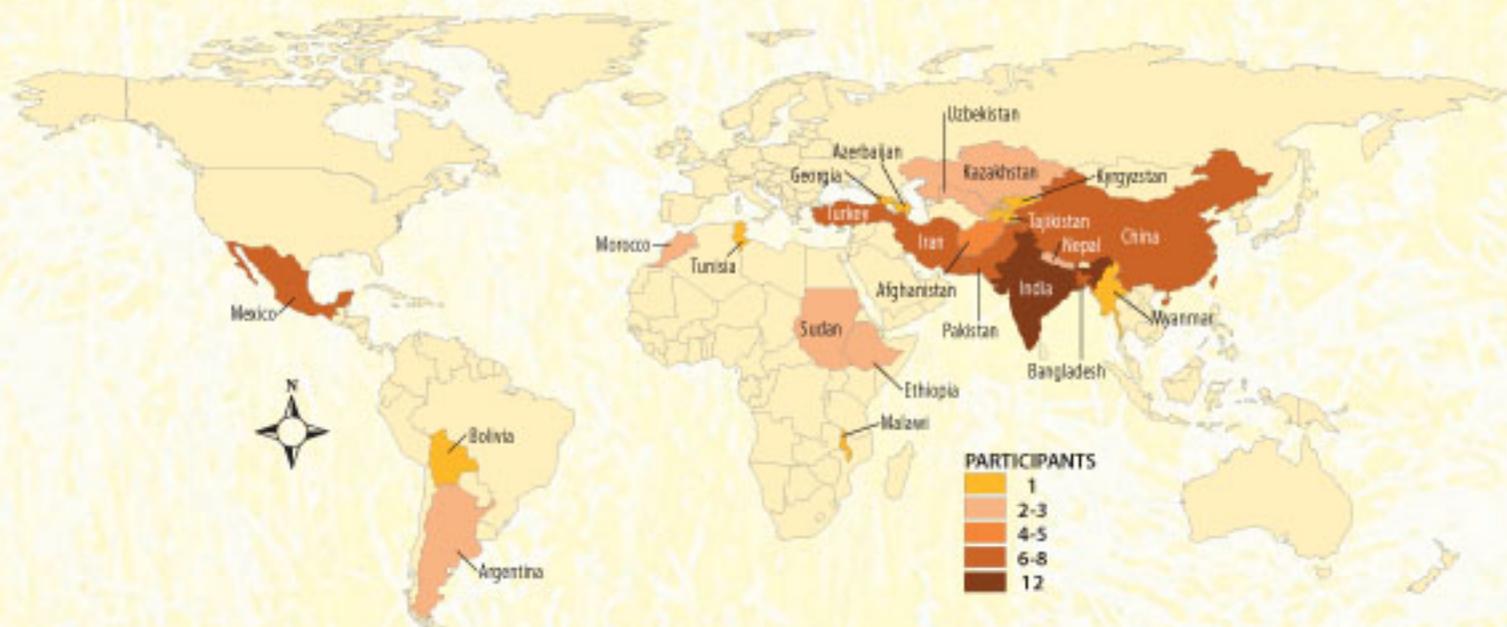


# **Impacts** of CIMMYT's international training linked to long-term trials in **conservation agriculture**: 1996–2006

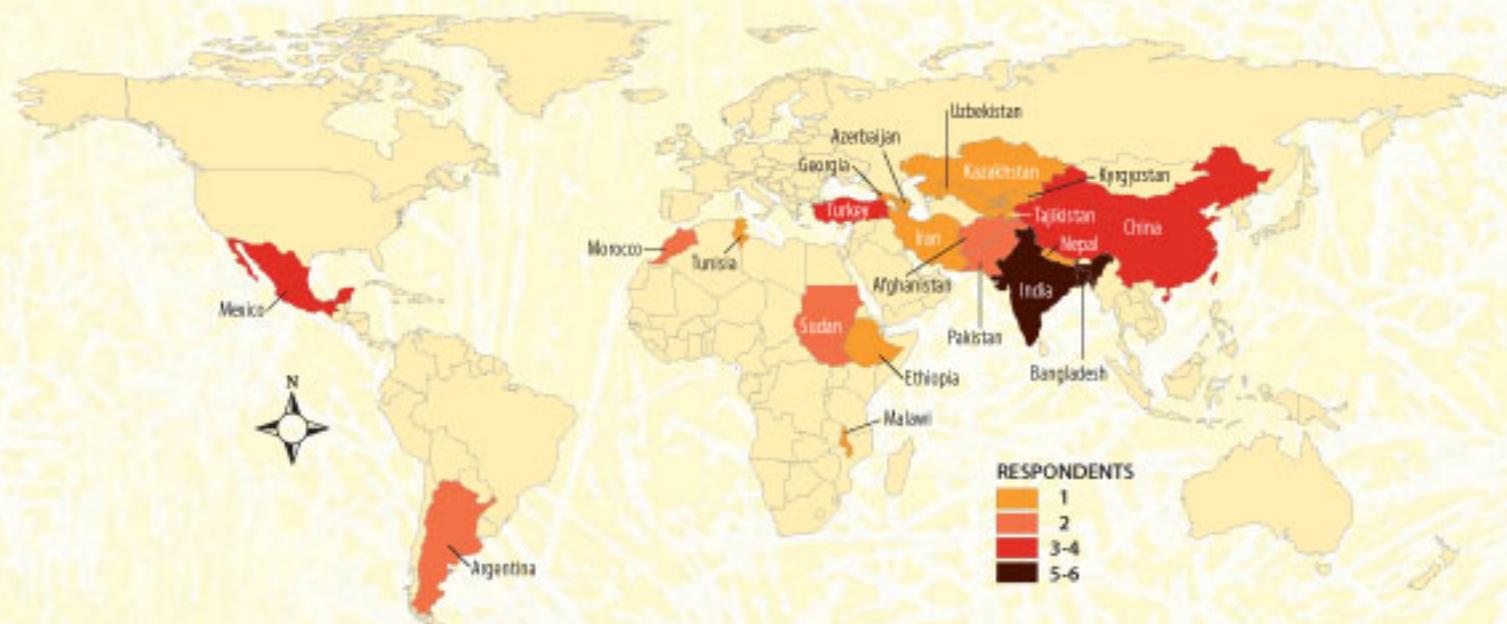
Jirina Svitáková, Petr Kosina, Roberto La Rovere



 CIMMYT



**Figure 1. Division of participants by country.**



**Figure 2. Division of respondents by country.**

# **Impacts of CIMMYT's international training linked to long-term trials in conservation agriculture: 1996–2006**

**Jirina Svitáková, Petr Kosina, Roberto La Rovere**

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# Contents

<b>Contents</b> .....	iii
<b>Index of tables</b> .....	iv
<b>Index of figures</b> .....	iv
<b>Acknowledgments</b> .....	v
<b>Acronyms and abbreviations</b> .....	vi
<b>Foreword and introduction</b> .....	vii
<b>1. Methodology</b> .....	1
I. Trainee survey .....	1
II. Research leader survey.....	2
<b>2. Results: Trainees’ perspective</b> .....	3
I. Characteristics of survey respondents.....	3
II. Perception of the course .....	4
Summary and conclusions – part II.....	5
III. Networking, communication, and collaboration after the course.....	5
Summary and conclusions – part III. ....	7
IV. Impacts of training on professional career and personal growth .....	7
Summary and conclusions – part IV.....	8
V. Impacts on trainee’s organization and research from trainees’ point of view .....	9
Summary and conclusions – part V.....	11
VI. Spillover impacts of the CA training at CIMMYT .....	11
Summary and conclusions – part VI. ....	12
<b>3. Research leaders’ perspective</b> .....	14
I. General information.....	14
II. CA training course evaluation.....	14
III. Impacts of CA training courses at CIMMYT .....	16
<b>Conclusions: Lessons learned and recommendations</b> .....	18
<b>Appendixes</b> .....	19

## Index of tables

Table 1. Survey response rate by training event.....	2
Table 2. Occupation of respondents. ....	3
Table 3. Respondents by employing institutions at the time of training and currently.....	4
Table 4. Type of work of respondents .....	4
Table 5. Attitudes, behaviors, and skills adopted, as reported by trainees. ....	7
Table 6. Number of supervised people before CIMMYT training and currently.....	8
Table 7. Contribution of CIMMYT training to improve local or regional farming practices.....	13
Table 8. Attitudes, behavior and skills adopted, as reported by leaders. ....	16

## Index of figures

Figure 1. Division of participants by country. ....	inside front cover
Figure 2: Division of respondents by country. ....	inside front cover
Figure 3: Division of research leader respondents by country. ....	inside back cover
Figure 4. Regions represented by respondents. ....	3
Figure 5. Age of respondents at the time of attending a course. ....	3
Figure 6. Percentage of time spent in different work environments. ....	4
Figure 7. Alternative training providers, as reported by survey respondents. ....	5
Figure 8. Constraints in trainees' organizations to use what learned during the courses. ....	5
Figure 9. Frequency of post-training interaction with course instructors and fellow trainees. ....	6
Figure 10. Percentage of respondents using different sources of information. ....	6
Figure 11. Type of work of subordinates before CIMMYT training and currently. ....	8
Figure 12. Promotion and salary increase after the CIMMYT training. ....	8
Figure 13. To whom was further training provided by the trainees. ....	12
Figure 14. Contribution of CIMMYT training to improve local or regional farming practices. ....	12
Figure 15. Constraints to use what trainees learned by trainees, as reported by leaders. ....	14
Figure 16. Sources of training and professional development for the staff in organizations. ....	14
Figure 17. Alternative training providers, as reported by leaders. ....	15
Figure 18. Beneficiaries of training provided by course participants, as reported by leaders. ....	17

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## Acronyms and abbreviations

AAAIID	Arab Authority for Agricultural Investment and Development
ADB	Asian Development Bank
ACIAR	Australian Centre for International Agricultural Research
ARIA	Research Institute of Afghanistan
BARI	Bangladesh Agriculture Research Institute
CA	Conservation Agriculture
CGIAR	Consultative Group for International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement.
FAO	Food and Agriculture Organization
FNRI	Food and Nutrition Research Institute
GO	Governmental Organizations
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IARC	International Agriculture Research Centers
ICARDA	International Center for Agricultural Research in the Dry Areas
IA	Impact Assessment
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
INIFAP	Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias
INTA	Instituto Nacional de Tecnología Agrícola (Argentina)
IRRI	International Rice Research Institute
IWMI	International Water Management Institute
IWWIP	International Winter Wheat Improvement Program
NARS	National Agricultural Research System
NGO	Non-governmental organization
NZAID	New Zealand's International Aid and Development Agency
OEA	Organización de los Estados Americanos
USAID	United States Agency for International Development
TIKA	Turkish International Cooperation and Development Agency
WRC	Wheat Research Centre

## Foreword and introduction

Conservation agriculture (CA) combines the principles of a) reduced tillage systems that feature minimal soil disturbance; b) retention of adequate levels of crop residues and cover on the soil surface, to protect the soil from water/wind erosion, water run-off and evaporation, improve water productivity and enhance soil properties; and c) economically viable, diversified crop rotations to help mitigate weed, disease, and pest problems. These principles are applicable to a wide range of crop production systems under low-yielding, dry rainfed and high-yielding irrigated conditions. CIMMYT has offered courses on CA for many years that link a multidisciplinary approach to sustainable crop management with the experience of agronomists leading projects in Asia, Africa, and Latin America.

