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# Assessing the Impact of the Bean/Cowpea Collaborative Research Support Program (B/C CRSP) Graduate Degree Training

By

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## Abstract

The study evaluated the impacts of the graduate degree training (GDT) component of the B/C CRSP. In their enhanced capacity, trainees have been playing important roles in strengthening teaching and research capacity in bean and cowpea sectors, both in the U.S. and in host countries. The study recommends the continued commitment and increased financial support to GDT.

**Keywords**: impact assessment, B/C CRSP, training, graduate degree, beans, cowpeas
**JEL codes:** Q16, I23, O15, O19

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# I. INTRODUCTION

The Bean/Cowpea Collaborative Research Support Program (B/C CRSP) was established in 1980 to address the problems of food insecurity in developing countries by enhancing the knowledge base necessary to achieve substantial improvements in addressing the constraints to bean and cowpea production, consumption, and utilization. This was to be achieved by enhancing the capabilities of host country (HC) scientists and research institutions to solve problems related to bean and cowpea production and consumption. Thus, the CRSP has allocated a major part of its resources to training scientists and researchers at selected universities and national agricultural research organizations in Africa and Latin America.

To date, the contribution of these trainees and the impact of the CRSP training model on institutional capacity building have not been systematically documented. Thus, the purpose of this study is to evaluate the impacts of the graduate degree training (GDT) on trainees and on universities/research institutions in host countries from both the perspective of U.S. scientists who mentored the trainees and the individuals who received graduate degrees with CRSP funding. In doing this assessment, the study adopted the modified Kirkpatrick framework as a guide in evaluating training impacts from four different perspectives: Reaction (whether trainees like the training), Learning (whether they learned something from the training), Performance (whether trainees applied what they have learned), and Results (impacts on the institution/society) (Kirkpatrick, 1998). Impact on trainees can be any changes in their personal and professional lives as a result of their GDT. Institutional capacity building involves improvements in the ability of an organization to perform its teaching and research mandate effectively, efficiently and sustainably.

This study is influenced and motivated by five recent assessments of graduate training programs, which were sponsored by the CGIAR (Stern, 2006), ATLAS/AFGRAD (Gilboy, et al, 2004), the Fulbright Student Program (SRI, 2005), ILRI in Kenya and Ethiopia (Eley, et al, 2002),

and IRRI (Raab, et al, 1996). Key findings of these studies included the importance of non-technical competence and non-monetary benefits that trainees gained, including critical thinking and research skills, as well as increased prestige, self-confidence, and changes in their attitude towards work.

The results reported in this study were based on the analysis of questionnaires returned by 76 former trainees, representing 60 percent of our frame population (or 41% of our target population), and 25 former and current US-PIs, supplemented by face-to-face interviews with former trainees and CRSP's collaborators at Sokoine University of Agriculture in Tanzania.

## II. THE B/C CRSP TRAINING PROGRAM

To date, the CRSP has supported a total of 496 students who earned 554 academic degrees (an average of 22 degrees per year from 1981 to 2005) at universities in the U.S. and host countries. The CRSP GDT exemplifies one of the models of university engagement in long-term training (Figure 1). A salient feature of the model is that the degree training is an integral part of CRSP-supported collaborative research projects -- both in the U.S. and host country (HC) universities. Collaborators identify the trainees based on the HC training needs and the universities' admissibility criteria. The training occurs under the direct supervision of CRSP researchers, which ensures that the training activity directly contributes to CRSP research goals and objectives, as well as to institutional capacity building in partner HC. Involvement in the CRSP research program also fosters the student-mentor relationship between the trainee and the university professor, which leads to a continued collaborative research relationship between the U.S. and the HC institution beyond the formal training program. The integration of training with an on-going research program, in many cases, leads to cost-sharing by the university in the form of reduced tuition costs, reduction in overhead costs, and/or partial support from other sources to support the thesis/research costs of completing a graduate degree.

