FINAL REPORT

ATT WORKSHOP ON BIOSAFETY FOR GHANA

Iowa State University, Ames Iowa, USA

June 15- July 11, 2014

August 1, 2014

This publication was produced for review by ATT, IFDC by:

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with key assistance and input from

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ATT WORKSHOP ON BIOSAFETY FOR GHANA

Summary:

An ATT Biosafety Workshop for Ghana Scientist and Regulatory officials was held at the Seed Science Center at Iowa State University, Ames, Iowa, on June 15-July 11, 2014. The program was hosted by the College of Agriculture and Life Sciences and the Seed Science Center. The 4-week program was attended by nine (9) Ghana scientists, regulatory officials, and communication specialists. ISU faculty and staff, as well as invited speakers participated in this workshop.

The goal of the workshop was to provide Ghana participants a broad knowledge of biosafety for the evaluation and possible deployment of transgenic crops through lectures, dialogues, visits to local biotech companies and hands-on training on laboratory diagnostics. The desired outcome was that participants would be able to learn all aspects of this process; from risk assessment and communications, to laboratory and field evaluations and regulatory requirements and approval processes. Evaluations at the workshop indicated that this outcome was achieved. The attendees also made recommendations on how to improve future workshops which will be taken into account.

The Learning Objectives of the ATT Workshop on Biosafety for Ghana were:

1. To gain knowledge of Biosafety Frameworks at the national and international level for the safe and timely evaluation and approval of transgenic crops for commercial use.
2. To learn to integrate process management applied to biosafety in new applications, design and approval of confined field trials, and approval process for laboratory and greenhouses studies.
3. To apply risk assessment tools, and learn risk communication and perception for detection and commercialization of transgenic crops.

IFDC BIOSAFETY WORKSHOP AT IOWA STATE UNIVERSITY: JUNE 14-JULY 12, 2014

PARTICIPANT LIST

Name	Institution	City, Country	Position	Gender	DOB
Samuel Amiteye, PhD	Biotech & Nuclear Ag Research Institute (BNARI)	Accra, Ghana	Senior Research Scientist	male	3/24/1972
Albert Aubyn, MPhil	CSIR- Crops Research Institute (CRI)	Kumasi, Ghana	Research Scientist	male	11/11/1960
Emmanuel Chamba, PhD	CSIR- Savanna Ag Res Institute (SARI)	Tamale, Ghana	Research Scientist	male	8/7/1963
Charles Debrah, MSc	CSIR- Crops Research Institute (CRI)	Kumasi, Ghana	Research Scientist	male	6/19/1981
Nicholas Denwar, PhD	CSIR- Savanna Ag Res Institute (SARI)	Tamale, Ghana	Research Scientist	male	7/1/1962
Grace Esi-Kyrem, PhD	CSIR- Crops Research Institute (CRI)	Kumasi, Ghana	Research Scientist	female	10/27/1960
Albert Kojo Quainoo, PhD	University for Development Studies (UDS)	Tamale, Ghana	Vice Dean	male	8/21/1961
Norbert Segbedzi, MBA	Biotech & Nuclear Ag Research Institute (BNARI)	Accra, Ghana	Biosafety Administrator	male	6/6/1986
Alexander Yawson, PhD	Biotech & Nuclear Ag Research Institute (BNARI)	Accra, Ghana	Research Scientist	male	2/19/1965

IFDC BIOSAFETY WORKSHOP PARTICIPANTS AT SEED SCIENCE CENTER

Ghana workshop participants and hosts. From left to right, Seed Science Center Director, Manjit Misra; Plant Transformation Center Director, Kan Wang; CSIR- Crops Res. Inst.-Kumasi, Albert Aubyn; Biotech & Nuclear Ag Res. Inst.-Accra, Norbert Segbedzi; CSIR- Savanna Ag Res Inst (SARI)-Tamale, Nicholas Denwar; Biosafety Workshop Training Director, Susana Goggi; Biotech & Nuclear Ag Res. Inst.-Accra, Samuel Amiteye; CSIR- Crops Res. Inst.-Kumasi, Grace Esi-Kyrem; Biotech & Nuclear Ag Res. Inst.-Accra, Alexander Yawson; University for Develp. Studies –Tamale, Albert Quainoo; CSIR- Crops Res. Inst.-Kumasi, Charles Debrah; CSIR- Savanna Ag Res Inst (SARI)-Tamale, Emmanuel Chamba. Back row, former ISU International Seed Programs and Process Management Specialist, Adelaida Harries.