This report summarizes the strengths, weaknesses, outcomes, and impacts of the CIMMYT CA course titled “Bed planting and zero till conservation agriculture technologies for irrigated and rainfed wheat and maize production systems.” During the 10-year span covered by this study, the course was held 16 times under the leadership of CIMMYT agronomist Dr. Ken Sayre. Information presented in this study was gathered from two surveys; one designed for past course participants (scientists attending four-to-five-week training courses in CIMMYT facilities in Mexico). The other survey was prepared for their immediate research leaders and supervisors in the area of agronomy/conservation agriculture.

## Summary of findings

This study focused on the training of scientists who work in public, private, or non-governmental sectors in the areas of agronomy and sustainable management of natural resources. Of the 82 trainees who participated in CIMMYT CA training courses between 1996 and 2006, 80 were men and 2 women. Course participants were usually selected by NARS leaders and through CIMMYT regional offices in cooperation with NARS leaders. Not all trainees were reached by the survey due to change of their contact details. Out of 67 distributed surveys to reachable course participants, we received 42 responses (63% response rate) and for surveys to research leaders – out of distributed 41 surveys we received 19 responses (46% response rate).

Course participants came to CIMMYT to strengthen their skills and knowledge and were actively involved in the CIMMYT's ongoing cropping systems management activities at the experimental stations near Mexico City or at Ciudad Obregón. A main goal of the course was that participants return to their institutions and incorporate their new skills and knowledge into their work, become more open-minded, in terms of the multidisciplinary aspects of CA, and extend new technologies to farmers.

Formal training activities linked to long-term trials in the field of conservation agriculture (CA) are, according to 45% of course participants and 37% of research leaders, available only through CIMMYT. The level of training was mostly evaluated as very satisfactory, with participants stating that they used the support materials distributed during the course in their work. The biggest constraint to applying CA information in the home institutions of participants was a lack of suitable CA machinery and equipment; research leaders instead reported a lack of financial resources as the main constraint.

The course helped in creating a scientific network; almost half the respondents are communicating with their instructors and fellow trainees at least twice a year. More than half the respondents and 74% of their corresponding organizations are currently collaborating with CIMMYT. Almost all respondents evaluated their level of confidence to perform their job as “higher” after the CIMMYT course and were able to describe tangibly how their methodologies and skills improved. Responses show that there is a perceptible increase in motivation to do more hands-on work in the field or in the laboratory after attending the course and to increase supervisory responsibilities. Almost half the respondents were promoted, with CIMMYT training believed to be a contributing factor in achieving these promotions.

All respondents considered the course relevant. Both trainees and research leaders state that participation in the course helped them to conduct new and diverse research. Generally, the training was considered a good investment for the trainees' organizations. Research leaders report improved staff morale, increased interest in hands-on work, more communication with international scientists, and increased knowledge and skills on CA and sustainable management of natural resources.

Dissemination of the knowledge presented in the course has been documented both within and outside of the participants' institutions. The main recipients of this knowledge have been thousands of farmers and hundreds of extension workers and researchers. In this way, the CIMMYT training helped the trainees' organization improve agricultural practices and spread them on a mass scale to local farmers.

# 1. Methodology

The present study assessed the perceptions on the CA courses given by CIMMYT as reported by trainees who participated in the CA courses and by research leaders in their organizations. Research leaders and course participants who responded to our survey are further referred to as “respondents” in this report. The following two sections describe the methodology that was employed.

## I. Trainee survey

In order to evaluate the strengths and weaknesses and the extent of impact that CIMMYT’s formal CA training program had on the professional development of participants and on strengthening the research agenda at their organizations, an extensive survey was administered to former trainees.

The questionnaire consisted of **37 questions** structured in 6 parts (reported in Appendix A):

- **I. Characterization of survey respondents.** Information to verify existing data from CIMMYT’s database (year of course participation, age, gender, and employer at the time of training) and to update biographical information (current occupation and employer, work position and proportion of time spent in different activities).
- **II. Perception of the course.** Information on the level of training received during the course, use and quality of distributed training materials, infrastructural and socioeconomic constraints to the use of the acquired knowledge and skills after course completion, suggestions for improvement of the CA course, and perception about possible alternative providers of similar training.
- **III. Networking, communication, and collaboration after the course.** Information on the participation in scientific networking among scientists after taking the course at CIMMYT.

- **IV. Impacts of training on professional career and personal development.** Information on the skills and attitudes acquired by participants including: confidence in job performance, desire and confidence to do hands-on laboratory or field work; how the training furthered personal careers.
- **V. Impacts of training on trainee’s organization and research.** Information on the relevance and utility of CIMMYT CA training for the trainees’ organizations and institutions. These questions were focused on changes in perception and on the way research is conducted in the respondents’ organization and were intended to detect outcomes and direct impacts resulting from CA courses.
- **VI. Spillover impacts of the CA training at CIMMYT.** Information to measure the broader outcomes and direct impacts of the CA training courses taken at CIMMYT; participants were asked if they provided any training to others in their organization based on the knowledge and skills they developed at CIMMYT, and if so, to whom the training was targeted and how it impacted the trainees’ region.

Some questions allowed respondents to make multiple choices for the answers considered appropriate, while other questions encouraged them to write down additional relevant information or comments.

The data sets cover a **10-year period**, from **1996 to 2006**. **Sixteen training courses** in the area of CA and sustainable management of natural resources were conducted in Mexico during this period. Course activities were carried out in the center’s Mexican research stations at El Batán, Toluca (May – June) or near Ciudad Obregón, Mexico (November – December). In total there were **82 course participants** from **23 different countries** (Figure 1, inside front cover). Figure 2 (inside front cover) presents the geographical distribution of the course respondents.

Table 1 shows the number of trainees along with the response rate by course. The survey was distributed to 67 (out of a total of 82) course participants. Distribution was dependent on accurate contact data; the remaining 15 participants were not reachable. **Forty-two questionnaires** were filled in and returned; the overall response rate was **63%**. The questionnaire was made available both online (<http://www.surveymonkey.com>) and by email. Participants from Spanish-speaking countries received their questionnaires in Spanish; all other questionnaires were in English.

## II. Research leader survey

Immediate superiors (research leaders) of the course participants were asked to share their perceptions of the impact CIMMYT's training

**Table 1. Survey response rate by training event.**

Year	Number of participants	Gender Male/female	Distributed questionnaires	Received questionnaires
2006 (El Batán)	2	2/0	2	2
2005 (Obregón)	1	1/0	1	1
2005 (El Batán)	5	5/0	5	4
2004 (Obregón)	2	2/0	2	0
2004 (El Batán)	9	8/1	9	5
2003 (Obregón)	6	6/0	6	4
2003 (El Batán)	8	8/0	8	5
2002 (Obregón)	9	9/0	7	6
2002 (El Batán)	8	8/0	7	5
2001 (Obregón)	5	5/0	5	4
2001 (El Batán)	5	4/1	5	2
2000 (Obregón)	7	7/0	6	0
1999 (Obregón)	3	3/0	1	1
1999 (El Batán)	4	4/0	2	2
1998 (Obregón)	3	3/0	1	1
1996 (Obregón)	5	5/0	0	0
Total	82	80/2	67	<b>42</b>

had on their institutions, employees, and region or country. The survey contained **18 questions** subdivided into 3 groups (Appendix B):

- **I. General information.** We asked the respondent's name, position title, and contact details and if s/he was part of his/her current organization while attending the CA course at CIMMYT. Other questions included how many people in the respondent's institution are involved in research activities related to CA or sustainable management of natural resources and the main infrastructural and socio-economic constraints to using what trainees learned during the course.
- **II. CA training course evaluation.** Questions addressed the training and professional development sources utilized by the respondent's organization and the existence of CA training courses besides those offered by CIMMYT. Leaders were encouraged to suggest improvements for future CA courses. They were asked if the training program at CIMMYT was a good investment for their organization and if the organization currently collaborates with CIMMYT.
- **III. Impacts of CA training courses at CIMMYT.** These questions addressed outcomes and direct impacts at the individual, institutional, and regional level in terms of conducting research, improving agricultural practices, sharing knowledge, and the perceived changes in attitudes after the training program.

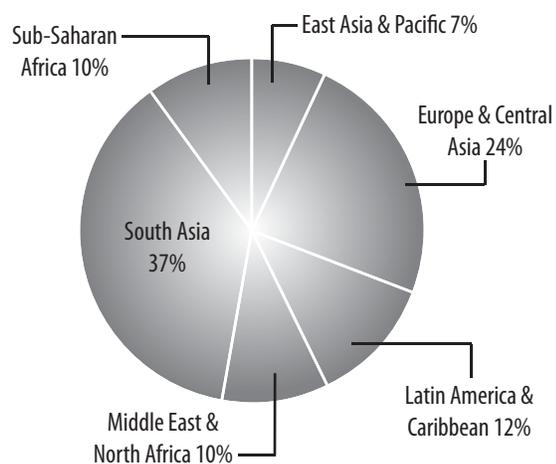
The recipients of the research leader survey were selected based on the 42 respondents to the trainee survey. Forty-one surveys were distributed (there was insufficient contact information for one research leader). Of these, one leader responded twice, referring to two different trainees. **Nineteen questionnaires** were received (Figure 3, see inside back cover); the response rate was **46%**.