While training per se does not automatically lead to institutional capacity building, it is one of the cornerstones of organizational capacity development. Horton, et al. (2003) referred to organizational capacity as the "resources, knowledge and processes employed by the organization to achieve its goals". GDT contributes to capacity development by recruiting highly qualified individuals (human resources) and through the application of their knowledge, skills and attitudes (management).

# III. RESULTS: TRAINEES

Seventy-six trainees (60%) returned the e-mail survey. Table 1 provides an overview of the sample respondents. More than one-half of the respondents were male (66%), from host countries (55%), and had specialized in plant science discipline (61%). About 62 percent of the respondents were supported for Ph.D. degrees, while 46 percent were fully funded by the CRSP during their graduate study.

The results were not surprising and confirmed a priori. Trainees who were fully supported would be more likely to respond to a request coming from the CRSP than those who were indirectly or partially supported. Also, trainees with higher degrees would be more likely to return the survey because a higher degree correlates to other factors such as possibly greater knowledge, greater appreciation of the importance of studies like this, higher income, and better access to the internet. Further, trainees who finished their degrees recently would be more likely to participate because of their recent affiliation with the CRSP.

## *A. Reaction and Learning*

### 1. Trainee assessment of graduate program and their CRSP research

Following Kirkpatrick's model, questions were included to determine trainees' general satisfaction with their GDT (Reaction). Almost all respondents considered their graduate program

(97%) and CRSP research (99%) as interesting and challenging, that they receive sufficient professional guidance from their CRSP supervisors (86%) and major professors (95%), that their graduate program (92%) and CRSP research (83%) was relevant to their current work/job responsibility, and that their graduate program (100%) and CRSP research (97%) provided excellent preparation for their future work.

### 2. Acquisition of KSAs

Trainees must first acquire the knowledge, skills, and attitudes (KSAs) from the training program before any impacts can occur. The goal was to identify the KSAs acquired during training and determine any problems encountered by trainees during their training (Learning).

Seventy-five out of 76 respondents identified at least one KSA acquired during their GDT. Overwhelmingly, trainees considered the ability to "design/ conduct/analyze scientific research" (87%) as the most important KSA acquired from their GDT. About one-half (51%) reported "analytical/critical thinking" in solving problems, followed by "scientific methods and tools" (47%). Nearly one-third of the respondents cited "language fluency and communication skills". Similarly, about one-third of the trainees identified "attitude towards work/collaborative work" as an important KSA.

To validate respondents' answers, trainees were also asked to select from a list of specific choices how they applied the acquired KSAs. About two-thirds of the trainees said that they shared their KSAs through seminar/conference (70%), research supervision of students (66%), and publication (66%).

## *B. Performance and Results Evaluation*

### 1. Employment details

Eighty-eight percent of the respondents were currently employed, either full-time (84%) or part-time (4%). Almost all U.S. respondents were working in the U.S (97%) and most of the HC

respondents were working in a host country (81%). The largest share of trainees worked at universities (44%). Most were doing research (84%), coupled with some administration/management work (40%), while some were teaching (29%) in conjunction with their other assignments. Forty-nine percent of the currently employed respondents (69% of HC trainees and 23% of U.S. trainees) were still doing work related to beans/cowpeas. This continued effort on beans/cowpeas usually involved collaborative work on plant breeding/pathology. About 26 percent said that they supplemented their income from their primary job with outside consulting.

## 2. Monetary Impacts

Respondents were asked to approximate the annual salary (US$) that they earned from their previous job (i.e., job prior to GDT), their first job after completing their GDT, and their current job. Not surprisingly, prior to their GDT, a large share (64%) of the trainees earned less than US$15,000 per year. At their present or most recent employment, majority (73%) of the respondents reported earning more than US$15,000. Moreover, 62 percent of U.S. trainees reported earning more than US$60,000 per year.