Workshop schedule:

ATT WORKSHOP ON BIOSAFETY FOR GHANA

Iowa State University, Ames Iowa, USA

June 15- July 11, 2014

June 14 (Saturday)
Arrive Des Moines International Airport (approximately 1:45 pm)
Transport to ISU – approximately 50 minutes
Check-in to Schilletter Village (SV) University Apartments
Group dinner hosted by Global Programs-CALS Office (time to be determined)

June 15 (Sunday)
2:00 p.m. Schilletter Village Community Center
Hosted lunch and orientation, including overview of university, housing system, Iowa agriculture, cultural tips, meal per diem.
5:00 p.m. Cy-Ride bus to Wal-Mart to purchase food (Lam will take ISU van to Wal-Mart for return trip to Schilletter Village)

June 16 (Monday)
9:15 a.m. Depart Schilletter Village via Cy-Ride for ISU Campus, 68 Heady Hall
Orientation: Register with International Students and Scholars Office. Bring your passport, DS-2019 and other official documents to this meeting!!
Obtain ISU ID cards for access to library and other services.
Walking tour of campus (including food, café options)

June 17 (Tuesday) – Workshop begins
8:00 a.m. Cy-Ride to ISU Campus – Seed Science Center (accompanied by Lam)
Welcome and Introduction: Dr. Manjit Misra
Roundtable: The status of biosafety and biotechnology in Ghana (Coordination: Dr. Susana Goggi)
Outline of the National Biosafety Framework for Ghana
Opportunities and challenges for ag biotech and sustainability in Ghana
Factors affecting biotech and biosafety decision making
Biosafety and risk assessment procedures in Ghana
Roles and responsibilities of the Biosafety Authority
Documenting confined field trials

June 18 (Wednesday)
Plant transformation (Dr. Kan Wang)
Introduction to plant transformation
Pipeline of biotech products (continued on next page)
Visit to the Plant Transformation Laboratory

Characterization of the genetically engineered products (Dr. Jeff Wolt)
Scope and elements of risk assessment
Content and development of a regulatory dossier (TBA)

June 19 (Thursday)
Public communication and perception (Dr. Lulu Rodriguez)
Communicating biotechnology and biosafety: Challenges and opportunities in Ghana
Public awareness and perception of biotechnology
Targeting audiences: Segmentation and messages
Working with the media: Responding to challenging questions
Building trust

June 20 (Friday)
USDA regulatory framework (Dr. Betsy Matos and Ann Dombroski Brokman)
National USDA regulations for confined studies
Institutional Biosafety Committee (IBC) regulations in the US
1:30 Depart Seed Science Center to Visit USDA approved plots

June 21-22 (Saturday)
Cultural Activity: (departure time TBD)
Des Moines Farmers' Market; state capitol building; Iowa Historical Museum; shopping

June 22 (Sunday)
Free day – no activities planned
Optional: 9 a.m. church with Denise (protestant church close to SV) – depart SV at 8:40 and walk short distance to church (contact Denise at bjelland@iastate.edu prior to Sunday if interested)

June 23-25
The international biosafety legal framework (Dr. Shanthu Shantharam)
The international Biosafety Framework
The Cartagena Protocol on Biosafety: Objectives and scope
Other international treaties governing biotech and biosafety: CODEX, IPPC, FAO, OECD, WTO and WIPO
Risk assessments practices and principles in different countries
The international biosafety legal framework
Case studies in India, the Philippines, Bangladesh and China

June 26 (Thursday)
Confinement (Dr. Susana Goggi)
Pollen flow containment strategy
Models of dispersion of pollen

1:45 pm – Depart Seed Science Center to visit the DeKalb Seed Conditioning Plant, Boone (Refuge in a seed bag) (Dr. Susana Goggi)

June 27 (Friday) (Dr. Susana Goggi)
Field visits
Trait development and evaluation
Visit to Pioneer greenhouses and DNA facilities

Meeting the final technology users
Visit by local farmers

June 28 (Saturday)
Cultural activities to be arranged

June 29 (Sunday)
Free day – no activities planned

June 30-July 1 (Monday and Tuesday)
Process management applied to biosafety TBA
Environmental release procedure manual
Commercial release procedure manual
Food and feed safety procedure manual