## 2. Results: Trainees' perspective

### I. Characteristics of survey respondents

Figure 4 shows the distribution of the trainees across the six areas of the world, using the classification system established by the World Bank.<sup>1</sup> The largest number of respondents was from South Asia (India, Nepal, Bangladesh, and Pakistan). The survey was answered by **41 men** and **1 woman**. Age of respondents is shown in Figure 5. Most respondents are agronomists (Table 2).<sup>2</sup>

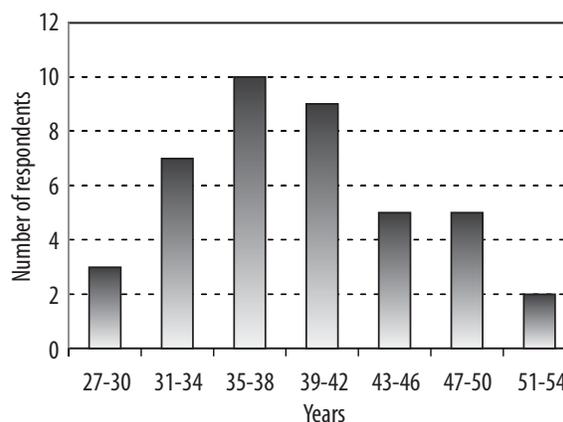
Most respondents worked—both at the time of training and at the time of survey response—for a national agricultural research center (Table 3); 4 work for a university or college and 3 for an agricultural extension program. The rest worked for NGOs, private institutions, non-research government agencies, or other institutions.<sup>3</sup> Participation in the CA course had no effect on respondents changing employers or their type of job, but five respondents mention as a secondary effect of their participation in the training course



**Figure 4. Regions represented by respondents.**  
(Total of respondents = 42)

that they improved their language skills, which allows them to work internationally, communicate with scientists, and cooperate with international research centers.

When asked to select their position and type of work in their organization, most respondents identified themselves as active researchers (52%, Table 4). Approximately half of respondents slightly advanced in their profession since training at CIMMYT. In terms of specific work activities, the most important work environment for almost all respondents was farmers' fields, where some spent up to three-quarters of their time. The second most



**Figure 5. Age of respondents at the time of attending a course.**  
(Total of respondents = 42)

**Table 2. Occupation of respondents.**

Type of work	Number of responses	Percent of total
Agronomy	31	74%
Plant breeding	4	10%
Plant pathology	1	2%
Other	6	14%
<b>Total</b>	<b>42</b>	<b>100%</b>

<sup>1</sup> Countries of respondents are: Afghanistan (2), Argentina (2), Azerbaijan (1), Bangladesh (6), Ethiopia (1), Georgia (1), China (3), India (5), Iran (1), Kazakhstan (1), Kyrgyz Republic (1), Malawi (1), Mexico (3), Morocco (2), Nepal (1), Pakistan (2), Sudan (2), Tajikistan (1), Tunisia (1), Turkey (4), Uzbekistan (1).

<sup>2</sup> Six people indicated that their jobs involved work "other" than the categories provided in the survey. Responses included: agricultural engineering (specialization in CA, farming system agronomist, soil scientist, seed specialist) and capacity building (technical assistance and capacity building of technicians and agronomists)

<sup>3</sup> One participant answered that he started working in another organization to have more support for his CA work and research.

selected place was experimental stations. Almost all respondents spent at least some of their time in the office and one-quarter of respondents worked part of the time in the laboratory (Figure 6).

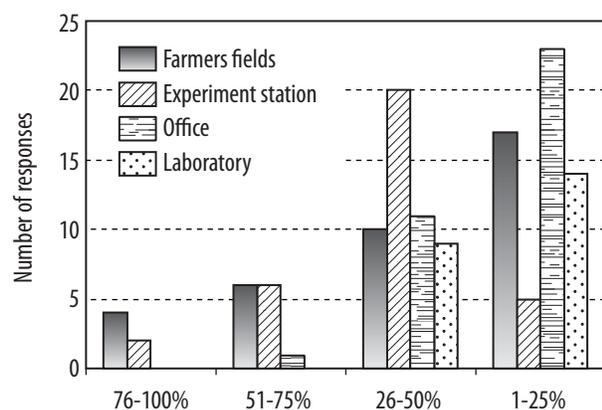
**Table 3. Respondents by employing institutions.**

Workplace	At time of training		At time of response	
	Count	Percentage	Count	Percentage
National research center	26	62%	23	56%
University or college	4	10%	4	10%
Agricultural extension program	3	7%	3	7%
NGO	2	5%	2	5%
Private company (for profit)	0	-	1	2%
Government agency that does not do research	0	-	1	2%
International agricultural research center	0	-	1	2%
Other	7	16%	7	16%
<b>Total</b>	<b>42</b>	<b>100%</b>	<b>42</b>	<b>100%</b>

**Table 4. Type of work of respondents.**

	Number of responses	Percent of total
Active researcher	28	52%
Researcher / administrator	6	11%
Professional trainer	6	11%
Extension specialist	5	9%
Professor	3	6%
Administration (e.g. director)	1	2%
Other	5	9%

Note: (more than one response was allowed).



**Figure 6. Percentage of time spent in different work environments.**

## II. Perception of the course

Most respondents rated the training as relevant to their level of knowledge, skill, and experience at the time of the course (37, or 88%). Almost all respondents (39, or 93%) stated that they used the learning (support) materials distributed during the training (books, publications, CDs, etc) in their work. Respondents were asked for suggestions to improve the course. Examples of responses are listed in the Box 1 below (similar responses are aggregated). The same format for reporting significant participant observations is used throughout the document, and focuses on selected meaningful answers only.

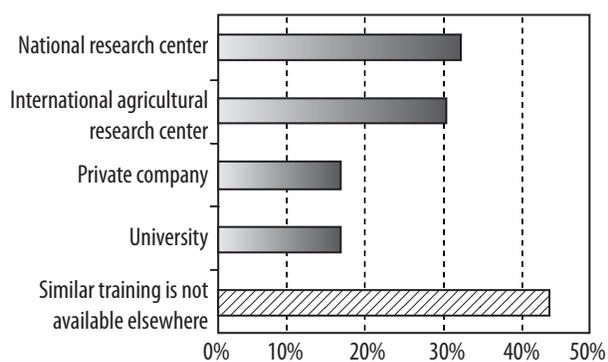
### Box 1 – suggestions for improvement of CA course:

- Training should last longer (2-3 months), so that trainees can fully understand all agronomic practices under CA from planting to harvest. Along with a longer training period, the course should be organized at various locations, so the success of CA methods can be compared in different places (mentioned by respondents from Malawi, Uzbekistan, China, India, Bangladesh).
- Include CA approaches for different farming and production systems; e.g., how to adopt CA when two crops in the system entirely differ in their biophysical requirements, promotion of traditional methods in farmers fields, etc. (mentioned by respondent from Nepal).
- Visit the other stations of CIMMYT and exchange the experiences between different countries (mentioned by respondent from China, Tunisia).
- Research-experimental applied programs should be done more in touch with farmers. Farmers and people who directly transmit knowledge and experiences from the course to farmers should participate in the course (mentioned by participants from Argentina, Mexico).

When asked about other providers who may offer training similar to that provided by CIMMYT, the most common response is that it is not offered elsewhere (45%). However, about one-third of respondents (33%) mentioned national research

centers and 31% mentioned other international agricultural research centers (IARC) as alternative providers of CA training (Figure 7).

When asked about infrastructural or socioeconomic constraints in their organizations to implement the information gained during the CA courses, most respondents (67%) said unsuitable and/or unavailable CA machinery or equipment was a constraint (Figure 8). In addition, 51% report limitations in financial resources and resources for providing further training (classrooms, publications, etc.), and a third recognize other issues: lack of technical assistance, limited



**Figure 7. Alternative training providers, as reported by survey respondents.**

Note: more than one option was possible.

laboratory space and research plots, environmental constraints, insufficient access to farmers' fields to apply what learned in the course.

### Summary and conclusions – part II

Overall, respondents are very satisfied with the level of training and support materials provided during the course, which they have found generally useful. Most would like to extend the course's length, as longer courses would be more practical for field research and would provide more time to learn the communication skills necessary for spreading and teaching CA information to farmers. When the trainees returned to their organizations and began to apply the knowledge gained during the course, the most common constraints were unavailability of suitable CA machinery, financial support, and resources to provide further training.

### III. Networking, communication, and collaboration after the course

Respondents indicated that there was more communication among trainees and instructors than among trainees themselves. During the years after participating in the CA course, almost half the respondents (48%) said they communicated with course instructors at least twice a year. Sixteen, or 38% of respondents have at some point interacted with their instructors since the course, but less than

once a year, and 14% did not communicate with the instructors at all.

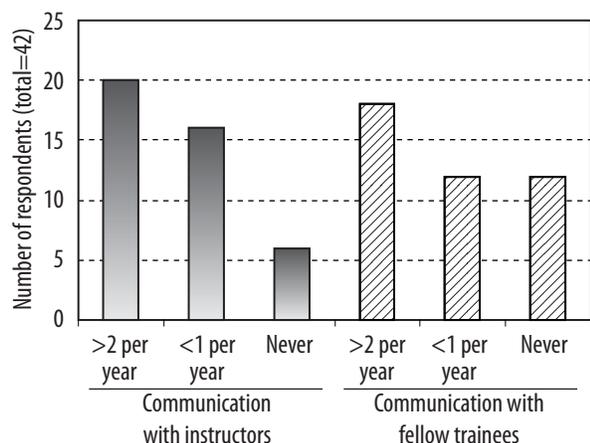


**Figure 8. Constraints in trainees' organizations to using what was learned during the courses.**

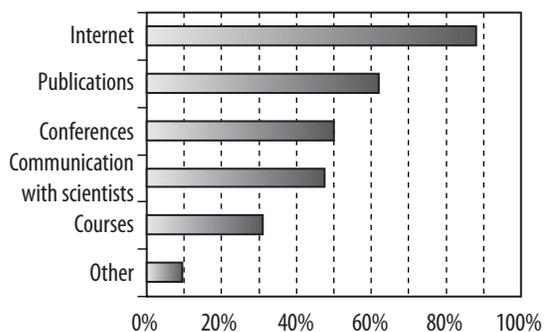
Note: more than one option was possible.

Similarly, 43% of the respondents said they communicated with their fellow trainees at least twice a year; about one-third (29%) less than once a year, and 29% did not communicate at all with other trainees (Figure 9). Selected responses on communication and collaboration are given in Box 2.

When asked about how they obtained information about current research and advances in CA, almost all respondents (88%) reported the internet as the main source of information (Figures 10). Other sources were scientific publications, participation in conferences and workshops, and communication with fellow scientists. More than a half of respondents (55%) are currently collaborating with CIMMYT. Examples of this collaboration are listed in Box 3.



**Figure 9. Frequency of post-training interaction with course instructors and fellow trainees.**



**Figure 10. Percentage of respondents using different sources of information**

Note: more than one option was possible.

