

**Farmer-to-Farmer East Africa**

**Volunteer Assignment Scope of Work**

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| **Summary Information** | |
| Assignment code | ET60 |
| Country | Ethiopia |
| Country Project | Horticultural Crops Production and Sector Support |
| Host Organization | Adigrat University Agricultural College of Agricultural Research and Extension Division |
| Host partner (2nd host) | Ethiopian Catholic Church-Social and Development Coordination Office of Adigrat Diocese (ECC-SDCOAD) |
| Assignment Title | Modern production technologies of cactus (*beles*) crop for arid dryland regions of Tigray |
| Assignment Preferred Dates | June-August (flexible) |
| Assignment objectives | * Innovate modern production technologies for cactus crop including demonstrated overseas production practices * Introduce integrated pest control methods emphasizing natural/physical and biological control methods and/or IPM |
| Desired Volunteer Skill/Expertise | Horticulturist with focused knowledge and experience on cactus production and pest control methods |

1. **BACKGROUND**

Ethiopia faces challenges of increasing population pressure and low levels of agricultural productivity which aggravate the country’s food insecurity and contribute to poor nutrition. Increasing production and diversification of fruits and vegetables must be coupled with behavior change at the household level to increase productivity levels of smallholder farmers and subsequently increase their incomes, as well as improve household nutrition status. Use of low levels of modern production technologies and practices contribute to yields that are lower than would otherwise be expected. Despite the high ecological and socioeconomic potentials of Ethiopia, horticultural production in the country is relatively small scale and underdeveloped. Presently however, the horticulture sector is a priority for the Agricultural Growth Program (AGP) of the Ethiopian government in the Growth and Transformation Plan (GTP) of the country[[1]](#footnote-1).

Among the several Ethiopian horticultural crops, cactus is one of the least considered crops of the country. However, the prickly-pear cactus is one of the very few plants that continue to grow in the on-going droughts areas of Tigray region as well as in pocket areas of other regions. Drought in Tigray region is one of the most factors in continually changing the landscape. It was historical that the droughts and subsequent poverty in Tigray-Ethiopia took millions of lives. On the other hand, it was also historical that cactus-based production system and its local food making were saving people’s life in Tigray. Some author articulate cactus based production as excellent example of community-driven, science-led, sustainable solutions for reducing the impact of food insecurity in Tigray[[2]](#footnote-2). The cactus is initially grown for fencing and control of soil erosion, but later-on its fruit and leaves were used for human consumption/food as well as animal feed/forage. Cactus is serving as a bridging food during draught seasons and food insecurity situations. Through prompting the use of cactus (*beles[[3]](#footnote-3)*), the crop would help in improving food security and income generation[[4]](#footnote-4). It served as a strategic wild crop for disaster risk reduction and climate change mitigation.

Generally, cactuses (*Opuntias*) are now part of the natural landscape and the agricultural systems of many regions of the world[[5]](#footnote-5). Typically around the world, there are three main production/farming systems: wild cactus communities; family orchards; and intensive commercial plantations. Cactus plant has adapted perfectly to arid zones characterized by droughty conditions, erratic rainfall and poor soils subject to erosion. It became an endless source of products and functions, initially as a wild plant and, later, as a crop for both subsistence and market-oriented agriculture, contributing to the food security of global populations in agriculturally marginalized areas (5).

The cactus (*beles*) belt areas of Tigray region has long dry season where the rainfall is ever scarce due to climate change. The landscape is a patchwork of greys and browns. For many months, the prickly pear cactus plants (*Opuntia ficus indica)* is one of the most spots of green far and wide due to its special nature to store-up water during the rains for the long dry season ahead of time (4). Among the three cactus production/farming systems, that of Tigray region can be categorized to the ‘wild cactus communities’ production/farming system. Production is mostly wild while serving significant number of people in Tigray.

The Tigray region is one of the four Agricultural Growth Program (AGP) and Feed-the-Future (FTF) regions of the country and horticulture sector is one of the priority areas of the AGP. Promoting horticultural production, and particularly cactus (*beles*) crop production in this case, can furthers the AGP, the FtF and the Growth and Transformation Plan (GTP) of Ethiopia.