July 2nd (Wednesday)
Socio economic considerations in biosafety decision making (Jose Falck-Zepeda PBS)
GE cotton
Assessing genetically engineered cotton's economic impact on farmers

July 3 (Thursday)
Commercializing GE Products (Jeff Stein PBS)
Commercial release process
Status of trade of GE products
Protocols for confined trials

July 3 – evening cultural activity
6:30 p.m. Depart for Des Moines
Outdoor July 4th orchestra and fireworks on the State Capitol grounds as part of national holiday celebrating U.S. Independence Day (July 4)

July 4 (Friday) Holiday – Independence Day (most offices and shops closed)
July 5-6 (Saturday-Sunday)
Weekend free

July 7 (Monday) through July 10 (Thursday)
Genetically engineering detection; adventitious/low level presence (Drs. Trisha Scott and Heather Simmons)
Lateral flow strip testing methods:

- Single trait strips
- Multiple trait strips
- Quantitative lateral flow testing, all including hands-on

Qualitative/Quantitative PCR testing methods

- Sampling
- Sample processing/DNA extraction methods, including hands-on extractions
- PCR methods, including hands-on PCR

- Evaluating data (gel electrophoresis, scoring quantitative data), including hands-on gel electrophoresis and in-depth training on quantitative graphs

Additional GE testing methods (Drs. Trisha Scott and Heather Simmons)
Trait purity

- ELISAs, including hands-on
- Bioassays, including hands-on

ELISAs, PCR and bioassays for trait purity are tests we do on commercial lots that should be positive for a particular GE trait to ensure they have the minimum % required by trait provider.

Research and development
Trait introgression in breeding programs

- Breeding stages
- Commercialization (including licensing, etc.)
- Marker-assisted breeding/Marker-assisted selection (marker technologies, parent screening, and typical selection process over generations)
- **Double-haploids technology (Dr. Ursula Frei)** presentation arranged at the request of the participants

July 10 (Thursday morning)
Global Outreach Strategy (Donna Ramaeker Zahn- PBS) presentation arranged at the request of the participants

July 11 (Friday)
a.m. Analysis and discussions
Wrap up training
p.m. Return to apartments – clean apartments, prepare for departure

July 12 (Saturday)
8:15 a.m. Depart for Des Moines Airport
Flight departs Des Moines at 11:15 a.m.

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What the participants enjoyed the most:

The activities the participants enjoyed the most were the hands-on training on transgenic detection and field visits. They requested that, in the future, we allot more time to the hands-on detection section so they do not feel rushed.

What the students would have preferred it was different:

The farmer we invited is a lecturer in the department of Agronomy and has a graduate degree (PhD). This fact is not unusual in Iowa but the participants felt his level of education was too high and, in their minds, it did not represent the average farmer. They would have preferred to stop on the road to talk to farmers, which is difficult to do in the USA. In the future we will invite farmers who do not hold graduate degrees.

Participants' evaluations:

The students were asked to evaluate each topic and presenter based on a list of learning and presentation characteristics. These were:

1. The component was well organized.
2. The main points were well covered and clarified.
3. The information and activities were useful.
4. I gained concepts and skills that are applicable to my organization's needs and interests.
5. The presenter demonstrated comprehensive knowledge of the subject matter.
6. The presenter conveyed ideas effectively and clearly.
7. The visual aids and handouts helped in understanding concepts and processes.
8. The presenter responded well to questions and concerns.
9. The presenter encouraged interactions among participants.

The topics and presenters were evaluated in a 1 to 5 scale. A score of 1=poor and a score of 5=excellent. All participants rated the presentations 3 or above for all categories. In a few cases the presenters did not distribute visual aids or handouts (7) and, consequently, participants rated these speakers as 3 for this category. Also, not all participants were interested in all topics so usefulness of the activity in some cases was rated as 3. A summary of this evaluations are in appendix 1.

The participants were then asked to comment on the overall workshop. Two (2) students rated the workshop as "good" while the remaining seven (7) gave the workshop the highest rating of "excellent".

Some of their comments were:

A. *What was the most valuable aspect of the workshop?*

- Public perception and communication; communication strategy; genetically engineering detection.
- It is time to fight pests using genes for improved agricultural productivity rather than sprays.
- Process management, socioeconomic considerations in biosafety decision making, and communications strategies.
- Interactive sessions.
- Very good speakers with experience in their various fields.