**Box 2 –Purpose of further communication with instructors and fellow trainees after the course end:**

- To keep in contact with the professionals and administrators of the organization and to expand projects with the support of CIMMYT professionals (mentioned by respondent from Argentina).
- To exchange articles, information, and knowledge of work in CA (mentioned by respondents from India, Malawi, Morocco, Bangladesh, Nepal, Tajikistan, Sudan, Mexico).
- To share the CA experiment experiences with Dr. K. Sayre<sup>4</sup> and report what was done and problems encountered (mentioned by respondents from India, Afghanistan, Morocco, Turkey, Nepal, Georgia, Bangladesh).
- Training of farmers and staff, conducting participatory research trials, and dissemination of resource conservation technologies with the collaboration of international organization like IRRI and IWMI (mentioned by respondent from Pakistan).

**Box 3 – examples of continuing collaboration between course instructors and participants:**

- Receiving CA advice from Dr. Ken Sayre (mentioned by respondents from all countries).
- Projects to facilitate widespread adoption of CA. Examples were provided IFAD (Malawi), ICARDA (Morocco), socio economic survey of ADB-IRRI Project (Pakistan), Tagem and Tubitak project (Turkey), Challenge Program project (China), USAID projects (India), national CA project (Turkey).
- Visits of farmers to CIMMYT’s demonstration fields (Mexico).
- Collaborative research. Specific examples are: Raised bed practice with straw management on farmers’ fields in Bangladesh, multiplication of improved wheat varieties in Georgia, germplasm (Afghanistan).

<sup>4</sup> Dr. Ken Sayre is agronomist, based at CIMMYT–Mexico; he has been the leader of the wheat program CA training courses from the mid-1990s until 2007

### Summary and conclusions – part III.

Dynamic scientific networks are one of the important pathways for dissemination of new information and research findings and sharing of knowledge among scientists. For one-third of participants, the main source of CA information is the internet; communication among trainees and instructors is done primarily by email. Many participants indicated that they had contacted other scientists and course participants and many also mentioned personal communication and collaboration with Dr. Ken Sayre after the course to discuss specific CA problems and review the results of their research.

### IV. Impacts of training on professional career and personal growth

After CIMMYT training as compared to before CIMMYT training, 64% respondents evaluated their level of confidence to perform their job as “much higher” and 32% evaluated it as “somewhat

higher.” Not surprisingly, when asked about attitudes and behavior/action changes adopted as a result of the training program, many mentioned the use of new skills, usually related to better understanding of zero tillage and bed planting, and machinery for conservation agriculture. In addition, 23 respondents indicated that CIMMYT training motivated them “a lot” to increase their hands-on work and for others it gave them “some” motivation.

The results show that the number of subordinates of course participants generally increased after their participation in CIMMYT training (Table 6). Before training most respondents had limited supervisory responsibilities. For example, before training, 20% reported not having any subordinates, and 20% supervised more than 10. These numbers changed by the time of the survey: only 7% continued without any subordinates and 40% of respondents supervised more than 10 subordinates (Table 6).

**Table 5. Attitudes, behaviors, and skills adopted, as reported by trainees.**

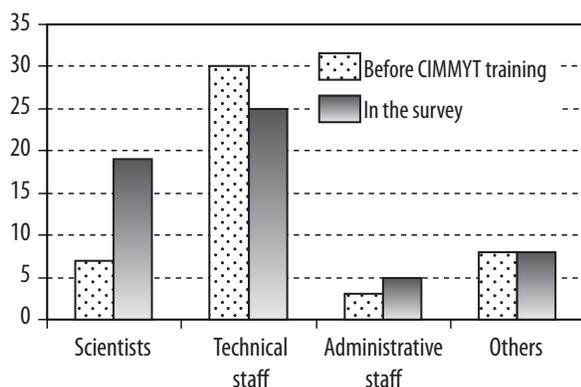
Adopted Changes	Examples of newly adopted behaviors and use of skills, with country of respondent that cited the information
Knowledge sharing	<ul style="list-style-type: none"> <li>• Demonstrating use of bed planting &amp; zero tillage (Turkey, Morocco, Mexico).</li> <li>• Ability to provide better training to farmers and scientists (Pakistan, Morocco).</li> <li>• Conservation agriculture demonstration trial on farm land (Uzbekistan).</li> <li>• Up-scaling crop residue management (Iran).</li> <li>• Presentations at some conferences about conservation agriculture and permanent bed planting systems (Morocco).</li> </ul>
Behavior changes	<ul style="list-style-type: none"> <li>• Working and communicating with farmers honestly and sincerely about CA and farmers’ problems (Bangladesh).</li> <li>• Spending more time doing hands-on, practical field research (Malawi).</li> <li>• Considering new problem solving approaches and selecting priorities (China, Nepal, Azerbaijan).</li> <li>• Confident when presenting the knowledge to farmers (Pakistan, Malawi, Nepal, Tajikistan, Bangladesh, Sudan, Mexico, India).</li> </ul>
Undertake research	<ul style="list-style-type: none"> <li>• Improving experimental design and precision (Georgia, Argentina).</li> <li>• Establishing CA experimental trails in cotton/wheat and rice/wheat systems (Uzbekistan).</li> <li>• Closer personal involvement in research- taking the field data personally without any technician’s assistance (India, Morocco, Malawi, Sudan).</li> <li>• Developed bed planting for cultivation of a winter wheat in irrigated conditions. Working on zero tillage technology for cultivation of corn (Kazakhstan).</li> <li>• Conducting research in farmers’ fields (Bangladesh).</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• Developing machinery: bed planters, wheel tractor zero tillage drill, wheel tractor driven potato planter, two wheel tractor driven bed planter (Bangladesh, Tajikistan, Bangladesh).</li> </ul>
Results	<ul style="list-style-type: none"> <li>• Bed planting already adopted on 1,500 ha in Kyrgyzstan.</li> <li>• Course encourages participants to follow in their work (Argentina).</li> <li>• Ministry of Agriculture of Turkey now supports CA.</li> </ul>

Level of subordinates also changed after participation in CIMMYT training. Figure 11 shows that participation contributed to the growth of participants' responsibilities by supervising more scientific and administrative staff and less supervision of technical staff and field workers. Before CIMMYT training, just 19% of participants supervised scientists; currently 51% supervise scientists. Before the course, 81% of trainees supervised technical staff and field workers; in survey results, only 66% supervised them.

Seventy-nine percent of respondents indicated that the training was "very helpful" for their career and for 21% it was "somewhat helpful." Figure 12 shows that 45% of respondents were promoted and—according to their perception—CIMMYT training was a contributing factor to this. Twenty-four percent indicated that their salary increased as a consequence of being trained at CIMMYT. Box 4 and Box 5 summarize some of the comments on why the training was helpful for their personal career.

**Table 6. Number of supervised people before CIMMYT training and at the time of the survey.**

	At the time of training	In the survey			
		none	1-5	6-10	>10
None	8	1	5	1	1
1-5	23	1	10	3	9
6-10	2	-	-	1	1
>10	8	1	-	1	6
		<b>3</b>	<b>15</b>	<b>6</b>	<b>17</b>



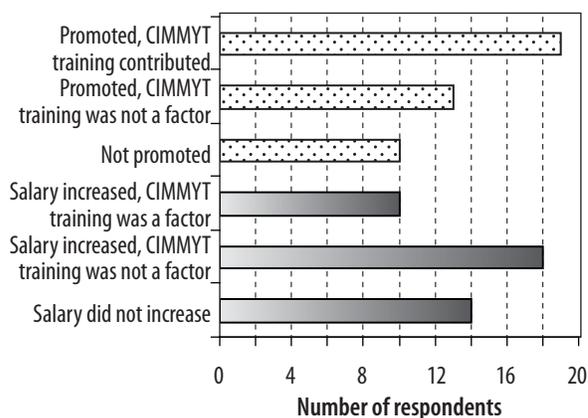
**Figure 11. Type of work of subordinates before CIMMYT training and at the time of the survey.**

#### Summary and conclusions – part IV

The majority of respondents increased their level of job performance, responsibility, and confidence as a result of the training course at CIMMYT. Generally, they supervised more people with higher qualifications (scientists) than prior to the CIMMYT training. The trainees felt more

#### Box 4 – Comments on why the training was helpful for the respondents' personal career:

- The course helped to reinforce the respondents' actions in bed planting and zero tillage in local conditions (mentioned by respondents from Pakistan, Turkey, Morocco, Bangladesh, Kazakhstan, México).
- The course helped to increase cooperation with scientists from various countries (mentioned by respondents from India, China).
- Participants become even more involved in CA. Specific examples: 1) the first Moroccan Researcher introducing CA in irrigated areas, 2) association with groups working on CA like RWC in India, 3) minimizing agricultural damages in Bangladesh, 4) specializing on bed planting technology in Tajikistan, 5) new research on winter wheat on bed in Kyrgyz Republic, 6) project of continuous bed planting system for Tagem and Tubitak in Turkey, 7) ARIA started research on CA in Afghanistan).
- The authority of respondents has grown (mentioned by respondent from Georgia).
- The course shows another way of working (mentioned by respondent from Argentina).



**Figure 12. Promotions and salary increases after CIMMYT training.**

motivated and more able to do hands-on work in the field and in the laboratory. The training was helpful for furthering careers and in many cases contributed to promotions and salary increases. Many respondents pointed out that after their participation in CIMMYT's CA training, they were regarded as experts in the field of CA in their respective countries.

## **V. Impacts on trainee's organization and research from trainees' point of view**

When asked about the relevance of the CA training and its use in their everyday work, 79% of respondents said training was "very relevant," and 21% reported that it was "somewhat relevant." As one would expect given the high ratings of

relevance, 64% said that they used "most" skills and knowledge gained during the course and 33% reported using "some." Box 6 summarizes examples of the skills that respondents used. Eighty-eight percent of respondents stated that the CIMMYT course helped their organization to conduct research in new areas (Box 7). Seventy-four percent of respondents agreed that training at CIMMYT helped them to conduct research differently, while 4 trainees (10%) answered negatively (Box 8).

Having spent several weeks at CIMMYT, trainees were asked whether the training was a good investment for their organization. Eighty-five percent responded positively, and 8% negatively, explaining that their organization was not interested in using their new knowledge. Examples of benefits are in Box 9.