1. **ISSUE DESCRIPTION**

Production constraints of cactus (*beles*) crop in Tigray region are diverse. The problems may be aggravated for its being wild. No or poor crop production and management practices are properly pursued. Yield ranges in Tigray/Ethiopia are low and mostly unknown[[6]](#footnote-6). Deterioration of the local/primitive varieties gradually losing its original nature of tolerance levels to climate change and pest infestation are severely observed. There are no or low efforts and practices in soil fertility and management system. The plant recovery system after cutting and/or harvesting and sometimes after unwise and wild destructions is strongly dependent on rainfall and intensity of usage. Insect pest infestation is recently reported to be calamitous due cochineal beetles which are attacking the prickly pear cactus. According to personal and email communications with key stakeholders[[7]](#footnote-7) in the region, these beetles were originally brought to Ethiopia from Latin America to create an income generating business in which dead cochineal beetles are ground up to produce red dyestuff for cosmetics and food applications, however, it has been created a side effect in that these beetles lay their eggs on the cactus plant and as the eggs hatch, the larvae suck the moisture from the blades of the cactus, slowly killing it. So far no solution has been found to the problem including looking for natural predators of the beetle.

Likewise to the other crops, there are many production factors that need to be considered for cactus production/farming. Yet, most crop production improving factors are loosely considered or overlooked except recent initiation by Mekele University and certain projects. These, among others, include site selection, species and variety selection, soil preparation, soil fertility management, land degradation, soil erosion, propagation and transplanting, planting density or plant population, management practices and care, harvesting systems, food preparation and preservation methods, etc.



Figure . Wild community farming system of cactus crop in Tigray region

Moreover, there is no or slight nutritional attention with low levels of farmers’ knowledge on nutrition for both human diet and animal feed. The way of feeding to animals (cattle, goat, sheep, etc) pursues wild fashion and has no normative consumption/feeding rate[[8]](#footnote-8).

In addition, cactus belt farming in Tigray is characterized by economically low viable family farms in terms of sustainably managing their natural resources, striving for food security and adapting to climate change. There is low rural community empowerment. Communities’ self-reliance are at low capacity to look after the disadvantaged and vulnerable households despite the potential of cactus (*beles*) value chain to the extent of establishing a *beles*/cactus processing industry for local and/or regional market, and formulating ‘*beles* dishes’ as a means of enhancing food security for the target communities (2).

The Agricultural College of the Adigrat University pursues three interrelated pillars: training; on-farm research; and farming community service. Under the training and community service pillars, the University in close collaboration with the ECC-SDCOAD has requested volunteer assistance to introduce modern cactus production technologies and IPM targeting to tackle the aforementioned problems and constraints of cactus (*beles*) value chain in Tigray. The University and the ECC-SDCOAD have identified lack of skills and knowledge on modern cactus production and pest management. Among the other aforementioned challenges, these are significantly contributed to the low yields and crop deterioration problem of the region. The volunteer specialist will train the targeted staff, intern students and smallholder farmers.

1. **OBJECTIVES OF THE ASSIGNMENT**

The objective of this particular volunteer assignment is to train and/or technically assist the targeted beneficiaries (52% female and 48% male) on modern cactus production technologies and IPM. The volunteer will assess current practices and will recommend improved practices through a series of trainings, and if possible through field (on-farm) practical demonstrations.

Selected beneficiaries include 10 staff (three lecturers/junior researchers, four Development Agents /DAs/ from the district agricultural office of the government and three Community Development Workers /CDWs/ of the ECC-SDCOAD); 10 intern students of the university and 50 smallholder cactus farmers.

The training for University staffs and students will take place in the University while the training for other staffs will be held in the office compound of the ECC-SDCOAD and/or in the neighbouring district’s agricultural office/s. Smallholder farmers can be trained in nearby Farmer Training Centres (FTCs). Smallholder farmers will benefit from both the training and direct technical assistances at on-farm levels. The volunteer will also conduct research mentoring and share her/his experience to the junior researchers at the University.

Anticipated training topics include but are not limited to the following;

* site selection and species/varietal selection,
* soil preparation, land degradation, soil erosion and various soil and water conservation measures
* propagation and transplanting methods,
* proper planting density or plant population,
* pest diagnostics and identification methods,
* natural/physical and biological pest control methods and/or IMP for possible pests and cochineal beetles,
* modern crop production management practices and care,
* recommended harvesting systems,
* food preparation and preservation methods,
* nutrient deficiency symptoms and nutrient requirements for cactus crop,
* preparation of organic manuring (compost, etc) and other natural/human made soil fertility management practices,

**Host contribution** – The agricultural college and research division of the Adigrat University and the ECC-SDCOAD interchangeably support the volunteer in accomplishing her/his overall assignment. Adigrat University will assign an associate to the volunteer to accompany and advise her/him on the local situations during the trainings in the University. The ECC-SDCOAD will organize the training, technical assistances, and on-farm visits for the smallholder farmers and staffs’ training for its staffs and DAs. In consultation and coordination with Adigrat University, the ECC-SDCOAD will arrange transportation for on-farm field trips and FTCs to serve the selected smallholder farmers. It will also organizes the volunteer’s hotel arrangements (lodging and meals), and ensure all required facilities are appropriate. CRS will cover logistic costs (lodging, fuel, etc) costs against receipts and provide per diem advances for meals.