- Testing traits.
- Detection of genetically engineered crop products.
- The knowledge gained from the various presenters as to how to handle issues of GMOs/biotech in Ghana as a beginner in the industry.
- Socioeconomic considerations.
- GM detection methods.
- Communications.
- Commercialization of GM crops.
- Genetically engineering detection; adventitious/low level presence.

B. *What topics or aspects did you find difficult to grasp or understand?*

- The topics were quite okay to understand.
- I did not have any difficulty following all the presentations.
- None. Facilitators and presentations were simplified.
- Biotech trait breeding.
- All topics were well understood.
- Software applications for genetic analysis and interpretation of results due to self-deficiency in the subject area.
- Double haploid.
- Some calculations under DNA quantifications.
- None.

C. *How will the concepts and skills you gained be applicable to your organization's needs and interests?*

- Insights on international regulatory frameworks, confinements and detection of GM crops will be very helpful in my institute's role as a regulator and biosafety implementer and the set-up of a GM testing laboratory.
- Will help me first and foremost to revise my lecture notes.
- Convey latest developments in biological sciences in genetically modified crops to colleagues, students and researchers.
- Will be able to add my voice professionally to the current debate on genetically modified crops in the country.
- IBC would better understand and interpret applications.
- Be confident to communicate.
- Appreciate costs involved and other resources in biosafety and do a good risk assessment.
- Strengthening the institutional biosafety committee.
- Explain better the concepts of genetic engineering and its applications.
- Establish a dedicated communications unit in the institute.
- The institutional framework drawn out will be helpful in linking the various stakeholders.
- My organization is in the process of establishing a GMO testing laboratory, therefore skills acquired from the GMO testing section will be very valuable to my organization.
- Will strengthen the human capacity of my institute to conduct tests on GMOs as compared to earlier states. Can now test for presence/absence of GMO and meet all requirements for GMO testing.
- Environmental considerations in confined field trials.
- Risk communication of the technology.
- Simple detection method.
- Easy extraction method.

- Hands-on practice will be applied in the biotechnology lab and the concepts and skills will be useful in application evaluation and biosafety regulation by the IBC.

D. *How could the workshop be improved?*

- The workshop could be shortened and run for about two weeks.
- Well organized and all should remain the same.
- Would love inclusion or visit to a farmer.
- Improvement on the internet service.
- The apartments should be connected to wireless internet.
- Laboratory section should be at least two weeks.
- Provide Wi-Fi connection at university apartments if future participants would continue to use these accommodations.
- More hands-on lab work needed.
- More time for crop improvement/breeding related topics.
- Should have a balanced program: two weeks of lecture; two weeks of laboratory work to avoid rushing laboratory work through the program. Remember that is my interest area.
- More time must be given to the aspect that requires hands-on practice.
- Lunch could be arranged for participants or the lunch break could be extended slightly for participants to have lunch at home.

E. *Other comments or suggestions*.

- It would be good to extend such workshops to other beneficiaries as a way of improving biosafety implementation and communication of GM crops. Definitely more emphasis on GMO detection.
- Preparation towards the program should be started early to enable participant's time to prepare adequately for the trip, especially the USA visa acquiring procedure.
- Social aspects and welfare was excellently catered for.
- All course instructors are indeed great, friendly and very resourceful.
- Course organizers were excellent. Very helpful, friendly and effective. Made us feel at home with them.
- In order to have a balanced program, some of the lectures that seem similar can be put together for more time at the laboratories.
- Excellent interpersonal relationships.

Biosafety Training at Iowa State University
June 15-July 11, 2014
WORKSHOP EVALUATION FORM – SUMMARY RESPONSES

Please complete the following evaluation for each component of the Biosafety Training Workshop

Roundtable: The status of biosafety and biotechnology in Ghana (Dr. Susana Goggi)	1 Poor	2	3	4	5 Excellent
1. The component was well organized.				4	5
2. The main points were well covered and clarified.			1	5	3
3. The information and activities were useful.				4	5
4. I gained concepts and skills that are applicable to my organization's needs and interests.			2	3	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				6	3
6. The presenter conveyed ideas effectively and clearly.				4	5
7. The visual aids and handouts helped in understanding concepts and processes.			2	1	5
8. The presenter responded well to questions and concerns.				5	4
9. The presenter encouraged interactions among participants.				2	7

