plant Science	—	5/7	5/10
Animal Science	—	1/7	1/10
Biology	3/3	—	3/10
Biotechnology	—	1/7	1/10

Table 6: Respondents' knowledge of TCAP goals.

How much do you know about the goals of the TCAP?	Nothing at all	A little	A lot
MSI students	—	4/5	1/5
TCAP students	1/8	7/8	—
Total	1/13	11/13	1/13

Table 7: Respondents' previous participation in research and mentoring.

Before joining TCAP, have you ever participated in any of these types of activities:	MSI students		TCAP students		Total	
	Yes	No	Yes	No	Yes	No
A research project developed by others	3/4	1/4	3/8	5/8	6/12	6/12
A research project that was developed independently by you	1/4	3/4	2/8	6/8	3/12	9/12
A mentoring experience	4/4	—	2/8	6/8	6/12	6/12

Table 8: Respondents' participation in TCAP activities.

How often do you participate in the following TCAP activities?	Not at all often	Somewhat often	Moderately often	Very often
Planning research				
MSI students	1/5	1/5	3/5	—
TCAP students	4/8	3/8	1/8	—
Total	5/13	4/13	4/13	—
Conducting research				
MSI students	—	—	1/5	4/5
TCAP students	1/8	3/8	2/8	2/8
Total	1/13	3/13	3/13	6/13
Being mentored				
MSI students	—	—	1/5	4/5
TCAP students	1/8	2/8	3/8	2/8
Total	1/13	2/13	4/13	6/13
Participating in a community of researchers on campus				
MSI students	—	3/5	1/5	1/5
TCAP students	2/8	1/8	2/8	3/8
Total	2/13	4/13	3/13	4/13
Participating in a community of researchers online				
MSI students	2/5	3/5	—	—
TCAP students	7/8	—	1/8	—
Total	9/13	3/13	1/13	—

Table 8: Respondents' participation in TCAP activities (Continued...).

How often do you participate in the following TCAP activities?	Not at all often	Somewhat often	Moderately often	Very often
Gathering, analyzing, and managing data				
MSI students	—	—	2/5	3/5
TCAP students	1/8	2/8	3/8	2/8
Total	1/13	2/13	5/13	5/13
Problem solving				
MSI students	—	—	3/5	2/5
TCAP students	2/8	4/8	—	2/8
Total	2/13	4/13	3/13	4/13
Participating in a research experience at your institution				
MSI students	—	—	1/5	4/5
TCAP students	2/8	1/8	1/8	4/8
Total	2/13	1/13	2/13	8/13
Participating in a research experience at another institution				
MSI students	3/5	1/5	—	1/5
TCAP students	7/8	—	1/8	—
Total	10/13	1/13	1/13	1/13
Reporting research results				
MSI students	—	—	2/5	3/5
TCAP students	5/8	1/8	1/8	1/8
Total	5/13	1/13	3/13	4/13
Application of course concepts through hands-on experiences				
MSI students	—	—	2/5	3/5
TCAP students	1/8	4/8	—	3/8
Total	1/13	4/13	2/13	6/13
Participating in research in a laboratory setting				
MSI students	—	—	—	5/5
TCAP students	1/8	1/8	2/8	4/8
Total	1/13	1/13	2/13	9/13
Participating in research in a field setting				
MSI students	2/5	1/5	—	2/5
TCAP students	3/8	4/8	1/8	—
Total	5/13	5/13	1/13	2/13

Table 9: Respondents' value of TCAP activities.