As the cost of living and the salaries differ widely, it is necessary to distinguish between salaries received by HC and U.S. nationals. The average current salary of a U.S. trainee is double the average salary of a HC trainee. As expected, the acquisition of a graduate degree greatly increased trainees' salaries – both for U.S. and HC nationals. Prior to GDT, 78 percent of HC nationals and 40 percent of U.S. nationals were earning less than US$15,000 per year. At their present or most recent employment, 57 percent of HC nationals and 97 percent of U.S. nationals were earning more than US$15,000 a year.

The difference in salaries received by respondents was also analyzed based on the academic degrees they received. Before GDT, a HC respondent with a B.S. degree earned about US$9,000 a year. At their present or most recent employment, HC respondents with M.S. degrees earned

US$21,000 a year, while those with Ph.D. degrees earned US$35,000 a year. On the other hand, U.S. nationals with a B.S. degree earned about US$19,000 a year prior to GDT. At their present or most recent employment, U.S. trainees with a M.S. degree earned US$65,000 a year, while those with Ph.D. degrees earned US$81,000 a year. These numbers represented an increase of about 180 percent from B.S. to M.S. and about 300 percent increase from B.S. to Ph.D. Interestingly, the difference between HC and U.S. salaries decreased with a Ph.D. degree.

It is important to note that the difference between the salaries that the trainees earned prior to GDT, compared to their current salaries, cannot be attributed to training alone. First, salaries that trainees reported prior to GDT are for different years. Also, even if the trainees had not earned a graduate degree, their salaries would have increased due to additional time in service. Finally, trainees reported their salaries prior to and after GDT in nominal dollars. Thus, some of the increase in their salaries can be attributed to inflation.

### 3. Non-monetary Impacts

Respondents were asked to describe and give concrete examples of any changes or impacts on their personal and professional lives that they could attribute to their CRSP-funded graduate degree. Sixty-four out of 76 respondents (84%) cited at least one positive impact of the GDT.

With respect to changes on their personal lives, most of the responses evolved around improved financial status, greater self-confidence, an opportunity to learn a second language, and winning new friends outside their home country. Professionally, aside from the KSAs that they acquired from their GDT, trainees frequently reported that GDT was an important factor that enabled them to secure their desired job. In addition, the respondents noted that their GDT helped them to develop or widen their professional networks, particularly among beans/cowpeas scientists. Further, many trainees reported that as a result of having been involved in research in a developing country, they were able to broaden their perspective on agricultural development.

### 4. Achievements/Contributions

Respondents were also asked to describe their significant accomplishments -- especially those related to the beans/cowpeas sectors. This question sought to identify impacts of training beyond the individual level. Because the question focused on accomplishments that only related to beans/cowpeas, fewer respondents answered this question. Forty-three out of 76 respondents (57%) reported at least one bean/cowpea-related accomplishment. Significant accomplishments that trainees cited include their role in the release of varieties, awards or recognition received from their bean/cowpea research, papers published, and the important positions or jobs they held as a result of their GDT.

Because trainees frequently cited having papers or articles published as one of their achievements, research outputs from the trainees' CRSP-supported research (during their degree program) were analyzed. Most of the M.S. and Ph.D. trainees published their research in journals/books (83% for Ph.D., 58% for M.S.) and also presented their research at a conference/seminar (89% for Ph.D., 76% for M.S.). As expected, this impact is greater for Ph.D.-supported trainees.

## *C. Factors affecting impact*

### 1. Significance of type of employer

Participant location can be an indicator of potential impact and the level in which impact takes place. The findings showed that almost all (82%) of the respondents who were working for the government continue to work on a bean/cowpea-related project, compared to 44 percent for trainees at universities, 20 percent for trainees in the private sector, and 33 percent for trainees at international organizations. Twenty-two percent of trainees working in the private sector and about one-third of trainees working at a university (32%) and for the government (31%) had outside consultancies. For government and university employees, low salaries possibly drive trainees to

seek outside consultancies. On the other hand, trainees employed at international organizations do not have outside consultancies.

