VOLUNTEER REPORT FORMAT

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

1.1 Assignment information

a) Volunteer Name: **WAYNE H THOMPSON**
b) Host Organization: BUKAWA AREA COOPERATIVE ENTERPRISE, IGANGA
c) Assignment: CREATING AWARENESS AND BUILDING CAPACITY OF LOCAL FARMERS ON SOIL HEALTH, AND MANAGEMENT FOR IMPROVED PRODUCTIVITY, INCREASED INCOMES AND SUSTAINABLE CONSERVATION OF NATURAL RESOURCES
d) Dates of Assignment: 8 JULY to 21 JULY 2017
e) Number of days worked EIGHT

1.2.1 Objective 1. Introducing concepts on soil health and impacts of poor agricultural practices

a) Progress with the objective. Delivered six (6) three to five hour presentation/discussions with numerous diagrams – emphasizing concepts presented in "Climate Smart Agronomy. Lessons from a Tree". Provided 12-page handout describing soil ecology relative to an idealized tree (attached)
b) Expected impacts/results. Trainers who received multiple exposures to the lesson will be able to further educate farmers and assist with implementation of soil health strategies.
c) Recommendations – REFER APPENDIX, "Climate Smart Agronomy. Lessons from a Tree"

1.2.2 Objective 2. Soil Health Management Systems.

a) Progress with the objective. Expanded on "Lessons from a Tree"
b) Expected impacts/results.
   i. Intercropping legumes with maize, emphasizing importance of using species-specific inoculum (Rhizobia) that includes micronutrients molybdenum (Mo) and boron (B) will improve nitrogen production by Rhizobia to be shared with both legume and maize.
   ii. Value of maintaining good soil cover to shade soil – will keep soil cooler, protect organic matter from the sun's energy, increase water infiltration, and decrease soil water loss through evaporation.
   iii. Basics of fertilizer DAP (18-46-0) management, specifically placement. This is a huge issue. Deep placement of DAP at a depth of 25 to 30 cm below the seed to will promote root proliferation deeper in the soil, applying only a fraction of DAP near the seed as starter fertilizer. Adoption of this practice could double grain yields.
   iv. Split applications of urea on maize will, while monitoring soil water status, ensure more efficient use of N. Also placement of urea below the soil surface will minimize N-loss as vapor – leaving most of the N available for the crop – thus increasing maize grain yields and quality.
   v. Compost as a nutrient source and soil amendment. Residue burning is an annual practice among farmers. The two main drivers promoting this practice are a) the complete release of potassium and other plant essential nutrients from the crop residues to soil (quick payback, short-term gain), and b) burning is an effective method for controlling insect pests that rest in crop residues. Farmers who gather crop residues after harvest (carbon source) and practice composting to control pests will conserve both carbon (sugars) from the residues and volatile nutrients (nitrogen and sulfur).
   vi. Both positive and negative aspects of zero- and minimum-tillage systems were described and diagrammed in detail. Because maintenance of full soil cover served as the primary driver to

affect positive change, the concept of dispensing with the use of a hoe to turn soil was emphasized. Adopters will replace the hoe with knives and piercing shafts – to cut crop residues in preparation for composting, and to deliver seed to the proper depth under full residue cover, to make well-targeted deep-placement of DAP practical, and to leave weed seeds undisturbed to minimize weed growth (although also understanding that weed growth post-harvest could serve as a potential cover crop, if terminated before flowering).

c) Recommendations.

i. Intercropping legumes with maize, using species-specific inoculum (Rhizobia) that includes micronutrients molybdenum (Mo) and boron (B) will dramatically improve nitrogen production by Rhizobia. Deep-placement of DAP as a shared fertilizer source for both plant species will promote comingling of maize and soyabean roots – further improving maize access to nitrogen provided by Rhizobium. Intercropping soyabean with maize will also improve the microclimate for soyabean because maize with its deeper root system and more efficient method of regulating internal leaf temperature (C4), will draw soil moisture through its roots to leaves and thereby provide additional evaporative cooling over a mono-cropped soyabean– thus helping to moderate the internal leaf temperature of soyabean and peanut (C3). Lower internal leaf temperatures ensure more efficient conversion of CO2 and H2O into sugars which translates into by higher oilseed yields and higher product quality.

ii. Emphasize value of maintaining good soil cover to shade soil – keeping it cooler, protecting organic matter from the sun's energy, improving water infiltration rates, and decreasing soil water loss through evaporation. Cover crops can be used to a) build soil nitrogen levels (legumes), b) add plant sugars to the soil for improving soil health and microbial diversity (also as chelating agents for Al, Mn, and P), and c) maintain year-round soil cover as a wind and water erosion-control measure. Because the practice of using soil cover is not currently practiced, the soil surface is exposed to direct sunlight and significant volumes of soil water are lost as vapor to the air. Soil temperatures rise far above air temperatures. As soil temperatures rise and water near the soil surface evaporates, water from deeper positions in the soil is drawn to the surface and in turn, evaporates. This process depletes plant available soil water and diminishes the conversion rate of CO2 + H2O to sugars, translating into lower biomass production, lower yields and lower production quality. When a soil is turned, weed seeds are exposed to sunlight. When exposed to the energy of sunlight, many seeds germinate – thus imposing competition with the crop for nutrients, water and space. Maintaining year-round full soil cover will decrease evaporative soil water loss, and increase soil water storage efficiency, and decrease weed emergence and establishment. [Note that when a farmer uses glyphosate to control weeds or to terminate a cover crop, they should use ammonium sulfate to condition water before adding and applying glyphosate – this practice could significantly improve the effectiveness of the application – thereby offering a significant economic advantage over using unconditioned water as a herbicide carrier].