1. **ANTICIPATED RESULTS FROM THE ASSIGNMENT**

It is anticipated that this volunteer assignment improve and equip the TOTs (staffs and students) and smallholder farmers on modern cactus production technologies and pest management (IPM) techniques and practices that will ultimately lead to improve the cactus production system and attain yield increases. Anticipated results from the assignment include:

* + A total of 70 direct beneficiaries will be benefited from this training and technical assistance:
    - Twenty staff and students (3 University staff, 10 intern students and 7 staffs of the host partner and government) will be trained as Training-of-Trainer (TOT) using a ToT model. These are further anticipated several cactus farmers in the future,
    - Target smallholder farmers (50) trained and practically demonstrated,
  + If time permits, TOT guidelines or manual will be developed and submitted t the host or host partner,
  + Field trip reports with recommendations to host organization and CRS is submitted and cash advance is reconciled
  + Final debriefing meeting with host organization, partners, CRS/USAID and relevant stakeholders is conducted
  + Outreach events conducted upon return to the US.

1. **SCHEDULE OF VOLUNTEER ACTIVITIES IN ETHIOPIA**

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| **Day** | **Activity** |
| Day 1 | Arrival into Ethiopia. The volunteer will be met at Bole International Airport by hotel pick person from CRS client hotel with logo of **CRS logo and volunteer name**. |
| Day 2 | * Briefing meeting at CRS office on security, general orientation and logistics and itinerary of the entire trip. * Discuss anticipated outcomes and work plan. |
| Day 3 | * Air flight to Mekele city (780 km) and car travel to Adigart town (120 km from Mekele) and meet with SDCOAD and Adigrat University, * Briefing on the main objectives of the assignment and work planning session and adjust the agenda as appropriate with the staffs of the host/host partner and CRS F2F. |
| Day 4 | Meeting with key stakeholders and key personnel as appropriate. Confirm the identified constraints with the targeted beneficiaries including the staff (junior lecturers/researchers and CDWs/DAs), students and smallholder cactus farmers. |
| Day 5-7 | Conduct trainings through scheduling for the anticipated venues (university, office of SDCOAD, FTC) and provide technical assistance following local schedules to reach all beneficiaries and geographical areas including selected kebeles[[9]](#footnote-9). |
| **Days 8** | **Rest day** |
| Day 9-14 | Systematically and strategically continue the activities of Days 5-7 |
| **Day 15** | **Rest day** |
| Day 16-21 | Systematically and strategically continue the activities of Days 5-7 |
| **Day 22** | **Rest day** |
| Day 23-26 | Continue the activities of Days 5-7 and complete and submit the TOT guidelines/manual |
| Day 27 | Wrap-up session: participants evaluate the overall technical assistance and trainings, and together with the volunteer discuss final report recommendations. Group presentation (PPT) at host/host partner level with the presence of CRS F2F. |
| Day 28 | Volunteer drives back to Mekele and flight back to Addis Ababa accompanied by CRS staff |
| **Day 29** | **Rest day** |
| Day 30 | * Volunteer finalizes his/her reporting and submits training M&E forms to CRS F2F staff. Debriefing at CRS office with USAID Mission and CRS staff. * Volunteer liquidates cash advances and expenditures with finance. * Depart for US (evening hours) |
| TBD | Outreach event upon return to the US, could include: presentation with a local group/organization, press release, media event and/or speaking tour. |

1. **DESIRABLE VOLUNTEERS SKILLS**

The volunteer will have the following qualifications and competencies:

* Qualifications in relevant field of sciences: horticultural science preferably in cactus husbandry, crop science, agronomy, with demonstrated knowledge and experience on cactus production and pest management,
* Hands on agricultural experience and knowledge
* Experience in cactus cropping systems, land management, pest management, natural resources management, biodiversity conservation etc,
* Affinity with capacity strengthening and facilitation of trainings
* Sensitivity and adoption towards cultural differences and gender mainstreaming focusing women empowerment,
* Good communication, inter-personal and writing skills,