### 2. Significance of participant location

An important purpose of this assessment is to analyze differences in impact by trainees' region of origin. Since 1980, the CRSP has supported collaborative projects in LAC, ESA, WA, and the U.S -- the main bean/cowpea-consuming regions of the world. Not surprisingly, more international trainees (18% LAC, 30% ESA, 11% WA) reported having academic problems than U.S. trainees (9%). The differences were even greater for non-academic problems -- 23 percent of the LAC trainees, 70 percent of the ESA trainees and 44 percent of the WA trainees reported experiencing non-academic related problems (e.g., financial and family) versus 18 percent of the U.S. respondents.

There were differences by location regarding where trainees found employment after completing their GDT. Most U.S. (66%) and ESA (70%) respondents are now working in universities, while the largest share of the LAC (45%) and WA (35%) trainees are employed by the government. Overwhelmingly, most HC trainees (69%) are still active in beans/cowpeas research (74% LAC, 60% ESA, 67% WA), compared to only 23 percent of U.S. trainees. Furthermore, 31 percent of the HC respondents have outside consulting jobs (10% LAC, 56% ESA, 56% WA), compared to 19 percent for U.S. trainees. To a large extent, these differences reflect where the trainees were recruited, as most trainees returned to the institution where they worked (e.g., university, NARS) prior to beginning their GDT.

### 3. Significance of degree level

The study analyzes the difference in impact according to the graduate degree obtained. As it is usually at least twice as expensive to fund Ph.D. degree training, compared to M.S. degree

training, it is sometimes argued that training funds should be prioritized towards funding M.S. students.

This analysis makes a distinction between the highest CRSP-supported degree (M.S.=32, Ph.D.=44) and the highest degree obtained regardless of funding source (M.S.=18, Ph.D.=58). Fourteen respondents who were supported by the CRSP for their M.S. programs went on for Ph.D. degrees, with support from another funding source. Most of the M.S. respondents were from the U.S (61%), while most Ph.D. respondents come from host countries (60%)

About half of the respondents with Ph.D. degrees currently work at a university (50%). This is not surprising, since a Ph.D. degree is usually a requirement for a job at a university, especially for academic positions. The other half of the respondents with Ph.D. degrees currently work for the government (23%), in the private sector, (9%), and at an international organization (12%). In contrast, 31 percent of the M.S. graduates were now working in the private sector, while 25 percent work for the government, 25 percent are at a university, and another 12 percent were at an international organization. Notably, most Ph.D. respondents (57%) were still active in beans/cowpeas-related activities, compared to only one-fourth of the M.S. trainees (24%). This difference is statistically significant at the 5 percent confidence level.

Only 6 percent of M.S. graduates sought outside consultancy to augment their income from their principal job, compared to 32 percent of the Ph.D. respondents. A correlation analysis affirmed that outside consultancy and highest degree attained is significantly correlated and the relationship is positive, meaning Ph.D. graduates are more likely than M.S. graduates to have outside consultancy projects.

While Ph.D. training is more expensive than M.S. training, Ph.D. graduates have greater impact in the long-run. First, most CRSP-funded Ph.D. graduates secured an academic position at a university. Consequently, they serve as multipliers, as generations of students are trained by CRSP

trainees. Second, M.S. trainees, who most often took positions in the private sector, seldom continued to collaborate with their CRSP supervisor. Finally, a higher percentage of Ph.D. graduates continued to work in the field of beans/cowpeas. Thus, if the objective of the GDT program is to develop a cadre of developing country scientists who continue to conduct bean/cowpea-related research, investing in Ph.D. training is a high priority endeavor.