iii. Basics of fertilizer management, specifically timing of applications and fertilizer placement. This is a huge issue. In 2001 the chemical fertilizers, DAP and Urea, were introduced to members of the cooperative. DAP is now applied at planting (50 kg/A) at a depth just below the seed. When rainfall is plentiful, DAP applications as promoted in 2001 are appropriate.

However, now that rainfall is typically not adequate at anthesis, pollination is restricted to fewer kernels on each ear, and pods of legumes hold increasingly fewer beans. With the 2001 system, root proliferation near the soil surface consumes all available water at or near the soil surface, leaving only deficient levels during grain fill. Deeper placement of DAP at a depth of 25 to 30 cm below the seed, with only a small fraction of the typical application rate placed just below the seed, will promote proliferation of roots at a greater depth (still in the root zone). Deep placement of DAP will increase the probability (many fold) that deeper soil water will rise to the zone of root proliferation. If full soil cover is maintain and DAP is placed deeper in the soil, grain yields will at a minimum double.

iv. Urea is typically applied to maize once at the V8 to V10 stage (50 kg/A). When applied on the soil surface, especially when soil is moist, relative humidity is low and surface temperatures exceed 20°C, most of the nitrogen will be lost as vapor. Nitrogen when injected or placed below the soil surface will not be lost as vapor. Also, farmers who adopt the practice of split applying urea into more than one application, i.e., ⅓ at V8, ⅓ at R1 (tasseling), and ⅓ at grain fill, will benefit both agronomically and financially by targeted applications. Also, risk of nutrient loss through leaching would be greatly diminished – where if a significant inundation of rainfall follows a single full rate application of nitrogen at the V8 growth stage (knee-high stage), much of the applied nitrogen could leach deep into the soil below the root zone of the crop.

1.2.3 Objective 3. Soil erosion control by maintaining full soil cover.

a) Progress with the objective. Expanded "Lessons from a Tree" to more thoroughly describe and diagram effects of good soil cover versus no soil cover as a means to control loss of soil through water and wind erosion. Emphasized that burning crop residues exposes the soil surface to the elements, promotes soil erosion, and further degrades soil health.
b) Expected impacts/results. Adopt practice of maintaining year-round soil cover – to shade and protect soil organic matter, improve water storage efficiency, improve water infiltration.
c) Recommendations.
   i. Seed short-stature legumes (clover) as permanent self-seeding living cover crop.
   ii. Cut weeds at soil line with knife. Create a 1-meter pile of green weeds for composting.
   iii. Remove crop dried residues (brown) for composting to control insects and disease.
   iv. Spike in compost to a depth of 20 cm rather than broadcast applying compost.

1.3 Action Plan

Recommendation	Specific Action	Responsible person	By when
1. Condition water with 21-0-024 (ammonium sulfate) for herbicide applications	*ISSUE:* Soil particles and ions deactivate glyphosate. *ACTION:* Treat water with ammonium sulfate to neutralize suspended particles and dissolved ions: e.g., Fe, Ca, Na, K, SOM, clays	Hakim and other trainers	At earliest application of glyphosate, AUGUST 2017

	REFER TO APPENDIX 1.		
2. Build Compost Piles in Teams (trainers should work together before transferring techniques to farmers).	Gather and pile mature crop residues (brown carbon source) and weeds (green nitrogen source) Use slurry of manure and/or DAP when adjusting moisture content. Blend sticks into mix as bulking agents. Build pile on aeration bed (20 cm bed of sticks). **REFER TO APPENDIX 2.**	Hakim and other trainers	INITIATE IN AUGUST 2017; COMPLETE FIRST BATCHES BY FEB 2018
3. Fertilizer application timing and method.	Apply full rate (50 kg/A) of DAP (18-46-0) at a depth of 25 to 30 centimeters at planting, not at 10 cm depth. Use split applications of UREA on maize, 1/3 at planting 2/3 at pollination. Always cover with soil to prevent N-loss by evaporation/volatilization. **REFER TO APPENDIX 3.**	Hakim and other trainers	Next planting, August 2017
4. Intercropping legumes with maize	Plant maize in rows, with one kernel per hole. Maintain within-row seed spacing at 20 to 30 cm (space between individual seeds within a row). Plant two rows of legume on each side of the maize row. The row of soya adjacent to maize row should be spaced 20 to 30 cm to the side of the maize row. Space between soya seed should be 10 to 15 cm. Peanut spacing should be the same as with maize, 30 cm. **REFER TO APPENDIX 4.**	Hakim and other trainers	Next planting, August 2017
5. Use species-specific inoculum when planting soyabean, peanut and other legumes.	Verify that the Rhizobium species in the selected inoculum is specific for the legume planted, e.g., soyabean, and that inoculum includes boron (B) and molybdenum (Mo)	Hakim and other trainers	Next planting, August 2017
6. Maintain soil cover and build soil organic matter levels	Before or after removing post-harvest crop residues from fields (i.e., gathering feedstock for composting), plant cover crop and terminate as plants reach reproductive stage (flowering). INCLUDE suggestions from other FtF volunteer reports that address appropriate cover crop species (Lessons from a Tree)	Hakim and other trainers	

