VOLUNTEER REPORT FORMAT

To be submitted to CRS at the end of volunteer assignment and shared with the Host

1.1 Assignment information: **ET48**

a) Volunteer Name: Stella Salvo
b) Host Organization: National Agricultural Biotechnology Laboratory (NABL) of the Holleta Agricultural Research Center (HARC)
c) Assignment: ET48
d) Dates of Assignment: July 26 – August 9, 2015
e) Number of days worked: 11

1.2.1 Objective 1 in your SOW:

To improve the knowledge and skill of biotechnology researchers of the NABL-HARC through higher profile knowledge and overseas' experience of US biotechnologist. To train the researchers beneficiaries of the NABL on Genomics and Bioinformatics. Major topics of the training include, but not limited to: Practical theory and application of cutting-edge next-generation sequencing techniques, RNA-sequencing, Data analysis and visualization, and computing, Next Generation Sequencing Technologies

a) Progress with the objective:

Major topics of formal classroom training included the following:

- Molecular breeding
- Advanced molecular techniques
- Genomics
- Bioinformatics

More specifically, training included the following subjects within the major topics listed above.

- Quantitative genetics theory
- Quantitative trait loci (QTL) genetic mapping
- Marker-assisted breeding and selection theory
- Molecular characterization and diversity
- Genome wide association studies
- Genomic selection
- Plant biotechnology and transcriptomics
- Next generation sequencing technology
- Presentation of open source software on bioinformatics

Direct training in the form of classroom-led practical experiences using online resources or screenshots included the following:

- Practical usage of open source software in statistical analysis of big data (R)
- Practical demonstration using open source software on molecular marker primer design
- Practical in open source online databases utilizing public genomic information for candidate gene investigations and functional genomics research

In addition, direct assistance was given to troubleshoot lab machinery

- Assistance in initial set up of lab equipment for flow cytometry. Software is not recognizing the lab machinery; error was seen as "BDPAC card" is not recognized. Junior researchers will contact

manufacturer for next step in installation, specifically, does the computer need to have access to the internet? What is the BDPAC card?

b) Expected impacts/results

- Biological production influence – plant and animal improvement
- Management and cultural practices – information technology through bioinformatics, conservation agriculture through biotechnology, improved sustainable agricultural production through research and development
- Media output and impact potential – Volunteer is a contributing blogger for The Huffington Post and plans to share this experience in the next blog.

The HARC is a holistic agricultural research site that is involved in the whole value chain for food security in Ethiopia from research & development or discovery, to plant breeding or crop improvement, seed purity and increase, soil science, agronomy, and livestock and microbial research and extension services. The NABL is as an important growth sector for the EIAR. By enabling higher level education and exposure on new technologies through volunteer intervention, research staff scientists build capacity and are empowered to participate in cutting edge research. Research outcomes have a direct impact to food security in country such as generating sustainable economic return and empowerment for Ethiopian farmers. Research in biotechnology, genomics and bioinformatics is important for sustainable agriculture, combating effects of climate change and is also a source for generating new product developments for agricultural markets, in turn, stimulating economic growth in country. The ultimate goal of using molecular techniques in plant biotechnology, animal production, and microbial discovery is necessary to expedite genetic gain and economic growth for the Ethiopian agricultural sector.

c) Recommendations[1]

- Improve technical assistants understanding of scientific theory behind day to day activities
- Improve access to scientific journals
- Provide staff with access to open source scientific journals
- Provide staff with all laboratory equipment instruction manuals
- Encourage journal club type activities with junior researchers and senior staff to foster consistent discussion on current scientific topics
- Provide opportunities for junior scientists to present work to facilitate exposure to scientific discussion and utilization of new technologies
- Encourage cross-collaborative efforts in improving understanding of new techniques and scientific theory on complex topics
- Improve access to the internet

[1] ***Note:*** The most useful recommendations for hosts are ones that they can implement themselves with minimal expense. For example, a cooperative might change its financial reporting procedures or hold more regular meetings of its board. Broad recommendations on tax or credit reform, changes in government policy, or investment in large-scale equipment, are usually not within the host organization's reach.