### **Box 5 – Other personal impacts, as described by respondents:**

- *Recognition that the base of agronomic problems is the same anywhere. It is necessary to be interested in conservation of natural resources and quality of life of poor people. These things generate a different world, with less poverty (mentioned by respondent from Argentina).*
- *Positive outcomes and direct impacts on scientific knowledge, gained from CIMMYT experts (mentioned by respondents from Afghanistan, India, Iran, and Kazakhstan).*
- *Improving level of technical English (mentioned by respondents from China and Tajikistan).*
- *The training gave a broad vision of CA globally and confidence and expertise to become a recognized scientist in the institution. The training improved the skill and knowledge of many researchers and enhanced their research quality. With the new knowledge, skills, and partnerships achieved during the course, the participants emerged with more credibility and authority (mentioned by respondents from Malawi, Nepal, Mexico).*
- *More information sharing with fellow scientists (mentioned by respondents from Bangladesh, India).*
- *Got the opportunity to work in IRRI as a Project Manager and in other international projects, like NZAID/ CIMMYT, DFID ADB-IRRI (mentioned by respondent from Pakistan).*

### **Box 6 – Examples of how respondents use new knowledge and skills learned during the CA course:**

- *Management of permanent bed planting systems in irrigated areas, type of sowing, residue management and soil factors, zero tillage, small-scale farm mechanization and machinery (mentioned by respondents from Morocco, China, India, Nepal, Tunisia, Mexico, Sudan).*
- *An improvement in investigation, calibration, how to prepare experimental design (trial layout), report writing and presentation, data collection, and time management (mentioned by respondents from Morocco, Mexico, Argentina, Malawi, Tunisia).*

**Box 7 – Examples of new areas of research started after participation in CIMMYT’s CA training:**

- *Not only our organization but our country started a country-wide project on bed planting after the training at CIMMYT (mentioned by respondents from Turkey and Morocco).*
- *The government has formed a Task Force on CA (mentioned by respondent from Malawi).*
- *Many zero tillage experiments were modified after CIMMYT training (mentioned by respondent from India).*
- *Experiments and trials on permanent bed planting (mentioned by respondents from Morocco).*
- *Our university gave recommendation of bed planting in intercropping system of sugarcane with various crops for higher income (mentioned by respondents from India).*
- *Zero tillage and minimum tillage with a power tiller and other aspects of natural resource management are priority areas of research in the national water policy (mentioned by respondent from Nepal).*
- *New research studies on development of the minimal and zero technology of cultivation of a winter wheat, corn, and soya (mentioned by respondent from Kazakhstan).*

**Box 8 – Examples of new ways of conducting research after participation in CIMMYT’s course:**

- *Long-term trials, fertility experiments, zero tillage and crop establishment trials, fertilizer response, raised bed planting, laser land leveling, crop residue management, experiment with straw management on station (mentioned by respondents from Turkey, Malawi, India, Pakistan, Morocco, Iran, Nepal, Ethiopia, Georgia, Bangladesh, Mexico).*
- *Zero tillage and bed planting research work on station and farmers’ field (mentioned by respondents from Bangladesh, Argentina).*
- *Trials on permanent raised beds in a rice-wheat system (mentioned by respondent from Pakistan).*
- *First-time testing of bed planters using different seed rates (GTZ Project) (mentioned by respondent from Tajikistan).*
- *Research conducted on development of the minimal and zero tillage technology of cultivation of winter wheat, corn and soya (mentioned by respondent from Kazakhstan).*
- *Permanent bed planting in rice-wheat-mungbean cropping system (mentioned by respondent from Bangladesh).*

**Box 9 – Examples of benefits that CA course provided to participants’ countries:**

- *It benefited also my country in giving new direction to research in bed planting and my organization initiated more projects on CA using skills from my training (mentioned by respondent from Pakistan).*
- *Provided helpful information, new technology, and new ideas for CA experts (mentioned by respondents from Sudan, Mexico, China, Kazakhstan, Ethiopia, Iran, Malawi, India, Turkey).*
- *Course participants return to their home country with a base of CA knowledge, and are able to campaign to their national research center or organization to adopt similar practices, resulting in increased sustainability productivity and improved livelihoods (mentioned by respondents from Argentina, Tunisia, Bangladesh, Nepal, India).*
- *Many CA projects were initiated and government policy was influenced (mentioned by respondent from India).*

Seventy-four percent of respondents knew about other staff in their organization who had attended some previous CIMMYT training. The average number of participants in CIMMYT's training activities is between four and five people per institution. Only 12% from their respective organizations attended a CIMMYT course. Comments on impacts on trainees' organization are listed in Box 10.

### **Summary and conclusions – part V**

The survey respondents perceive the content of the CA training as relevant to their work and they use most of the skills and knowledge learned at CIMMYT in their current job. These skills have helped most of the participants' organizations conduct research in new areas and experiment with different approaches. The majority of respondents agree that the several weeks spent at CIMMYT participating in the CA course was a good investment for their organization.

## **VI. Spillover impacts of the CA training at CIMMYT**

Fifty-eight percent of respondents reported sharing their newly gained CA knowledge within their institution and 34% gave training to people outside their own institution. Information was mainly disseminated to farmers (for 83% of respondents). In addition, 64% respondents trained extension workers, 58% researchers, and 50% worked with technical staff. Other places where information was shared include: NGO's, private agricultural machinery manufacturers, and seed companies (Figure 13). Examples of information dissemination are listed in Box 11).

Trainees were asked whether CIMMYT training helped their organizations to improve agricultural practices (increase the adoption of CA) locally or in their region. Fifty-two percent of

### **Box 10 – Examples of impacts on trainees' organizations:**

- *CIMMYT contributed to strengthening the research qualities of our organization. Many wheat researchers have visited CIMMYT either as a trainee or a visiting scientist and all have improved their knowledge, skill, and efficiency to work more aggressively in the organization (mentioned by respondent from Nepal).*
- *Training helped in broadening the outlook and readjusting research priorities (mentioned by respondent from India)*
- *IRRI was encouraged to work with rice under CA and people from NGOs come to learn to our organization about CA practices (mentioned by respondent from Bangladesh).*
- *BARI maintaining CA research work in farmers' field at various places (mentioned by respondent from Bangladesh).*
- *As a result of six years work (2002-2008,) there are more than 5,000 ha with zero tillage in the cycle O-I and at least another 100 ha more in P-V. More that 10,000 ha used some parts of CA, like leaving the residues on the field, rotations, vertical ploughing, and use of chemicals (mentioned by respondents from México).*

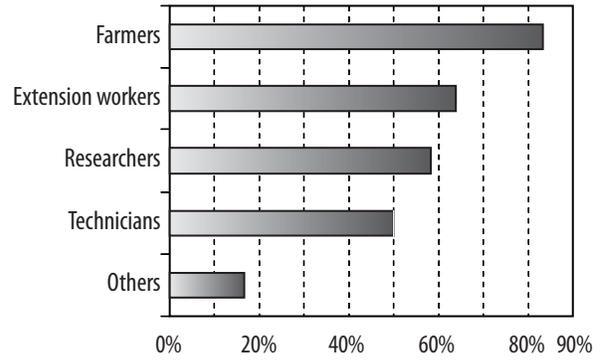
### **Box 11 – Examples of further knowledge dissemination by participants of CA courses:**

- *International training course on bed planting and reduced tillage in SE Anatolia for Asian Countries in 2004 (mentioned by respondent from Turkey).*
- *Short-term CA training programs and field days for scientists, extension workers, and farmers (mentioned by respondents from Bangladesh, Mexico, Tajikistan, Georgia, Bangladesh, India, Morocco, Pakistan).*
- *Technical training on zero tillage, reduced tillage, CA technologies, stakeholders training workshop on RCTs and farm mechanization, power tiller operator training (mentioned by respondent from Nepal).*
- *Capacity building for technicians and farmers, in INIFAP and government (mentioned by respondent from Mexico).*
- *Presentation of the knowledge in a workshop, adaptation of small machinery in small-scale farming (mentioned by respondent from Argentina).*

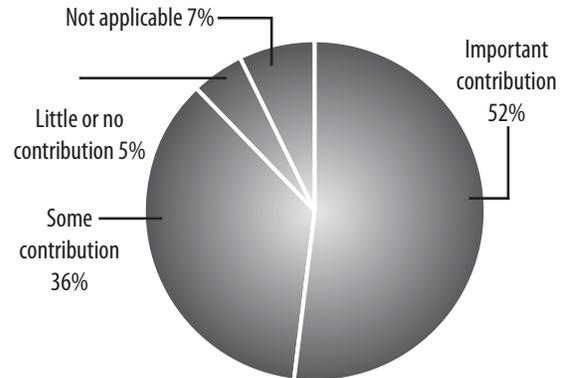
respondents answered that it “made an important contribution” and for 36% the course “made some contribution” (Figure 14). Comments on impacts of CIMMYT training to improve the agricultural practices are in Table 7.

**Summary and conclusions – part VI**

The outcomes and impacts of training from CIMMYT were not limited to the trainee or his/her institution. Most course participants have in fact been sharing their new knowledge and skills both inside and outside their organization. They mostly trained the trainers in their own organizations after taking the CIMMYT course. These spill-over training activities involved a diverse group of audiences such as farmers, extension workers, researchers, and technicians. Respondents also perceived that after participating in CIMMYT training they have been contributing to improving agricultural practices (including increasing adoption of CA) both locally and in the region.