How valuable are the following TCAP activities to you in your education?	Not at all valuable	Somewhat valuable	Moderately valuable	Very valuable
Planning research				
MSI students	—	—	—	5/5
TCAP students	—	—	6/7	1/7
Total	—	—	6/12	6/12
Conducting research				
MSI students	—	—	—	5/5
TCAP students	—	—	4/7	3/7
Total	—	—	4/12	8/12
Being mentored				
MSI students	—	—	—	5/5
TCAP students	—	—	3/7	4/7
Total	—	—	3/12	9/12
Participating in a community of researchers on campus				
MSI students	—	—	—	5/5
TCAP students	—	2/6	1/6	3/6
Total	—	2/11	1/11	8/11
Participating in a community of researchers online				
MSI students	—	1/5	1/5	3/5
TCAP students	3/5	1/5	1/5	—
Total	3/10	2/10	2/10	3/10
Gathering, analyzing, and managing data				
MSI students	—	—	1/5	4/5
TCAP students	—	2/7	3/7	2/7
Total	—	2/12	4/12	6/12
Problem solving				
MSI students	—	—	1/5	4/5
TCAP students	—	1/7	2/7	4/7
Total	—	1/12	3/12	8/12
Participating in a research experience at your institution				
MSI students	—	—	—	5/5
TCAP students	—	—	4/7	3/7
Total	—	—	4/12	8/12

Table 9: Respondents' value of TCAP activities (Continued...).

How valuable are the following TCAP activities to you in your education?	Not at all valuable	Somewhat valuable	Moderately valuable	Very valuable
Participating in a research experience at another institution				
MSI students	—	—	2/5	3/5
TCAP students	1/5	—	3/5	1/5
Total	1/10	—	5/10	4/10
Reporting research results				
MSI students	—	—	—	5/5
TCAP students	—	1/6	4/6	1/6
Total	—	1/11	4/11	6/11
Application of course concepts through hands-on experiences				
MSI students	—	—	—	5/5
TCAP students	—	1/6	4/6	1/6
Total	—	1/11	4/11	6/11
Participating in research in a laboratory setting				
MSI students	—	—	1/5	4/5
TCAP students	—	1/7	2/7	4/7
Total	—	1/12	3/12	8/12
Participating in research in a field setting				
MSI students	—	—	1/5	4/5
TCAP students	—	—	3/5	2/5
Total	—	—	4/10	6/10

Table 10: Respondents' perception of educational processes.

How important do you believe these processes are in your education?	Not important at all	A little important	Somewhat important	Moderately important	Extremely important
One-on-one mentoring					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	1/8	4/8	3/8
Total	—	—	1/13	5/13	7/13
Collaboration with faculty other than your advisor					
MSI students	—	—	—	2/5	3/5
TCAP students	—	—	3/8	5/8	—
Total	—	—	3/13	7/13	3/13
Collaboration with other students at your institution					
MSI students	—	—	1/5	1/5	3/5
TCAP students	—	1/8	1/8	5/8	1/8
Total	—	1/13	2/13	6/13	4/13
Collaboration with other students at other institutions					
MSI students	—	1/5	—	1/5	3/5
TCAP students	—	2/8	2/8	2/8	2/8
Total	—	3/13	2/13	3/13	5/13
Independent development of hypotheses					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	1/8	5/8	2/8
Total	—	—	1/13	6/13	6/13
Independent development of research designs					
MSI students	—	—	—	—	5/5
TCAP students	—	1/8	—	3/8	4/8
Total	—	1/13	—	3/13	9/13
Field experience					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	—	3/8	5/8
Total	—	—	—	4/13	9/13

Table 10: Respondents' perception of educational processes (Continued...).

How important do you believe these processes are in your education?	Not important at all	A little important	Somewhat important	Moderately important	Extremely important
Laboratory experience					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	—	1/8	7/8
Total	—	—	—	2/13	11/13
Exposure to diverse research methods and tools					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	1/8	4/8	3/8
Total	—	—	—	5/13	7/13
Experience writing grants					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	2/8	3/8	3/8
Total	—	—	2/13	4/13	7/13
Experience presenting results (e.g. meetings, papers)					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	3/8	2/8	3/8
Total	—	—	3/13	3/13	7/13
Working with students from different ethnic backgrounds					
MSI students	—	—	—	1/5	4/5
TCAP students	—	—	5/8	1/8	2/8
Total	—	—	5/13	2/13	6/13

Table 11: Respondents' mentoring experiences

	MSI students		TCAP students		Total	
	Yes	No	Yes	No	Yes	No
Is there anyone involved in your research experience that you would consider a mentor?	4/5	1/5	6/7	1/7	10/12	2/12
Are you being mentored by more than one person?	2/4	2/4	3/5	2/5	5/9	4/9

Table 12: Respondents' mentor's role.