- Improve stability of electrical power at the research site
- Foster junior scientists to attend regional scientific meetings/conferences
- Foster junior scientists' network and relationships to other researchers in SSA and worldwide
- Empower junior scientists to write research proposals scientific methods to design experiments

1.3 Number of people Assisted: 44

a) Through formal training: 24 (5 female)
b) Through direct technical assistance (Do not double count)=20 (4 female)
c) Out of these above, number of host staffs: 38
d) Training/assistance by field:

Category	Total	Males	Females
Members/ owners			
Employees	44 from EIAR (38 HARC)	35	9
Clients/ Suppliers			
Family Members			
Total	44	35	9

1.4 Gender

a) What gender roles did you recognize in your host community? Did these roles play a part in your assignment? How?

There were fewer females taking this training. However, two of the female junior researchers were also junior level leads in the research facility for their specific subprogram. The junior leads (both male and female) were crucial in translating the level of science currently being conducted at the research facility. They were able to share what level of content was appropriate for the group. The difficulty, overall, was that a large proportion of the group (male and female) required basic or base level training (which was not an SOW objective). A small proportion of the group wanted to discuss high level topics in biotechnology. This feedback was provided by 2 female lead junior researchers, both highly regarded in the HARC scientific community. Therefore, the assignment was carried out to touch on all aspects of basic to high level, each with limited depth.

b) How might CRS or the host organization improve opportunities for the women in this host or host community?

CRS or the host may initiate women in agricultural science network to foster open communication and information sharing between women researchers. The mission may include a women in science support network or women in science leadership to help build confidence in taking leadership roles in their respective scientific domains and to openly foster community between women scientist leaders.

1.6 Value of volunteer contribution in $

a. Hours volunteer spent preparing for assignment:

Volunteer spent 15 days ($7050 USD) before assignment date and 11 days ($5170 USD) during the assignment dates. Material was prepared before assignment and also each evening and morning during assignment dates to update and add content as per needs for each training group.

b. Estimated value of all material contributions volunteer contributed to host during assignment:

Material covered was a book on molecular biology and genetics and softcopies of research articles. Estimated value $470 USD *11 days = $5170 USD.

1.7 Value of hosts' contribution in $ (Please consult the host as well)

a) Meal: coffee breaks $50 Birr/day=400Birr=$20USD
b) Transportation
c) Lodging
d) Translation
e) Other (Specify): Meeting room facility $1000 Birr/day= 8000 Birr= $400USD
Total 420$

1.9 Host Profile Data:

Did you obtain any data that supplements or corrects the data in the existing host information as detailed in the SOW? Please list it.

At the NABL, the three sub-programs in plant biotechnology, animal biotechnology and microbial biotechnology each have significantly different research objectives and levels of understanding of the scientific material.

The assignment objective on genomics and bioinformatics requires more detailed intervention on the basic aspects of how to set up the experimental design before implementing genomics and bioinformatics. For example, more interaction with the plant and animal breeders on quantitative genetics theory is necessary to understand applications and approaches to next generation sequencing technology. This is a gap that could be filled though the existing HARC research staff. The level of understanding on plant biology, basic genetics and biotechnology is very high. The new recruits and junior level scientists have all been selected through rigorous application processes. They are some of the best young researcher scientists in Ethiopia. The limitation is the link between the basic science and the applied study and application of plant and or animal breeding and evolutionary biology or population genetics.

1.10 Recommendations for CRS:

CRS has prepared a very good base level understanding of the scope of work. After spending more time with the researchers and discussing in depth research objectives, I present here the important knowledge transfer that would be helpful in requesting technical expertise as per conversation by the NABL staff. The NABL staff are requesting additional technical expertise specific to each sub-program at NABL.

Plant Biotechnology

-Advanced tissue culture techniques in somatic embryogenesis callus initiation and maintenance to produce embryogenic regenerable callus cultures.

-Improvements to doubled haploid induction in tissue culture using androgenesis and microspore culture

-Studies on secondary metabolites for increased production of beneficial products from medicinal plants in tissue culture
-Somatic hybridization in tissue culture using protoplast fusion

Animal Biotechnology

-Using sexed semen in cattle production with semen separation procedures using flow cytometry
-Training on animal breeding and molecular genetics, using molecular markers to identify and differentiate between animal breeds and on using molecular markers to assist in selection to expedite conventional breeding methodologies

Microbial Biotechnology

-Metagenomics – using big data to expedite characterization and identification of microbial communities for the use in probiotics research and improvements to animal feed and digestibility through enzyme biochemistry
-Fermentation biochemistry hands on training in small and large batch preparations