**Figure 13. To whom further training was provided by the trainees.**



**Figure 14. Contribution of CIMMYT training to improved local or regional farming practices.**

**Table 7. Contribution of CIMMYT training to improve local or regional farming practices.**

Country	Contribution and country of origin of trainee commenting
Afghanistan	<ul style="list-style-type: none"> <li>We got new ideas; the trained staff applied the tools and knowledge and brought some change on method of cultivation as well as method of fertilizer application.</li> </ul>
Bangladesh	<ul style="list-style-type: none"> <li>Locally bed planting system managed irrigation water application properly with minimum involvement of labor, minimum water loss and uniform distribution with less effort. Moreover, through demonstration in farmers field, one pass seeding operation by two wheel tractor (power tiller) attract farmers due to reduced cost and timely planting. Visitors from other organizations/group farmers observed the differences of new practices. Participation in district level technology fair, CA demonstrated through poster, video display.</li> <li>Wheat Research Center of Bangladesh Agricultural Research Institute has adopted the utilization of machinery like bed former.</li> </ul>
Ethiopia	<ul style="list-style-type: none"> <li>The overall impact of CIMMYT collaboration is big.</li> </ul>
Georgia	<ul style="list-style-type: none"> <li>Farmer interest to new practices has grown significantly, but adoption of CA was hampered by absence of appropriate machinery.</li> </ul>
China	<ul style="list-style-type: none"> <li>More technicians and farmers learning and practicing CA technology than before.</li> <li>We build a bed planter based on the CIMMYT model and give them to the farmers to adopt the bed-planting system and now the area is about 5,000 chinese mu. We also get money from the local government to support the research bed-planting system.</li> </ul>
India	<ul style="list-style-type: none"> <li>Developed a machine named "Rotary disc drill" which can seed into loose crop residues including sugarcane ratoons but it still needs fine tuning as the front powered discs of the machine wears out very fast.</li> <li>Farmers adopted technology of zero tillage at large scale in Haryana and increased their profits margins.</li> </ul>
Kazakhstan	<ul style="list-style-type: none"> <li>Our development on the minimal and zero technology of cultivation of agricultural crops instill in farms of Almaty area.</li> </ul>
Malawi	<ul style="list-style-type: none"> <li>Farmers adopt some of the CA associated technologies but it is hope that in the near future they will adopt CA as a complete technology.</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>It permitted to realize more effectively investigation. We reached about 5,000 ha of zero tillage fields, and about 10,000 ha using the components of CA practices.</li> <li>We have suitable machinery, the area of CA cultivation increased, the field were leveled as requisite to reach a support from national government.</li> </ul>
Morocco	<ul style="list-style-type: none"> <li>In the regional centre of Settat was CA since the beginning one of the most important research area and many scientists have contributed to the development and building capacities in this area. The package of CA was ready by the time I attended CIMMYT and it was an opportunity to share and discuss our experience with Dr Sayre and Wall.</li> </ul>
Nepal	<ul style="list-style-type: none"> <li>Organization has given priority to research on resource conservation and several technologies have been recommended for the farmers. The adoption of these technologies has increased steadily though availability of appropriate machineries locally appeared to be a major bottleneck. Collaboration with other countries in South Asia has improved scientific exchange and a network has been established through regional programs, therefore scientists, organizations and more of people of respected countries have been benefited.</li> </ul>
Tunisia	<ul style="list-style-type: none"> <li>My organization adapted the technique of zero tillage and developed it in sowing on vegetable cover in the fields in different areas. This work is carried out with the collaboration of the international organization (CIRAD, AAAID).</li> </ul>
Turkey	<ul style="list-style-type: none"> <li>Second crop was planted with tillage but now some farmers use no tillage for planting second crop of maize or cotton in Anatolia</li> </ul>
Pakistan	<ul style="list-style-type: none"> <li>We were/are already conducting research in bed planting with ACIAR Australia, CIMMYT enhanced capabilities and helped the project, organization and country.</li> <li>Dissemination of zero tillage technology, bed planting and crop residue management practices.</li> </ul>
Spain*	<ul style="list-style-type: none"> <li>My work on permanent bed planting system in Spain is the first research work in Spain about this. I'm transmitting my experience about permanent bed planting to researchers in Instituto de Agricultura Sostenible - Cordoba in Spain.</li> </ul>

\* Participant from Morocco.

### 3. Research leaders' perspectives

#### I. General information

In terms of leader respondents' presence in their organizations during the time of their subordinate's CA training at CIMMYT, 37% of the leaders surveyed were supervisors of course participants, 49% were colleagues, and 16% were new to the organization and had not held the position reported in the survey, during the time of CIMMYT's training. In 9 of the 19 organizations surveyed, 1 to 5 researchers and support staff in the organization were involved in CA or sustainable management of natural resources. In three of the organizations, more than 16 people were involved in this type of research and practice.

In terms of infrastructural or socioeconomic constraints for the participants' organizations to use what the trainees learned during the CA courses (Figure 15), 79% of the constraints reported by research leaders comprised financial resources, 68% a lack of access to mechanization, and 53% a lack of technical assistance, staff, and resources (classrooms, teaching/extension materials, etc.) for CA information dissemination.

#### II. CA training course evaluation

When asked where most of their staff received training, 16 respondents chose national research centers, 10 respondents answered CIMMYT, and 9 mentioned a national university (Figure 16). When asked about alternative providers of training comparable to that offered by CIMMYT, 42% mentioned that some national research centers provide similar information or training, while 32%

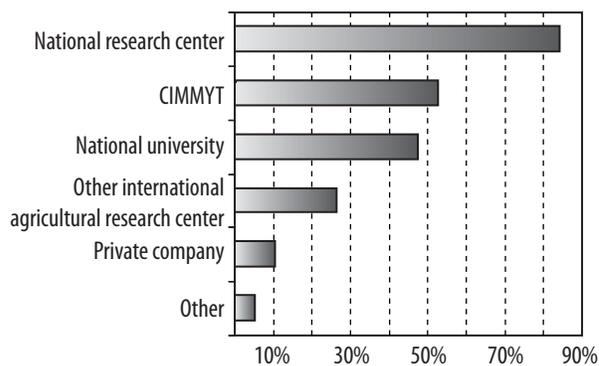


Figure 16. Sources of training and professional development for the staff in organizations.

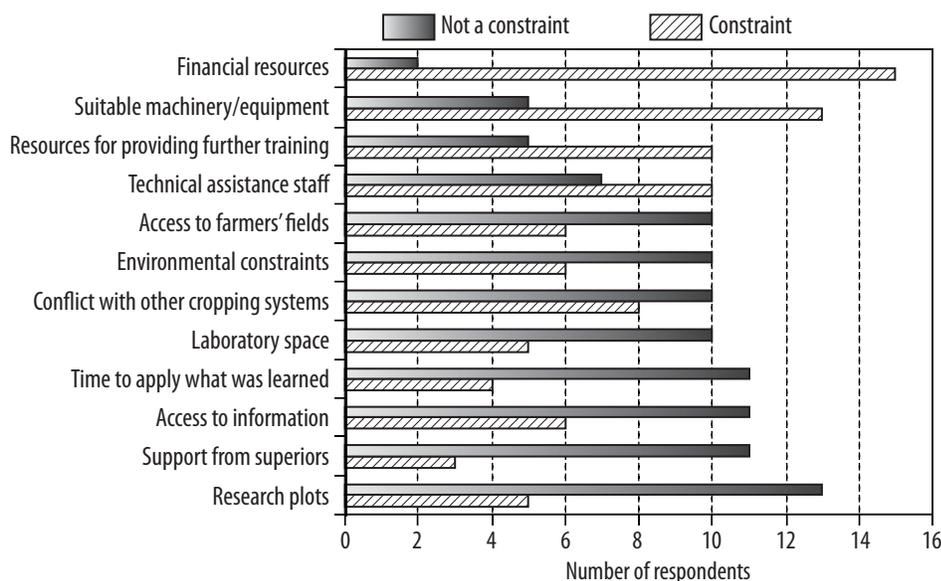
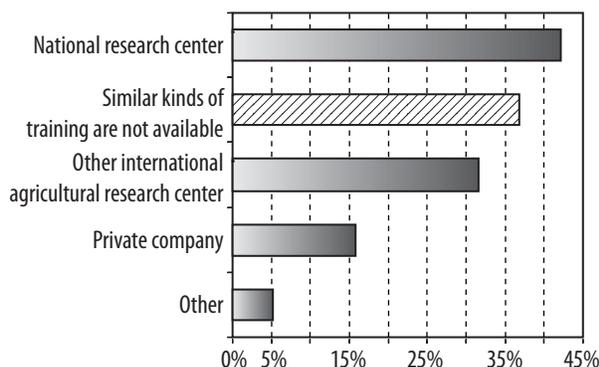


Figure 15. Constraints to trainees' use of what they learned, as reported by leaders.

mentioned other international agricultural research centers. The statement that similar training was not available elsewhere was also common: 37% of leaders who selected this answer (Figure 17).



**Figure 17. Alternative training providers, as reported by leaders.**

Seventy-four percent of research leaders stated that their organization collaborated with CIMMYT. Examples:

**Box 12 – Examples of collaboration with CIMMYT:**

- *In breeding (mentioned by respondents from Morocco, Sudan, China, Afghanistan, Turkey).*
- *Conducting training, helping with surveys, germplasm exchange, creating links to other organizations, and national project proposals (mentioned by respondent from Bangladesh).*
- *Our institute is a partner in IWWIP (mentioned by respondent from Turkey).*
- *Collaboration INTA – CIMMYT (mentioned by respondent from Argentina)*
- *Closely working with the Rice-Wheat Consortium (mentioned by respondents from Nepal).*

Suggestions for improvement for the CA courses at CIMMYT:

**Box 13 – Suggestions for improvement of CA courses at CIMMYT:**

- *CIMMYT’s CA program should be more practical and field oriented (mentioned by respondent from Bangladesh).*
- *More course offered, more participants, and longer training period (mentioned by respondents from China and Turkey).*
- *CIMMYT should invite trainees to share information about their own projects and support them. With more active collaboration and sharing of information with the participants, CIMMYT could achieve more success and higher adoption of sustainable agricultural methods (mentioned by respondent from Argentina).*

After having a member of their staff spend several weeks at CIMMYT, leaders were asked whether the training program was a good investment for their organization. For 83% of respondents the answer was positive. Examples cited of why the training was worth the investment are:

**Box 14 – Examples of why the CA training was worth the investment of trainee’s institution:**

- *Any training abroad is a chance to see other countries’ experiences (mentioned by respondent from Sudan).*
- *Trainees improved their research ability and were exposed to the most recent research activities (mentioned by respondent from China).*
- *Helped to improve the methodology used in our work, brought new knowledge and new experiences to our organization (mentioned by respondents from Argentina and Turkey).*
- *Our organization feels the motivation that comes back with the trainee (mentioned by respondent from Morocco).*
- *After someone receives training, they have been able to use their training in farmers’ fields (mentioned by respondent from Bangladesh).*

### III. Impacts of CA training courses at CIMMYT

A high portion of respondents (63-79%) believed that their staff morale improved, as well as the interest in hands-on work in the field or laboratory, in communicating with international scientists, and in CA knowledge and skills with sustainable management of natural resources in a broad sense. Selected examples of answers are given in Table 8.

For 90% of respondents the course helped their organization conducting work in new areas (Box 15).

#### Box 15 – examples of new areas of research conducted by trainees’ organizations as a result of their training in CIMMYT:

- *Research on bed planting undertaken after CIMMYT training (mentioned by respondent from Bangladesh).*
- *Long-term five year Tagem project and three year Tübitak project (mentioned by respondent from Turkey).*
- *Reorganizing of the production system to be more sustainable in agronomic terms so that it could survive the world energy crisis (mentioned by respondent from Argentina).*
- *Many farmers are now adopting CA practices (mentioned by respondent from Nepal).*
- *More than 20 villages conducting this type of research in new areas and 340 acres of land including 675 farmers work with at Rajshahi (mentioned by respondent from Bangladesh).*

Fifty-eight percent of respondents stated that training at CIMMYT helped their organizations to conduct research differently, while 24% said it did not make a difference in this sense. Examples are listed in Box 16.

#### Box 16 – Examples of how trainees’ institutions are conducting research differently as a result of their participation in CIMMYT training:

- *After the training, researchers doing research on agronomic practices found new ways to conduct their research, like crop rotation under reduced tillage system (mentioned by respondent from Bangladesh).*
- *Conducting CA in different areas and long-term trials (mentioned by respondent from China).*
- *Use of new sowing methods, cultivation by low irrigation, ploughing just once and use of such prepared soil for many years, managing stubble-field, new machinery. Work starts to focus more on sustainable agriculture practices (mentioned by respondent from Argentina).*
- *Long term trial in rice-wheat-mungbean system with straw management and Nitrogen levels with conservation tillage systems (mentioned by respondent from Bangladesh).*

To evaluate the effective spread of CA practices from participants to farmers, research leaders were asked if the CIMMYT CA training had helped their organization to improve agricultural practices. The most common response (90%) is that the course did lead to agricultural improvement (see Box 17).