### *D. Returned to home country*

Brain drain is a matter of concern to program administrators and donors, since the goal of capacity building in developing countries is not achieved if trainees stay in the U.S (UN Economic Commission for Africa, 2000). The questionnaire asked trainees if they returned to their home country immediately after the GDT and if not, where they went and why they did not immediately return to their home country. It is important to note that while some former trainees did not return home immediately, almost all eventually returned and are currently working in their home country or at another country in the region. Also, although the questionnaire asked trainees if they returned to their home country, the study is primarily interested in whether they returned to a developing country.

In the case of the CRSP, 86 percent (36 out of 42) of HC respondents returned to their home country or in another developing country after completing their GDT. Out of the six respondents who did not return, four stayed in the U.S. permanently and two are still in graduate school. However, four trainees who returned to their home countries at some point in the past are currently working in the U.S. Almost all trainees who stayed in the U.S. cited having work opportunities or job offers in the U.S. as major reason for not returning home after completing their GDT.

Most of the returnees earned a Ph.D. degree (86%) and specialized in plant sciences (69%). Five of the respondents who did not return home were in the social sciences. With respect to the

return rate by region, all of the nine respondents from WA, nine out of ten respondents (90%) from ESA, and 18 of the 23 respondents from LAC returned to their home country (78%).

HC trainees who returned to their home country were also asked whether or not they returned to the same institution where they were employed prior to studying in the U.S. Out of the 29 responses who answered this question, 23 trainees (79%) returned to the same institution – mainly the government (36%) or a university (31%) – and 72 percent are working in a bean/cowpea-related field. Furthermore, about one-half of the returnees (43%) are currently involved in a bean/cowpea-related organization (e.g., the Bean Improvement Cooperative) and 62 percent had collaborated with their former CRSP supervisor on at least one research project after completing their GDT. These results demonstrate that the CRSP GDT program has been successful in strengthening the capacity of host countries to carry out bean/cowpea research. Moreover, 36 percent of the returnees have found outside consulting opportunities to supplement their income from their primary job.

### *E. Continued collaboration with B/C CRSP*

This section analyzes the characteristics of respondents who continued to and did not continue to collaborate with a CRSP scientist (i.e., their U.S. GDT supervisor) after completing their GDT. Twenty-nine out of 74 (39%) trainees reported that they had collaborated with their supervisors at least once since completing their GDT. Most of these trainees were plant sciences graduates (76%) and from host countries (60%). In contrast, most U.S. trainees (29 of 34, 85%) reported that they did not collaborate with a CRSP scientist after graduation. However, as one trainee commented, non-collaboration does not necessarily mean that a trainee does not want to collaborate. In some cases, there are limited opportunities to collaborate, due to differences in career advancement, change in career priorities, and the difficulty of long-distance collaboration.

A majority of trainees who collaborated with a CRSP scientist at least once since completing their GDT are either currently working for the government (38%) or a university (38%), whereas most of those who did not collaborate are either employed at a university (49%) or in the private sector (20%). Eighty-six percent of trainees who had collaborated with their former CRSP supervisor are currently working on a bean/cowpea-related project. Further, 55 percent of those who collaborated are currently associated with one or more bean/cowpea-related organizations.

## IV. RESULTS: PRINCIPAL INVESTIGATORS

A key-informant questionnaire was e-mailed to all CRSP supervisors (or US-PIs directly in-charge of the trainees) to validate and supplement trainees' answers to questions on Performance and Results Evaluation. As US-PIs are primarily responsible for recruiting trainees, they were asked to identify the factors that influenced their decision to fully or partially support a trainee under the CRSP. The primary reasons cited for fully supporting a trainee was because the individual was from a host country (31%) and that he/she could not pursue a graduate program without full funding (27%). The main reason PIs gave for partially supporting a trainee was because leveraged funds were available, either from the department (39%) in which the trainee was enrolled, or from an external source (25%), such as foreign scholarship or another research grant.