Plant transformation (Dr. Kan Wang)	1 Poor	2	3	4	5 Excellent
1. The component was well organized.			1	3	5
2. The main points were well covered and clarified.			1	2	6
3. The information and activities were useful.			1	3	5

4. I gained concepts and skills that are applicable to my organization's needs and interests.				5	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				3	6
6. The presenter conveyed ideas effectively and clearly.			1	2	6
7. The visual aids and handouts helped in understanding concepts and processes.			1	2	6
8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				4	5

Characterization of the genetically engineered products (Dr. Jeff Wolt)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.			1	3	5
2. The main points were well covered and clarified.				6	3
3. The information and activities were useful.			1	4	4
4. I gained concepts and skills that are applicable to my organization's needs and interests.			1	4	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.			1	2	5
6. The presenter conveyed ideas effectively and clearly.				5	4
7. The visual aids and handouts helped in understanding concepts and processes.			1	5	3
8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				1	8

Public communication and perception (Dr. Lulu Rodriguez)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**

1. The component was well organized.				1	8
2. The main points were well covered/clarified.				1	8
3. The information and activities were useful.				3	6
4. I gained concepts and skills that are applicable to my organization's needs and interests.				5	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				4	5
6. The presenter conveyed ideas effectively and clearly.				3	6
7. The visual aids and handouts helped in understanding concepts and processes.			1	5	3
8. The presenter responded well to questions and concerns.				3	6
9. The presenter encouraged interactions among participants.				1	8

USDA regulatory framework (Dr. Betsy Matos and Ann Dombroski Brokman)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				5	4
2. The main points were well covered and clarified.			1	4	4
3. The information and activities were useful.			1	4	3
4. I gained concepts and skills that are applicable to my organization's needs and interests.				6	3
5. The presenter demonstrated comprehensive knowledge of the subject matter.				6	3
6. The presenter conveyed ideas effectively and clearly.			1	5	3
7. The visual aids and handouts helped in understanding concepts and processes.			1	5	3
8. The presenter responded well to questions and concerns.				5	3
9. The presenter encouraged interactions among participants.				2	7

The international biosafety legal framework (Dr. Shanthu Shantharam)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.			2	5	2
2. The main points were well covered and clarified.				8	1
3. The information and activities were useful.			2	5	2
4. I gained concepts and skills that are applicable to my organization's needs and interests.			1	6	2
5. The presenter demonstrated comprehensive knowledge of the subject matter.				4	5
6. The presenter conveyed ideas effectively and clearly.				6	3
7. The visual aids and handouts helped in understanding concepts and processes.			2	5	2
8. The presenter responded well to questions and concerns.			1	4	4
9. The presenter encouraged interactions among participants.				2	7

Confinement – Pollen dispersal 1 to 250 meters (Dr. Susana Goggi)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				4	5
2. The main points were well covered and clarified.				4	5
3. The information and activities were useful.				4	5
4. I gained concepts and skills that are applicable to my organization's needs and interests.				5	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				3	6
6. The presenter conveyed ideas effectively and clearly.				5	4
7. The visual aids and handouts helped in understanding concepts and processes.			1	4	4

8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				1	8
Confinement – Pollen dispersal over complex terrain (further than 1 km) (Dr. Raymond Arritt)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				3	6
2. The main points were well covered and clarified.				3	6
3. The information and activities were useful.				4	5
4. I gained concepts and skills that are applicable to my organization's needs and interests.			3	3	3
5. The presenter demonstrated comprehensive knowledge of the subject matter.				5	4
6. The presenter conveyed ideas effectively and clearly.				5	4
7. The visual aids and handouts helped in understanding concepts and processes.			3	1	5
8. The presenter responded well to questions and concerns.			1	4	4
9. The presenter encouraged interactions among participants.				2	7
Farmer's perspective of Biotech products (Dr. Erik Christian)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.			3	4	2
2. The main points were well covered and clarified.			3	5	1
3. The information and activities were useful.			3	3	1
4. I gained concepts and skills that are applicable to my organization's needs and interests.			4	3	2
5. The presenter demonstrated comprehensive knowledge of the subject matter.				5	4
6. The presenter conveyed ideas effectively and				6	3

