



Volunteer Name: Jeff Knowles

Country: Ethiopia

Country project: Horticultural crop production & sector support.

Host: Sebeta Gethsemane Nunnery.

Venues: Sebeta

Audience: 14 Nuns and student

Number of people trained/assisted: 14

Date/duration: 1/20-2/2/2016

Others: Recommendations to the host with regard to the assignment. See below.



1. Assignment Objectives as in SOW

- 1) Provide training and technical assistance on integrated soil fertility management techniques**
- 2) Demonstrate the different techniques of improving soil organic matter content**



2. Achievement of the assignment objectives

- 1) The farm is using approximately 11 fields to grow vegetables, fruit trees, teff, barley or beans. The farm uses two different styles of management based on the established flood irrigation system. Seven of the 10 fields are irrigated and three of the fields rely on rainfall which generally allows only one crop/year. The seven irrigated fields are used for vegetable production and some fruit trees are planted in these fields. Knowles provided training to Weletamariam on basis soil fertility, composting, soil conservation, biochar and managing your soils to improve soil quality.**
- 2) Using the soil test kit provided by CRS, Knowles and Weletamariam completed soil analysis on 7 of the 11 fields. The analysis revealed 5 of the irrigated fields to be adequate to surplus levels of nitrogen, phosphorus and potassium, (NPK). The ph level on all fields was neutral. It is not known if the soil test kit shows available nutrients**

2. Achievement of the assignment objectives, continued,

or is simple an indication of the levels of N, P, K and Ph that exist in the soil. Assuming this test reveals available nutrients, the nuns are doing an extremely good job with their current fertility applications of manure and compost. Two of the three dry land fields were also tested with the same results, adequate to surplus levels of N, K & K. The soil PH is lower in these fields, but well within acceptable levels.

3) SOIL FERTILITY IS NOT THE PROBLEM! However, three major problems were identified which are effecting soil quality and undoubtedly leading to declining yields. A) soil compaction from excessive tillage. B) Lack of organic matter within the soil. 3) Lack of soil organisms, worms, insects and soil microbes.



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3. Recommendation to the host against the assignment

- 1. It is recommended that the host work on; correcting the compaction of the soil, the lack of organic matter within the soil and increase the insects, worms and microbes within the soil. Knowles has determined soil fertility is not the problem, the nunneries current farming operation is the cause of the problems. Begin to change current farming operations.**
- 2. Begin to experiment with cover crops, especially legume crops such as clovers or perrineal peanuts. Non legume crops such as oats would be acceptable. The intent is not to harvest these legumes or small grains, but to improve soil quality by providing habitat for soil organisms by increasing organic matter particularly in the 3 fields farmed under dry land conditions. Upon completion of harvest of the teff or other crops, plant a legume crop such as clover or perennial peanut content within the soil.**

3)Recommendation to the host against the assignment. Cont.

- 3. Weletemariam should become proficient with the material in the folder entitled, “Unlock the secrets of the soil”. Weletemariam should train the appropriate nuns on the contents of the material within the folder with particular attention focused on four basic principles of improving soil quality. A) Keep the soil covered as much as possible, B) Disturb the soil as little as possible, C) Keep plants growing throughout the year to feed the soil, D) Diversify as much as possible using crop rotation and cover crops.**
- 4. Begin to experiment with no tillage on small vegetable plots within the vegetable fields. One way this can be done is to cover a vegetable plot with 4-5 inches of mulch. When ready to plant the crop poke holes through the mulch and keep the parcel covered with mulch, adding if necessary. This piece should remain undisturbed year after year. Over time the insect life will increase dramatically and the soil quality will improve.**

3)Recommendation to the host against the assignment. Cont.

- 5. Increase the existing compost material 10 fold over the existing amount currently being produced. Food scrapes, wood ash and biochar are currently being used for composting. Increase the variety of dead organic matter to include; weeds, crop residues, banana leafs, leaves, etc. Ideally, their would be one compost pile for each field. The nunnery is currently turning the compost which helps in the breakdown, however, the nuns expressed concern with the odor. To avoid turning and reduce labor, layer compost material and cover the pile with a thin layer of soil or manure. If the piles get above three feet, put a thin layer of soil or manure every foot.**
- 6. Continue with the existing application of manure and compost. It should be recognized the nunnery is doing a very good job utilizing the manure produced on the farm.**
- 7. Currently the apples trees and other fruit trees are not producing fruit. Plowing is occurring within inches of every tree trunk and feeder roots are being destroyed. It is recommend that a one meter band around each tree not be plowed and mulch always cover**



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4. Anticipated Impact

- 1) Following the simple rules; “A) Keep the soil covered as much as possible, B) Disturb the soil as little as possible, C) Keep plants growing throughout the year to feed the soil, D) Diversify as much as possible using crop rotation and cover crops”, will have a dramatic effect on soil quality and increase crop production.**
- 2) It is anticipated using cover crops along with manure and increased compost and biochar will eliminate the need for commercial fertilizers.**



5. Recommended future volunteer Assistance

Only the nunnery can follow the recommendations provided in this assignment. It will take time to make the changes necessary to improve soil quality.

I do not have any recommendations for future volunteer assistance regarding soil fertility. However, CRS should follow up with the nunnery over the next 3 years to determine their success in implementing the recommendations.





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Thank You!