1.4 Number of people Assisted

a) Through formal training (T)
b) Through direct technical assistance (Do not double count) (DT): 90
c) Out of these above, number of host staffs: 1
d) Training/assistance by field

Category	Total	Males	Females
Members/ owners	90	80	10
Employees	1	1	
Clients/ Suppliers	0		
Family Members	0		
Total	91	81	10

1.5 Gender

a) What gender roles did you recognize in your host community? Did these roles play a part in your assignment? How? BOTH MEN AND WOMEN PARTICIPATED. MOST BUT NOT THE ENTIRE LEADERSHIP WERE MEN. BOTH MEN AND WOMEN FACILITATED DT TO FARMERS, WHICH WERE ORGANIZED BY COOPERATIVE LEADERSHIP

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

1.6 Value of volunteer contribution in $ 6,580

a. Hours volunteer spent preparing for assignment. 20 hr (35 years of experience made it relatively easy to prepare)
b. Estimated value of all material contributions volunteer contributed to host during assignment. $30

1.7 Value of hosts' contribution in $ 209.71

a) Meals: 0
b) Transportation for participants: $101.24
c) Lodging: 0
d) Translation: $66.75
e) Other (Specify): Training venue: $27.81, Farmer mobilization: $13.91
1USD = Ushs 3,595.42

1.8 Host Profile Data:

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

Soil profile samples (six) were collected on our last day with Hakim and the executive committee of Bukawa Area Cooperative Enterprise board. We recorded the sampling process on video (available in Drop Box). Samples were delivered to the soil science department at Makerere University in Kampala. Upon receiving the analytical data, I will compile and describe our observations.

1.9 Recommendations for CRS:

a. REPORTING … Report contact hours to improve measurements of outcome success/failure.

1.10 Press Release

FOR IMMEDIATE RELEASE

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Houston Area Volunteer Travels to Uganda to Share Skills with Local Farmers

Farmer to Farmer program promotes economic growth and Agricultural development in East Africa

Wayne Thompson, a **soil scientist** from **Houston, TX** travelled **to Uganda** for **two** weeks to share his/her technical skills and expertise with local farmers. Wayne's assignment is part of Catholic Relief Services' Farmer-to-Farmer (FTF) program that promotes economic growth, food security, and agricultural development in East Africa.

"FtF is an excellent outreach program. FtF makes it possible for experts and specialists to share their knowledge and wisdom where it is desperately needed. A short two or three week visit reinforced by in-country CRS support teams translates into significant positive changes for impoverished communities," said **Mr. Thompson**.

Funded by the U.S. Agency for International Development (USAID), the five-year program matches the technical assistance of U.S. farmers, agribusinesses, cooperatives, and universities to help farmers in developing countries improve agricultural productivity, access new markets, and increase their incomes.

In **Uganda**, **Wayne** worked with **Bukawa Farmer Cooperative Enterprise** on climate smart cropping systems training and giving technical assistance to **On-Farm Production** to modify their cultural practices in response to changing and less predictable precipitation patterns. **Plant nutrition and soil health were his assigned areas of focus.** Up to **300** beneficiaries were reached.

Wayne's volunteer assignment is one of nearly 500 assignments that focus on agriculture, food security and nutrition in Ethiopia, Tanzania, Kenya and Uganda. This is the first time CRS has been involved in the 28-year-old Farmer-to-Farmer Program funded by the U.S. government.

CRS is partnering with five U.S. institutions to tap into the rich diversity of the U.S. agriculture community: the National Catholic Rural Life Conference, Foods Resource Bank, National Association of Agricultural Educators, American Agri-Women, and the University of Illinois' College of Agricultural, Consumer and Environmental Sciences.

The U.S. volunteers will travel to East Africa for anywhere from one to six weeks, their expenses covered by USAID.

“One thing we are certain of is that this program will be beneficial not just to the farmers in East Africa, but also to the volunteers from America,” said Bruce White, CRS’ director for the program. “It’s going to make the world a little bit smaller for everyone involved.”

For more information, visit farmertofarmer.crs.org

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Catholic Relief Services *is the official international humanitarian agency of the Catholic community in the United St*