What is your primary mentor's role?	MSI students	TCAP students	Total
Faculty member	4/4	1/6	5/10
A laboratory technician	—	—	—
Graduate student	—	4/6	4/10
Some other role	—	1/6	1/10

Table 13: Respondents' perceptions of the most liked aspect of their mentoring experience.

What do you like the most about your mentoring experience?
MSI students
He advises me in taking decision and has always been of great help.
I like the fact that it is easy to communicate with my mentor. Since it is easy to communicate with my mentor I feel secure asking questions when I do not know how to do something, have ideas about the research, or even need clarity on the research. Every question is viewed as a learning experience to my mentor. This creates a great learning environment.
My mentor is very personable with me. Not only do we exchange emails but phone calls and meet regularly to talk not only science but life in general.
TCAP students
Access to knowledge concerning the best paths to take in research and how to conduct such methods. Also advise on courses and beginning a career in general.
I am learning a lot.
My mentor is really knowledgeable about what my options are. I like working through problems with my mentor and learning the trade.

Table 14: Respondents' thoughts on improving their mentoring experience.

What could make your mentoring experience better?
MSI students
Not applicable. (2 students)
TCAP students
I think having his expectations explained would really help me understand what he wants.
My mentoring experience might be better if my mentor could suggest some papers I might read to better understand the concepts she is trying to teach me.
Nothing.

Table 15: Length of respondents' research experience.

Number of months ^a	MSI students ^b	TCAP students	Total
1 to 2 months	—	1/7	1/11
3 to 4 months	2/4	3/7	5/11
5 to 6 months	1/4	1/7	2/11
7 to 8 months	—	2/7	2/11
9 months ^c	1/4	—	1/11

^a Number of months were calculated using the month and year students reported starting their research experience to the month of May 2012.

^b One student reported starting their research experience in June 2010 and was excluded in the count.

^c As August was the earliest month that undergraduates could have joined TCAP, the maximum number of months is nine months.

Table 16: Respondents' thoughts on what they want to gain from their research experience.

What do you hope to gain from your research experience?
MSI students
Hands on experience, knowledge and an opportunity to further my education in this area.
I hope to be a more well-rounded scientist. Learning techniques and habits that could be beneficial in any field.
I hope to gain experience needed to prepare for a life in research.
Lab experience.
TCAP students
Experience developing independent research plans and exercising creativity with those plans.
Experience in lab and field research.
I didn't get very much from my research because we did not have enough time
Interest in a new subject matter, learn more about something, get laboratory experience.
Laboratory experience and expert in technical practice, such as PCR.
More experience, better skills interacting with people in a research environment and more knowledge of the science surrounding my chosen field

Table 17: Respondents' participation in research activities.

In your research experience, how often do you do the following?	Not at all often	Somewhat often	Moderately often	Very often
Conduct miscellaneous basic lab duties (e.g. wash glassware, weigh samples, tend to plants, enter data, etc.)				
MSI students	—	—	1/5	4/5
TCAP students	1/7	3/7	2/7	1/7
Total	1/12	3/12	3/12	5/12
Conduct skilled lab work duties (e.g. DNA isolation, PCR, immunoassays, etc.)				
MSI students	—	—	1/5	4/5
TCAP students	1/7	1/7	1/7	4/7
Total	1/12	1/12	2/12	8/12
Work with another undergraduate in learning to do research				
MSI students	—	1/5	—	4/5
TCAP students	6/7	1/7	—	—
Total	6/12	2/12	—	4/12
Work with a graduate student				
MSI students	2/5	2/5	1/5	—
TCAP students	2/7	1/7	—	4/7
Total	4/12	3/12	1/12	4/12
Teach someone else how to performed skilled lab work tasks				
MSI students	1/5	—	1/5	3/5
TCAP students	6/7	1/7	—	—
Total	7/12	1/12	1/12	3/12
Prepare a report with research results				
MSI students	—	2/5	1/5	2/5
TCAP students	6/7	—	1/7	—
Total	6/12	2/12	2/12	2/12
Present at a scientific conference				
MSI students	—	2/5	1/5	2/5
TCAP students	6/7	—	1/7	—
Total	6/12	2/12	2/12	2/12