**Table 8. Attitudes, behavior and skills acquired, as reported by leaders.**

Adopted changes	Examples of newly-adopted behaviors and use of skills
Knowledge sharing	Improved relation among professionals and workers for sharing knowledge (mentioned by respondent from Argentina).
Behavior changes	Staff self-confidence is improving (mentioned by respondent from Turkey).
Undertake research	Experimental plots laid out using simple methods (mentioned by respondent from Sudan) Data recording capability and timing of work improved (mentioned by respondent from Bangladesh). Better management of setting up field experiments, supervising field work, and making better decisions on time (mentioned by respondent from Tunisia). Ability to organize efficiently research activities and to apply correct methodology (mentioned by respondent from Argentina).
Results	Developed a permanent bed system for our region (mentioned by respondent from Turkey)

**Box 17 – Examples of how CIMMYT CA course contributed to improvement of agricultural practices in participants institutions/countries:**

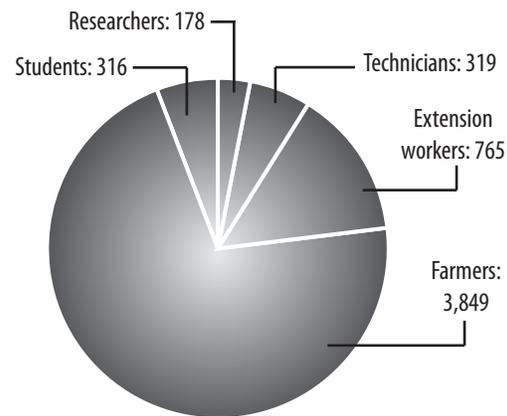
- Helped in the way of handling on-farm trials (mentioned by respondent from Morocco).
- Involve local farmers under reduced tillage practice. Farmers are buying and using machines for better crop establishment (mentioned by respondent from Bangladesh).
- Helped in securing money from local government and do demonstrations and research in west and south areas of Henan, with about 200 farmers (mentioned by respondent from China).
- Bed - planting already adopted on 1,500 ha (mentioned by respondent from Kyrgyzstan).
- Technical personnel were trained locally and nationally and demonstrations in farmers' fields improved (mentioned by respondent from Turkey).
- The contribution was important, because we are able to share the new practices with farmers, and help them to adjust the existing machinery for new purposes of CA (mentioned by respondent from Argentina).
- It has helped both ways, locally and nationally, CA practices are now widely accepted (mentioned by respondents from Nepal and Bangladesh).

According to 53% of respondents, participants of CIMMYT CA courses provided further training in their own institution to colleagues and outside their institution. Examples are summarized in Box 18:

**Box 18 – Examples mentioned by respondent from Turkey:**

- 15-19 October 2007 bed planting and zero-tillage course National Eskişehir.
- International Course on Conservation Agriculture Technologies for Rainfed Wheat Production Systems, CIMMYT-ICARDA, September 26-October 7, 2005.
- International Training Course on Bed and Reduced Till Planting Technologies, 2004, for central Asian countries and Turkey researchers.
- Example mentioned by respondent from Argentina: Organized long-term, regular training for farmers
- Example mentioned by respondents from Turkey and Nepal: Seminars for researchers and training for support staff.

In terms of further training given by the trainees after returning to their organization following the course at CIMMYT, 14 leaders described the type of its beneficiaries (Figure 18).



**Figure 18. Beneficiaries of training provided by course participants, as reported by leaders.**

An impact on their organization is recognized by 47% of leaders (comments are given in Box 19):

**Box 19 – Comments from respondents of research leader survey, related to overall impact of CA course on their institutions/countries:**

- CA has become a major concern in modern agriculture in the country (mentioned by respondent from Nepal).
- Changing views on solving problems, way of thinking (mentioned by respondents from Sudan and Turkey).
- Agricultural university build up linkage, ACIAR started collaborative research, groups of farmers visit from other training institutes, conducting more fieldwork on CA and others national activities (mentioned by respondent from Bangladesh).
- The offer of sustainable agricultural technologies could be extended (mentioned by respondent from Argentina).

## Conclusions: Lessons learned and recommendations

- The worldwide impact of CIMMYT's CA courses is limited by the demographic structure of course participants. The average age of course participants at the time of training was 39; this should be reduced to impact and influence a new generation of agronomist scientists. It could be useful to invite for collaboration more PhD students from universities and junior scientists from national and international centers and NGOs focused on agriculture in developing countries.
- Besides the scientific content of the training courses, participants should also develop and improve their communication and extension skills so that the new knowledge can efficiently be communicated to a broad audience in an effort to achieve faster changes in farmers' fields. (The communication aspects have been receiving increased attention during most recent years' when courses were offered.)
- During the training courses, scientific materials containing technical and professional information about CA that are designed for course participants to use in their research and field practices are distributed. To increase the impact of distributed learning materials for farmers, CIMMYT should create and distribute materials that are very easily understandable and illustrative, such as pictorial guides, which can be distributed to local farmers, as well as build the capacity of the course participants so they are able to develop their own materials in their home institutions. This would further assist in knowledge dissemination among national scientists and farmers.
- In many developing countries, the main field workers in rural areas are women. Yet almost all participants in CIMMYT's course were men—and in the majority of countries CIMMYT works with, there are deep social and cultural gender-based barriers in communication among men and women. To help overcome this gap, more women should be invited to attend the courses, or contact NGOs involved in agriculture and working directly with communities, as these organizations typically work closer with the farmer than many national research centers.
- Fundraising – agronomy research programs of most NARS are often marginalized and lack resources not only for capacity building of new cadres, but even for their own research. CIMMYT with partners should continuously search for funding to support another generation of participants.
- Again to increase the impact, one opportunity is in preparing a condensed version of the five-week program, which would be delivered in countries to many more scientists, provided that the technical and infrastructural conditions for delivering the course in other areas are present.
- As participants indicated that receiving a diploma would increase the attractiveness of the course for both participants and their donors, CIMMYT should look into ways to increase the value of the course by awarding a different type of accreditation. One way of doing so could be through linkages with some recognized university.

# Appendixes

## I. Survey for participants of CIMMYT courses and visiting scientists in the area of conservation agriculture

This questionnaire asks your opinion about the impact of CIMMYT Capacity Building Program in the field of conservation agriculture that you have attended. Your views will help CIMMYT to get an accurate picture of the strengths and weaknesses of this training program.

Thank you very much for your time!

### I. GENERAL QUESTIONS

#### 1. Please, provide your current contact details:

Name: .....

Organization: .....

Address: .....

Address2: .....

City/Town: .....

ZIP/Postal code: .....

Country: .....

Email address: .....

Phone number: .....

2. What is your gender?       male       female

3. What is your present age?      years

#### 4. What is your current area of specialization?

plant breeding

plant pathology

agronomy

biotechnology

economics

other - Please

specify: .....

#### 5. What type of organization (your employer) did you work for in the following times?

At the time of training / stay at CIMMYT

please specify 'other'

Currently

please specify 'other'

#### 6. What was your position at the following times:

At the time of training / stay at CIMMYT

Currently

**7. What type of work do you do?**

- |  |   |
|--|---|
| <input type="checkbox"/> active researcher           | <input type="checkbox"/> professional trainer           |
| <input type="checkbox"/> researcher / administration | <input type="checkbox"/> professor                      |
| <input type="checkbox"/> extension specialist        | <input type="checkbox"/> administration (e.g. director) |
| <input type="checkbox"/> other please specify:       |   |

**8. In your present work activities, what percentage of your time is spent in the following places?**

**(Please check one answer for each place)**

<b>% time spent in</b>	<b>0%</b>	<b>1-25%</b>	<b>26-50%</b>	<b>51-75%</b>	<b>76-100%</b>
Office	<input type="checkbox"/>				
Laboratory	<input type="checkbox"/>				
Experiment station	<input type="checkbox"/>				
Farmers' fields	<input type="checkbox"/>				
Other	<input type="checkbox"/>				

**9. What CIMMYT course have you participated in:**

**Name of course** (visiting scientists, skip this question): Zero tillage & bed planting

**Year:** .....

**Place:** .....

**Course leader (s):** .....

**II. QUESTIONNAIRE**

**1. Considering your previous background and experience at the time of the training course, what would you say that the level of training you received at CIMMYT was...**

- too elementary Why? .....
- satisfactory
- too difficult Why? .....

**2. Have you been using the learning (support) materials that were distributed during training in your work?**

- yes, I used materials (books, publications, CD-Roms, ...)
- no, I didn't use the materials because they were not relevant to me
- no, I didn't use the materials because I had no possibility
- not applicable, no materials were distributed during the training.

**3. Are there any of following infrastructural or socioeconomic constraints in your organization to use what you learned at CIMMYT?**

	YES	NO	don't know	not applicable
Financial resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support from superiors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical assistance staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suitable machinery/equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research plots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conflict with other crop systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental constraints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time to apply what you have learned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to farmers' fields to apply what you have learned in the CIMMYT training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Resources for providing further training (classrooms, publications...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\* Other:

**4. Looking back, is there something to improve in the CIMMYT's CA course?**

- no  
 don't know  
 yes      Explain what: .....

**5. Are you aware of an alternative providers where your organization could go for similar kinds of training?** (please check all the answers that are true for your organization.)

- Other International Agricultural Research Center (IARC)  
 National research center(s)  
 University  
 Private company (or companies)  
 Nowhere: similar kinds of training are not available elsewhere.

Please provide specific example of the institution ticked above: .....

**6. Since the training program, how frequently have you communicated with any of the training instructors?**

- not at all  
 less than once time per year  
 more than two times per year

Explain for what purpose or give examples of the communication / collaboration: .....  
 .....

**7. Since the training, how frequently have you communicated with your fellow trainees?**

- not at all  
 less than once time per year  
 more than two times per year

Explain for what purpose or give examples of the communication / collaboration: .....  
 .....

**8. How do you obtain new information about the current research and advances in the area of Conservation Agriculture?** (Please check all answers that are true for you)

- scientific publications
- internet
- communication with fellow scientists (community of practice)
- other Please specify .....
- attending courses
- attending conferences or workshops

**9. Are you currently collaborating with CIMMYT?**

- yes Explain how .....
- no

**10. How would you rate your level of confidence to perform your job after CIMMYT training as compared to before CIMMYT training?**

- much higher
- somewhat higher
- about the same
- lower

**11. Please list any attitudes or behavior (the way you manage things, undertake research, approach the problem, etc.) you have adopted and used as a result of the training program.** (Skip this question if you have not adopted any.)