Many of the PIs (79%) recognize the capacity-building impacts of the GDT on the trainee and on the institution where they go after completing their graduate study. This capacity-building effort opens up opportunities for future collaboration between the CRSP and former trainees (32%). Further, CRSP's strong commitment to long-term training (42%) had paved the way for the recruitment of excellent students around the world, who are now distinguished agricultural scientists and research collaborators of the CRSP. In many instances, PIs noted that the CRSP has supported

both the trainees' coursework and thesis or dissertation research (32%), which enabled trainees "to work on real problems and research topics relevant to the needs of the host country".

PIs were asked to identify bean/cowpea-related achievements or accomplishments of their former trainees. Most of the PIs (64%) reported significant jobs held by their former trainees, including positions such as 'Dean', 'Department Chair', 'Director', 'Manager', 'Professor'. Several PIs cited specific research contributions (15%) (e.g., 'becoming the authority in bacterial disease research in Dominican Republic', 'contribution to the understanding of root rot mechanisms and the role of nitrogen fixation and bio-control agents in root rot control') and publications and awards that resulted from the trainees' bean/cowpea-related research (6%).

# V. RESULTS: CASE STUDY AT SUA

## *A. Background*

A case study was carried out to assess to what extent trainees had enhanced teaching and research capacity building at a partner HC institution and to document the kind of collaboration that had occurred between former trainees and U.S. and HC institutions. The institution selected for the case study was Sokoine University of Agriculture (SUA, in Tanzania). In partnership with the National Beans Research Program, SUA has a mandate to test lines and conduct performance trials for the low altitude ecosystem (<1,000m). It also contributes and exchanges germplasm with other national bean program partners.

The CRSP has collaborated with SUA faculty since 1981, before it became a separate institution from the University of Dar es Salaam. US-PI Dr. Matthew Silbernagel (USDA-ARS, Washington State University) began and led the program, which is now known commonly within the campus as the "bean project". While the program initially focused on plant breeding, its research focus was expanded in subsequent years. Prior to 1980, very little bean research was conducted in

Tanzania. Thus, the entry of the CRSP greatly enhanced Tanzania's capacity to conduct bean-related research.

### *B. B/C CRSP Training Investment*

Largely as a result of CRSP support, SUA has become the key institution in Tanzania for bean/cowpea-related degree training. To date, the CRSP has supported a total of 20 students from Tanzania in 25 academic degrees. Eleven of these trainees went to the U.S. for their graduate study, while the other eight pursued their graduate degrees at SUA. For U.S. degree training, the US-PIs, in collaboration with SUA staff, identified the training and research needs of a project component. For SUA-based degree training, HC-PIs identified disciplines and departments with a shortage of bean scientists.

Trainees, who were SUA employees, were usually granted study leave before going to the U.S. for GDT, which benefited both the trainee and SUA. First, the trainee continued to receive compensation while studying. Second, because the trainees were required to return to their home institution after completing their graduate program, this helped ensure that KSAs acquired from the trainees' GDT supported capacity building at the university. For example, the CRSP supported the training of SUA's two plant breeders. Third, upon returning to Tanzania, trainees were assured of being appointed to a faculty position at SUA. These reasons serve as significant incentives for Tanzanian trainees to return home. Contrary to the popular notion that trainees from Africa rarely return to their home countries, 10 out of the 11 CRSP-supported trainees from Tanzania returned home after completing their GDT in the U.S. and a majority was still working at SUA. Furthermore, the returning trainees have become the main CRSP collaborators at SUA.

While the GDT, not the CRSP per se, has contributed to the capacity building at SUA, the CRSP has facilitated this endeavor by awarding scholarships to SUA staff and through its support of collaborative research. Because of the scholarship opportunity made available by the CRSP to SUA,

its teaching and research capacity has been strengthened. Further, through their teaching and research activities, these CRSP-supported trainees have produced "second-generation" trainees who hold key bean research-related position at the national level. Former CRSP trainees have also been successful in getting externally-funded bean-related projects to complement and enhance their existing CRSP projects. Furthermore, SUA's CRSP collaborators are active participants in other research networks in Africa, especially the Southern Africa Bean Research Network (SABRN) and the Eastern and Central Africa Bean Research Network (ECABREN) under the Pan-Africa Bean Research Alliance (PABRA). Finally, despite major infrastructure and technology challenges, SUA's CRSP trainees have published numerous research papers in major journals, proceedings, and books, and have authored extension bulletins and manuals that are currently used by farmers and students.