Table 17: Respondents' participation in TCAP activities (Continued...).

How often do you participate in the following TCAP activities?	Not at all often	Somewhat often	Moderately often	Very often
Present at a student symposium				
MSI students	—	1/5	2/5	2/5
TCAP students	6/7	—	1/7	—
Total	6/12	1/12	3/12	2/12
Be involved in writing a manuscript for publication				
MSI students	1/5	4/5	—	—
TCAP students	5/7	1/7	1/7	—
Total	6/12	5/12	1/12	—

Table 18: MSI respondents' perceptions of collaborators.

To what extent do you feel comfortable approaching the following types of collaborators at the other institution?	Not at all	Somewhat	Moderately	Very
Faculty members	1/4	—	1/4	2/4
Students	—	1/4	2/4	1/4

Table 19: Extent of which MSI respondents have travelled to work with collaborators.

	Yes	No
Have you spent time working with collaborators at their campus? ^a	—	4/4

^a As none of the MSI students have spent time working at their collaborators' campus, a set of questions about their perceptions of faculty members and students at the other institution was not asked.

Table 20: Respondents' perception of the most liked aspect of their research experience.

What do you like most about your research experience?

MSI students
I have gained a lot of hands on experience.
I like the fact that I know exactly how what I do is important to the overall research.
Learning new techniques.
The project I am currently working on.

TCAP students
I am learning so much!
I like my work with in the lab and learning how to interpret data.
Independence and the excitement of doing something novel.
Learn about the scientific mechanism such as DNA isolation; get to know more people and learn new things.
Nice to be able to actually do research and see what's it's like to be a scientist.
The ability to learn from a faculty mentor as well as a graduate student mentor.

Table 21: Respondents' perceptions on improving their research experience.

What could make your research experience better?

MSI students
Collaborating with other labs.
Collaborating with other universities.
N/A
Working with a new person.

TCAP students
Explore more into different research and get in touch with professor.
I wish I were doing more lab work and data analysis.
I'd like to be exposed to more lab techniques.
Maybe having more time or better time management.
Nothing.

Table 22: Respondents' interest in graduate school.

To what extent are you interested in graduate school?	Not at all interested	A little interested	Somewhat interested	Moderately interested	Extremely interested
MSI students	—	—	1/5	1/5	3/5
TCAP students	—	—	2/8	3/8	3/8
Total	—	—	3/13	4/13	6/13

Table 23: Respondents' perceptions of whether their research experience has impacted their interest in graduate school.

Has your research experience impacted your interest in pursuing graduate school?	Yes	No	I don't know
MSI students	2/4	—	2/4
TCAP students	3/7	2/7	2/7
Total	5/11	2/11	4/11

Table 24: Ways respondents' have been impacted by their research experience to pursue graduate school.

In what ways has your research experience impacted your interest in pursuing graduate school?
MSI students
I started my research experience as an undergrad and it made me decide to go to grad school instead of dental school.
My research experience has made me aware of the graduate school route.
TCAP students
I know more that I want to go.
It showed me it was a viable option and that grad school increased my available options

Table 25: Respondents' perception of how their research experience has contributed to their ability to succeed in graduate school.