1. **ACCOMMODATION AND OTHER IN-COUNTRY LOGISTICS**

* Before flying/travelling to the assignment site, the volunteer will stay in Addis Ababa at one of the CRS’s client hotels that will be booked and confirmed before the arrival date.
* In Addis Ababa, the hotel usually has rooms that include services such as airport pickup and drop-off, breakfast, wireless internet, etc.
* The hotel or CRS will arrange a vehicle for short travel from the hotel to CRS and vice versa while in Addis Ababa.
* All required materials will be prepared ahead of time and will be provided to the volunteer. CRS Ethiopia will provide the volunteer with a laptop computer (if s/he needs), local internet dongle (modem/EVDO) and mobile phone with charged local SIM-card. Any other required logistics and facilities can also be requested by the volunteer during her/his stay in Addis Ababa.
* CRS will arrange local flight and transport vehicle and as well as will accompany the volunteer to the assignment site.
* During her/his entire assignment duration, the volunteer will be booked in a hotel at Adigrat town.
* CRS Ethiopia will arrange hotel accommodation and cover the lodging bills against receipts.
* CRS HQ will provide the volunteer with a per-diem advance to cater meals and incidences.
* CRS Ethiopia will also reimburse the volunteer with laundry costs against receipts.
* Before departing to US, the volunteer will also liquidate advances (if any) at CRS Ethiopia.
* For more information, please refer to country information that will be provided.

1. **RECOMMENDED ASSIGNMENT PREPARATIONS**

* Although CRS F2F has developed such hinting SOW, the volunteer can fine-tune through her/his professional qualifications to successfully carry out this assignment.
* Although the assignment site is in dry highland areas and malaria may not be prevalence, having precautions in taking pills or vaccination for malaria and (maybe also for cholera) upon recommendations by her/his doctors/health professionals in US may be advisable.
* Prior to travel, the volunteer is advised to prepare necessary training and demonstration aids and written handouts. Softcopies of the handouts and any other paper materials can be printed for immediate use at the CRS office in Addis Ababa on request by the volunteer.
* If the volunteer requires use of simple training aids like flip charts, markers or tape s/he should make the request and collect from the CRS office in Addis Ababa prior to travel to the assignment place.
* If required, translation of handouts to the local language can be done in the locality of the assignment, if required.
* Depending on the meeting places and availability of electric power and LCD projector, the volunteer may use a laptop and projector for power point presentations.

1. **KEY CONTACTS**

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| **Host Organization** | |
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1. *World Bank (2010): Ethiopian Agricultural Growth Project (AGP) Project Information Document (PID)-Appraisal Stage, Report No.: Ab5416* [↑](#footnote-ref-1)
2. ## *David A. B. Unknown. The Cactus-based Production and Processing Initiative in Ethiopia. The Praxis Ethiopia Foundation.* [*http://www.praxisethiopia.org/donate-money/donate\_1.htm*](http://www.praxisethiopia.org/donate-money/donate_1.htm)

   [↑](#footnote-ref-2)
3. *Local name of cactus in Tigray/Ethiopia* [↑](#footnote-ref-3)
4. *HELVETAS Swiss Inter-cooperation. 2015. Cactus for food security and climate change adaption in Ethiopia. The Beles SUNRise Project in Ethiopia’s Northern Region Tigray;* [*http://www.helvetas.org/projects.ethiopia/*](http://www.helvetas.org/projects.ethiopia/) [↑](#footnote-ref-4)
5. *Candelario M. J., Salvador P.G., Enrique A., Stephen G. R., and Manuel D. S. (edrs). 2001. Cactus (Opuntia spp.) as Forage. FAO Plant Production and Protection Paper-169. Food and Agriculture Organization of the United Nations, Rome.* [↑](#footnote-ref-5)
6. *Candelario MJ et.al (2001) reported wider forage yield range of 25-125 t/ha (75-80% aboveground biomass) for Northern Mexico depending upon the species, plant vigor, climate, soil fertility and management system.* [↑](#footnote-ref-6)
7. *Mekele Schools of Rainbows4Children and Vocational Agriculture PLC, Agricultural offices, ECC-SDCOA, Adigrat University, etc.* [↑](#footnote-ref-7)
8. *In Northern Mexico, Candelario MJ et.al (2001) reported a consumption rate of 15-40 kg (normal climate) and up to 90 kg (drier climate) of fresh cladodes/day/beast for cattle where as a range of 3-9 kg/day for sheep and goat.* [↑](#footnote-ref-8)
9. *Kebele is the lowest administrative structure of Ethiopia below district/woreda level. Usually is consists many villages*  [↑](#footnote-ref-9)