## VI. SUMMARY AND CONCLUSION

Since 1981, the CRSP has invested more than US$69 million to support global bean/cowpea research. About US$7 million of the total was spent on training, in order to develop a critical mass of bean/cowpea scientists. To this end, the CRSP has supported nearly 200 students for M.S. and Ph.D. degrees at U.S. universities in the fields of plant sciences, food sciences and social sciences -- fields critical to the development of bean and cowpea research in host countries in Latin America and Sub-Saharan Africa and the U.S. The priority placed on funding training demonstrates the CRSP's long-term commitment to capacity-building at HC institutions. However, given the decline in the availability of donor funding to support graduate degree training (GDT) for students from developing countries, there is a need to assess the impacts of this type of investment. This study is the first major attempt to document and assess the impacts of the B/C CRSP graduate degree

training program, from the perspectives of the trainees and the U.S. scientists who supervised the trainees.

One of the key findings is that almost all (86%) of the HC trainees returned to their home country and most of them are still involved in bean/cowpea research. Moreover, the study revealed that after completing their GDT, a much higher percentage of the HC trainees continue to collaborate with CRSP scientists and conduct bean/cowpea research, compared to U.S. trainees. Similarly, a much higher percentage of Ph.D. trainees continue to collaborate with CRSP scientists and conduct bean/cowpea research, compared to M.S. trainees.

The study documents that the B/C CRSP has been playing an important role in strengthening teaching and research capacity in beans and cowpeas, both in the U.S. and in host countries. Thus, in order to build on and sustain these successes, the study recommends the continued commitment and increased financial support to GDT, putting high priority to supporting HC trainees.

In assessing the impact of training, the study acknowledged several issues that limit the analysis. First, it was not possible to separate the impacts of CRSP-funded GDT from the impacts of training received elsewhere. Second, the assessment of the impact of GDT on trainees' income did not take into account some factors that affect impact, including differences in training years, the quality of training, and the extent to which the trainees apply their KSAs to generate impacts. Nonetheless, the findings, as well as the limitations of the study, suggest avenues for future research, including a more rigorous quantitative analysis of the costs and benefits of GDT to the trainee and to the B/C CRSP, and an analysis of the impact of GDT on trainees who pursued their graduate study in host country institutions.

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**Figure 1**. B/C CRSP's U.S.-based graduate degree training model