To what extent has your research experience contributed to your ability to succeed in graduate school?	Not at all	A little	A lot	I don't know
MSI students	—	—	3/4	1/4
TCAP students	—	3/6	1/6	2/6
Total	—	3/10	4/10	3/10

Table 26: MSI respondents' thoughts on attending their collaborators' institution for graduate studies.

	Yes	No	I don't know
Would you consider pursuing graduate studies at the other institution that is collaborating with you on your research project?	3/5	—	2/5

Table 27: Reasons why MSI respondents would attend their collaborator's institution.

Why would you consider pursuing graduate studies at this other institution?

I believe it will be an opportunity to broaden my horizon; furthermore they have the type of program; I am interested in participating in.
 I feel as if I could further my knowledge of the research I am currently doing which in return could prepare me for a career.
 To get a taste of life at another institution. I have been at my institution for the last 7 years.

Table 28: Respondents' report of the top two barriers to graduate school.

What are the top two barriers that might stop you from going to graduate school?

MSI students		TCAP students	
First barrier	Second barrier	First barrier	Second barrier
Finances	Finding a career upon completion	Inspiration to study	Tuition fees
Funding	International status	Money	Class requirements
Money	Time	Money	Getting a job
		Money	Job offer post undergraduate degree
		Money	Money
		Time	Financial
		Wanting to travel	

Table 29: Respondents' report of needed supports for graduate school.

What kinds of support would you need if you were to pursue graduate school?

MSI students
 Financial.
 Graduate assistance. Guarantee that my international status will not affect me.
 Grants, Scholarships, Assistantships, Fellowships, Career placement.
 Monetary.

TCAP students
 A scholarship would be nice it would help out a lot.
 Financial support.
 I feel like some sort of monetary support would be the most helpful.
 Monetary.
 None really. It is a decision I need to make.
 Scholarship and the recommendation of professor. Also, the interest in study graduate school is important.

Table 30: Respondents' perceptions of a plant breeding career before participating in their research experience.

Before participating in your research experience, what did you think about a career in plant breeding?

MSI students

- I actually never thought about a career in plant breeding prior to my research.
- I didn't know much about plant breeding before my research.
- I liked the idea because of my past experience of how plant bred crops help my country.
- Never thought of it.

TCAP students

- I had very little Idea about what plant breeding would be like.
- I never ever considered it. I thought it would be an awful job.
- I wanted a career in plant breeding before this project
- I was highly interesting in plant breeding, and thought the TCAP experience would be a great way to learn more about plant breeding.
- I was not considering it.
- It is a worldwide and multicultural career. Somewhat is boring while the result has to wait for years.

Table 31: Respondents' motivation to pursue a plant breeding career.

To what extent are you motivated to pursue a career in plant breeding?	Not at all motivated	A little motivated	Somewhat motivated	Moderately motivated	Extremely motivated
MSI students	—	1/5	2/5	1/5	1/5
TCAP students	1/8	—	3/8	3/8	1/8
Total	1/13	1/13	5/13	4/13	2/13

Table 32: Respondents' change of perceptions about plant breeding.

Have your perception about plant breeding changed since you started your research experience?	Yes	No	I don't know
MSI students	4/5	1/5	—
TCAP students	6/8	1/8	1/8
Total	10/13	2/13	1/13

Table 33: Ways respondents' perceptions about plant breeding has changed since participating in their research experience.

In what ways did your perceptions of plant breeding change?

MSI students

I can see it as a career now. A career in which I am changing the world.

I didn't know what it was before doing research.

I was very enlightened, I think it is a very good idea

TCAP students

I didn't think breeding was so heavily based in molecular biology techniques.

I got to know what working in plant genetics could be like. What I learned was that it is a dynamic science that it is an adaptable science.

I thought it would be an ethical challenge, but I was confusing transgenics with plant breeding, when they are really two very different things. My perception has changed SO much since I've started working there.

It brings me more in-depth to look at the plant breeding. The mechanism and all take me to another level for the understanding in plant breeding.

Plant breeding is very repetitive in research methods and not as interesting as I previously thought.