- 1)
- 2)
- 3)

**12. How much (if at all) did the CIMMYT training motivate you to do more hands-on work in the field or laboratory?**

- a lot
- some
- not at all
- not applicable: I did a lot of hands-on work before training
- other Please, explain .....

**13. How many people did you supervise at the following times?**

- lower Prior the CIMMYT training
- lower Currently

**14. If you supervise people, select the type of work your subordinates do in following times.** (check all relevant answers)

- Prior the CIMMYT training  Others - Please specify
- Currently  Others - Please specify

**15. How helpful was the training program at CIMMYT in furthering your career?**

- very helpful
- somewhat helpful
- no difference Why? .....

**16. Have you been promoted to a more senior position since you participated in the CIMMYT training and do you think that your stay/participation in the course contributed to your promotion?**

- I was promoted and CIMMYT training was a factor contributing to my promotion.
- I was promoted but CIMMYT training was not a factor.
- I was not promoted.

**17. Has your salary increased since you participated in the CIMMYT training and do you think that your stay/participation in the course contributed to your salary increase?**

- My salary increased and CIMMYT training was a factor for salary increase.
- My salary increased but CIMMYT training was not a factor.
- My salary did not increase.

**18. Please describe any other impact on you personally that has not been covered in the questions above.** *(Feel free to attach extra pages if you need more room to write.)*

**19. How relevant was the content of the training to your work?**

- very relevant
- somewhat relevant
- not at all relevant      Why? .....

**20. In your current job, how much of the skills and knowledge which you learned at CIMMYT do you use?**

- most       some       a little       none

Explain which or provide examples: .....

**21. Do you think that the CIMMYT training helped your organization conduct research in new areas?**

- yes       don't know
- no       not applicable

Explain why or provide examples:.....

**22. Do you think that the CIMMYT training helped your organization to conduct research differently?**

- yes (e.g. conducting long term trials)
- no
- don't know
- not applicable

Provide example: .....

**23. Having spent several weeks at CIMMYT, which implies costs (financial and time), do you think the training program was a good investment for your organization?**

- yes      Explain why: .....
- no      Explain why: .....
- don't know

**24. Have other staff in your organization have attended a CIMMYT training program?**

- don't know
- no
- yes (approximately how many other staff have attended a CIMMYT training program?)

**25. Please describe any other impact on your organization that has not been covered in the questions above.** *(Attach extra pages if you need more room to write.)*

**26. Have you provided any training based on the knowledge and skills you developed at CIMMYT?**

- yes, within my institution
- yes, outside my institution
- no *(If no, skip the next question)*

Please provide some examples: .....

**27. If you provided training, please specify for who:** *(Please, check all answers that are true for you.)*

- researchers                       extension workers  
 technicians                       farmers  
 others                              Please specify: .....

**28. Did the CIMMYT training help your organization improve agricultural practices (increase adoption of CA) locally or regionally?**

- made an important contribution  
 made some contribution  
 made little or no contribution  
 not applicable

**Please describe how your organization has improved agricultural practices locally or regionally:**

## II. DIVISION-RESEARCH LEADER SURVEY

This questionnaire asks your opinion about the usefulness of the training taken by your staff in the field of conservation agriculture, conducted by the International Center for the Improvement of Maize and Wheat (CIMMYT). Your views will help CIMMYT to get an idea of the utility, strengths and weaknesses of this training. Thank you very much for your time!

**Please, provide contact details of your institution:**

**Name of organization:** .....

**Your name:** .....

**What is the title of your position:** .....

**Email address:**.....

**Phone number:**.....

**Were you at the organization when the trainees attended the CIMMYT CA course?**

- yes, I was a supervisor of the participant  
 yes, I was a colleague of the participant  
 no

other, please specify: .....

**1. How many people in your institution are involved in research activities related to the Conservation Agriculture or sustainable management of natural resources in agriculture?**

researchers                      don't know  
support staff                      don't know

**2. What are the major sources of training and professional development for the staff in your organization? (Please check all the answers that are true for your organization).**

- national university  
 national research centers  
 private company  
 CIMMYT  
 other international agricultural research center

Other (please specify): .....

**3. Taking into consideration that your subordinate spent several weeks at CIMMYT, which implies costs (financial and time), do you think his/her participation in the training program was a good investment for your organization?**

- yes Explain why: .....
- no Explain why: .....
- don't know

**4. Have you observed any changes in the way your staff works since they attended CIMMYT training?**

*(Please check all that apply.)*

- No, I have not observed any changes.
- Staff have improved morale after CIMMYT training.
- Staff have more interest in hands-on work in the field or lab after CIMMYT training.
- Staff have increased communication with international scientists after CIMMYT training.
- Staff have increased knowledge and skills about CA and sustainable management of natural resources in a broad sense.

Other, please specify: .....

**5. Please list any prominent attitudes, behaviors (the way your staff manages things, undertakes research, approaches the problem, etc.) or skills that your staff has illustrated as a result of the training program. (Skip this question if your staff has not used any of the behaviors or skills taught in the training.)**

- 1) .....
- 2) .....
- 3) .....

**6. Do you think that the CIMMYT training helped your organization conduct research in new areas?**

- not applicable: My organization does not conduct research.
- don't know
- no
- yes

If yes, please provide examples: .....

**7. Do you think that the CIMMYT training helped your organization to conduct research differently?**

- not applicable: My organization does not conduct research.
- don't know
- no
- yes (e.g. conducting long term trials)

If yes, please provide examples: .....

**8. Has CIMMYT training in Conservation Agriculture helped your organization improve agricultural practices locally or nationally?**

- not applicable : My organization does not conduct extension work.
- don't know
- no
- yes

If yes, please describe how: .....

**9. Are there any of the following infrastructure or other constraints in your organization that prevent your staff from using what they have learned at CA course at CIMMYT?**

	YES	NO	don't know	not applicable
Financial resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support from superiors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical assistance staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suitable machinery/equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research plots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conflict with other crop systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental constraints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time to apply what you have learned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to farmers' fields to apply what you have learned in the CIMMYT training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Resources for providing further training (classrooms, publications...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\* Other:

**10. Is your organization currently collaborating with CIMMYT?**

- yes Explain how .....
- no
- don't know

**11. Looking back, is there something to improve in the course of CA at CIMMYT?**

- no
- don't know
- yes Explain what: .....

**12. Have the trainees provided any training to your organization's staff or others based on the learning that they gained at CIMMYT?**

- yes, within institution
- yes, outside institution
- no (If no, skip the next question)
- don't know

Please, provide some examples: .....

**13. If you answered "yes" in the previous question, please specify for who and an estimation of the number of persons trained: (Please check all answers that are true for your organization.)**

**ESTIMATED number of participants or trained personnel**

- researchers
- technicians
- extension workers
- farmers
- students
- others

Other, please specify:.....

**14. Are you aware of alternative providers, where your organization would go for similar kinds of training?** (please check all the answers that are true for your organization.)

- Other International Agricultural Research Center (IARC)
- National research center(s)
- University
- Private company (or companies)
- Nowhere: similar kinds of training are not available elsewhere.

Please provide specific example of the institution(s) ticked above: .....

.....

**15. Has CIMMYT training in CA had an impact on any other aspects of your organization?**

- yes            Explain what: .....
- no
- don't know

**16. Do you have any other comments about CIMMYT training in the area of conservation agriculture?**



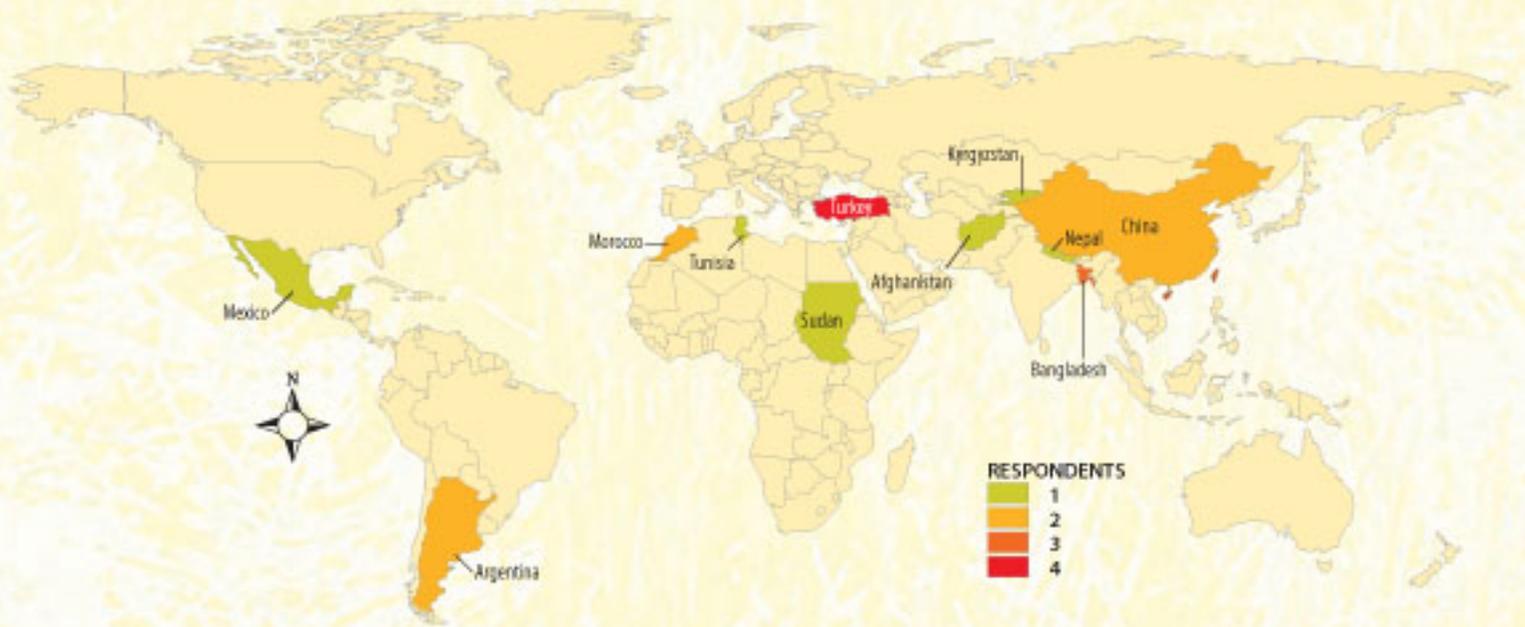


Figure 3. Division of research leader respondents by country.