clearly.					
7. The visual aids and handouts helped in understanding concepts and processes.			3	1	2
8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				1	5
Tour – Monsanto Seed Conditioning Plant Identity preservation and Refuge-in-a-bag (Nate Cottington)	**1** **Poor**	**2**	**3**	**4**	**5** **Excellent**
1. The component was well organized.				4	5
2. This tour complemented well the overall program.				2	7
3. The information was useful.				2	7
4. I gained concepts and skills that are applicable to my organization's needs and interests.				5	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				2	7
6. The presenter conveyed ideas effectively and clearly.				2	7
7. The visual aids and handouts helped in understanding concepts and processes.				3	6
8. The presenter responded well to questions and concerns.				5	4
9. The presenter encouraged interactions among participants.				2	7
Tour – DuPont Pioneer International Headquarters – Plant Transformation (Public Relations Representative)	**1** **Poor**	**2**	**3**	**4**	**5** **Excellent**
1. The component was well organized.				2	7
2. This tour complemented well the overall program.					9
3. The information was useful.				2	7
4. I gained concepts and skills that are applicable to my organization's needs and				4	5

interests.					
5. The presenter demonstrated comprehensive knowledge of the subject matter.				3	6
6. The presenter conveyed ideas effectively and clearly.				2	7
7. The visual aids and handouts helped in understanding concepts and processes.				3	6
8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				2	7

Process management applied to biosafety	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				4	5
2. The main points were well covered and clarified.				6	3
3. The information and activities were useful.			1	3	5
4. I gained concepts and skills that are applicable to my organization's needs and interests.				3	6
5. The presenter demonstrated comprehensive knowledge of the subject matter.				3	6
6. The presenter conveyed ideas effectively and clearly.			1	3	5
7. The visual aids and handouts helped in understanding concepts and processes.				6	3
8. The presenter responded well to questions and concerns.				5	4
9. The presenter encouraged interactions among participants.				3	6

Socio economic considerations in biosafety decision making (Jose Falck-Zepeda PBS)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				3	6

2. The main points were well covered and clarified.				4	5
3. The information and activities were useful.			1	3	5
4. I gained concepts and skills that are applicable to my organization's needs and interests.				5	4
5. The presenter demonstrated comprehensive knowledge of the subject matter.				4	5
6. The presenter conveyed ideas effectively and clearly.			1	4	4
7. The visual aids and handouts helped in understanding concepts and processes.			2	4	3
8. The presenter responded well to questions and concerns.				5	4
9. The presenter encouraged interactions among participants.				2	7

Commercializing GE Products (Jeff Stein PBS)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				3	6
2. The main points were well covered and clarified.				5	4
3. The information and activities were useful.				3	6
4. I gained concepts and skills that are applicable to my organization's needs and interests.				3	6
5. The presenter demonstrated comprehensive knowledge of the subject matter.				2	7
6. The presenter conveyed ideas effectively and clearly.				4	5
7. The visual aids and handouts helped in understanding concepts and processes.			1	4	4
8. The presenter responded well to questions and concerns.				3	6
9. The presenter encouraged interactions among participants.				2	7

Genetically engineering detection; adventitious/low level presence (Drs. Trisha Scott and Heather Simmons)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				1	8
2. The main points were well covered and clarified.				1	8
3. The information and activities were useful.				2	7
4. I gained concepts and skills that are applicable to my organization's needs/interests.				1	8
5. The presenter demonstrated comprehensive knowledge of the subject matter.				1	8
6. The presenter conveyed ideas effectively and clearly.				2	7
7. The visual aids and handouts helped in understanding concepts and processes.				2	7
8. The presenter responded well to questions and concerns.				1	8
9. The presenter encouraged interactions among participants.				2	7
Communication Strategy and Outreach (Donna Ramaeker Zahn PBS)	**1** ← **Poor**	**2**	**3**	**4**	**5** → **Excellent**
1. The component was well organized.				4	5
2. The main points were well covered and clarified.				6	3
3. The information and activities were useful.			1	4	4
4. I gained concepts and skills that are applicable to my organization's needs and interests.			1	5	3
5. The presenter demonstrated comprehensive knowledge of the subject matter.				4	5
6. The presenter conveyed ideas effectively and clearly.			1	2	6
7. The visual aids and handouts helped in understanding concepts and processes.			2	4	3
8. The presenter responded well to questions and concerns.				4	5
9. The presenter encouraged interactions among participants.				4	5

PLEASE COMMENT ABOUT THE WORKSHOP OVERALL BELOW

A. What was the most valuable aspect of the workshop?

- Public perception and communication; communication strategy; genetically engineering detection.
- It is time to fight pests using genes for improved agricultural productivity rather than sprays.
- Process management, socioeconomic considerations in biosafety decision making, and communications strategies.
- Interactive sessions
- Very good speakers with experience in their various fields
- Testing traits
- Detection of genetically engineered crop products.
- The knowledge gained from the various presenters as to how to handle issues of GMOs/biotech in Ghana as a beginner in the industry.
- Socioeconomic considerations.
- GM detection methods.
- Communications
- Commercialization of GM crops.
- Genetically engineering detection; adventitious/low level presence.