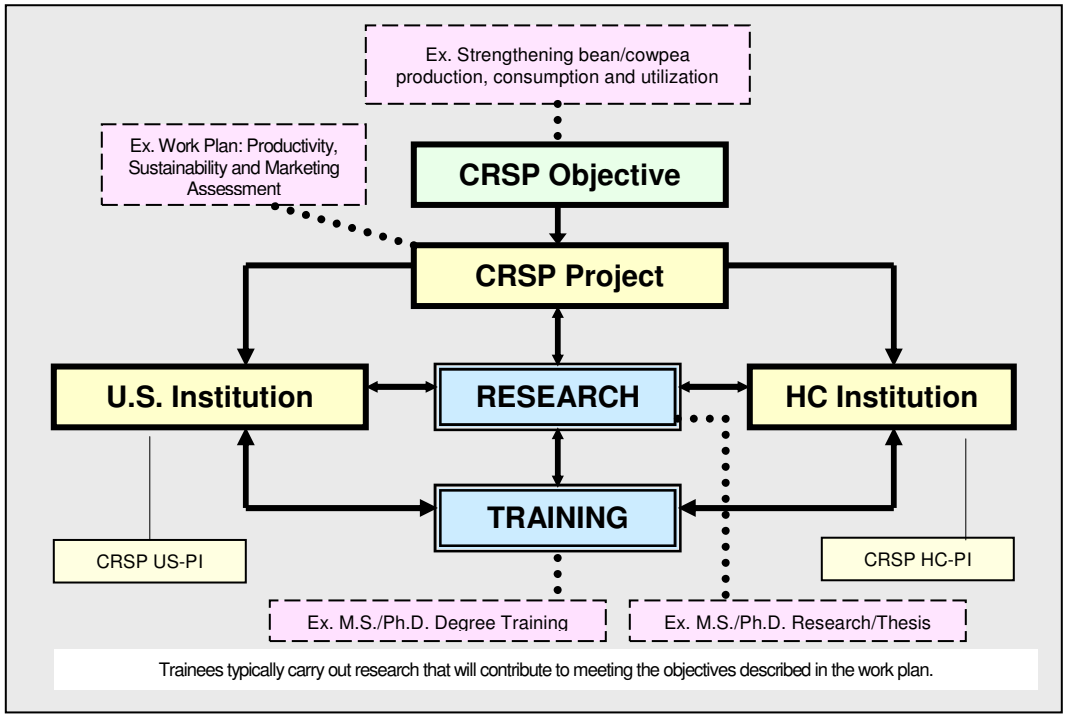

**Table 1**. Overview of the B/C CRSP trainee respondents

| Region | Target population | % | Frame population | % | Respon-dents | % | Response Rate[b/] |
|---|---|---|---|---|---|---|---|
| Latin America | 56 | 30% | 41 | 33% | 23 | 30% | 56% |
| East/South Africa | 25 | 13% | 18 | 14% | 10 | 13% | 56% |
| West Africa | 17 | 9% | 12 | 10% | 9 | 12% | 75% |
| U.S. | 89 | 48% | 55 | 44% | 34 | 45% | 62% |
| Discipline | | | | | | | |
| Food Science | 39 | 21% | 21 | 17% | 13 | 17% | 62% |
| Plant Science | 123 | 66% | 83 | 66% | 46 | 61% | 55% |
| Social Science | 25 | 13% | 22 | 17% | 17 | 22% | 77% |
| Highest B/C CRSP-supported degree | | | | | | | |
| Ph.D. | 95 | 51% | 71 | 56% | 44[a/] | 58% | 62% |
| M.S. | 92 | 49% | 55 | 44% | 32 | 42% | 58% |
| Funding | | | | | | | |
| Indirect | 35 | 19% | 28 | 22% | 11 | 14% | 39% |
| Partial | 80 | 43% | 51 | 40% | 30 | 39% | 59% |
| Full | 72 | 39% | 47 | 37% | 35 | 46% | 74% |
| Gender | | | | | | | |
| Female | 78 | 42% | 45 | 36% | 26 | 34% | 58% |
| Male | 109 | 58% | 81 | 64% | 50 | 66% | 62% |
| Grant Period | | | | | | | |
| 1 (1981-1986) | 46 | 25% | 22 | 17% | 14 | 18% | 64% |
| 2a (1987-1997) | 93 | 50% | 62 | 49% | 30 | 39% | 48% |
| 2b (1998-2002) | 28 | 15% | 23 | 18% | 15 | 20% | 65% |
| 3 (2003-2005) | 20 | 11% | 19 | 15% | 17 | 22% | 89% |
| **Total** | **187** | | **126** | | **76** | | 60% |

a/ This number represents the trainees' highest CRSP-supported degree. Many trainees who were supported for their M.S. degrees had gone on to continue studying for their Ph.D. degrees with financial support from other sources. Considering the highest degree received by trainees, regardless of funding source, 58 (76%) respondents have Ph.D. degrees and 18 (24%) have M.S. degrees.
b/Percent of frame population who returned the questionnaire.