B. What topics or aspects did you find difficult to grasp or understand?

- The topics were quite okay to understand.
- I did not have any difficulty following all the presentations.
- None. Facilitators and presentations were simplified
- Biotech trait breeding
- All topics were well understood
- Software applications for genetic analysis and interpretation of results due to self-deficiency in the subject area.
- Double haploid
- Some calculations under DNA quantifications.
- None

C. How will the concepts and skills you gained be applicable to your organization's needs and interests?

- Insights on int. regulatory frameworks, confinements and detection of GM crops will be very helpful in my institute's role as a regulator and biosafety implementer and the set-up of a GM testing laboratory
- Will help me first and foremost to revise my lecture notes.
- Convey latest developments in biological sciences in genetically modified crops to colleagues, students and researchers.
- Will be able to add my voice professionally to the current debate on genetically modified crops

in the country.
- IBC would better understand and interpret applications.
- Be confident to communicate.
- Appreciate costs involved and other resources in biosafety and do a good risk assessment.
- Strengthening the institutional biosafety committee.
- Explain better the concepts of genetic engineering and its applications.
- Establish a dedicated communications unit in the institute.
- The institutional framework drawn out will be helpful in linking the various stakeholders.
- My organization is in the process of establishing a GMO testing laboratory, therefore skills acquired from the GMO testing section will be very valuable to my organization.
- Will strengthen the human capacity of my institute to conduct tests on GMOs as compared to earlier states. Can now test for presence/absence of GMO and meet all requirements for GMO testing.
- Environmental considerations in confined field trials.
- Risk communication of the technology.
- Simple detection method.
- Easy extraction method.
- Hands-on practice will be applied in the biotechnology lab and the concepts and skills will be useful in application evaluation and biosafety regulation by the IBC.

D. How could the workshop be improved?

- The workshop could be shortened and run for about two weeks.
- Well organized and all should remain the same.
- Would love inclusion or visit to a farmer.
- Improvement on the internet service.
- The apartments should be connected to wireless internet.
- Laboratory section should be at least two weeks.
- Provide Wi-Fi connection at university apartments if future participants would continue to use these accommodations.
- More hands-on lab work needed.
- More time for crop improvement/breeding related topics.
- Should have a balanced program: two weeks of lecture; two weeks of laboratory work to avoid rushing laboratory work through the program. Remember that is my interest area.
- More time must be given to the aspect that requires hands-on practice.
- Lunch could be arranged for participants or the lunch break could be extended slightly for participants to have lunch at home.

E. Other comments or suggestions.

- It would be good to extend such workshops to other beneficiaries as a way of improving biosafety

implementation and communication of GM crops. Definitely more emphasis on GMO detection.
- Preparation towards the program should be started early to enable participants time to prepare adequately for the trip, especially the USA visa acquiring procedure.
- Social aspects and welfare was excellently catered for.
- All course instructors are indeed great, friendly and very resourceful.
- Course organizers were excellent. Very helpful, friendly and effective. Made us feel at home with them.
- In order to have a balanced program, some of the lectures that seem similar can be put together for more time at the laboratories.
- Excellent interpersonal relationships.

F. Overall, how would you rate the entire workshop?

[ ] POOR [ ] FAIR [2] GOOD [7] EXCELLENT

From left to right, Charles Debrah; Seed Science Center Director, Manjit Misra; Global Programs Director, Denise Bjelland; Norbert Segbedzi; Associate Dean CALS, Joe Colletti; Samuel Amiteye; Grace Esi-Kyrem; Albert Aubyn; Alexander Yawson; Emmanuel Chamba; Nicholas Denwar; Albert Quainoo; former ISU International Seed Programs and Process Management Specialist, Adelaida Harries; Biosafety Workshop Training Director, Susana Goggi; Global Programs Coordinator, Eduarda Becerra.