ANNUAL REPORT
ON IMPLEMENTATION OF 2005/2006 RESEARCH PROTOCOL ON INTEGRATED NATURAL RESOURCE MANAGEMENT IN LUSHOTO

By

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Introduction

There have been several developments during the implementation of this protocol. Some of it was unplanned like when farmers in Kwalei village contributed Tsh. 700,000 (USD 700) for purchasing improved livestock. Another development which was unplanned was when the SACCOS which the AHI in Lushoto had facilitated to form was granted audience with a local bank CRDB in Tanga for a working agreement in which the bank will extend loans to its members. This SACCOS won the prestigious award of being the best in Lushoto for year 2006. As for the livestock, we have managed to provide one bull. This was identified in Arusha. A colleague in Selian - Arusha (Mr. Lyatonga) is in the process of identifying heifers. The AHI team also managed to host a successful Watershed course that brought people from the AHI region and beyond. This event was graced by the District Commissioner of Lushoto and built a strong foundation for recognition by policy leaders in the District. In this progress report we have divided the report along the three themes it was implemented in order to make easy reading and focus on theme matters. We can say so far the implementation was very successful.

1. **Stakeholder Engagement for Niche-compatible Agroforestry and nursery establishment:**

Objective:

To enhance the positive (and minimize negative) synergies between trees and other system components through niche-compatible agro-forestry and multi-stakeholder negotiations.

Activities done so far:

a) Negotiation support:

- Awareness creation meetings on water source utilization and conservation were conducted in each of the six villages.
- About 12 stakeholder negotiation meetings were conducted regarding Niche-compatible agroforestry. This involved discussion of tree species with their compatibility or incompatibility to different niches. (The meetings were conducted in the six villages involving different stakeholders on certain niches (water sources, water users/owners), Sakarani meetings: manager/the affected communities, Herkulu meeting (manager/multi-stakeholder meeting) and Baga meeting: Natural Resource and Tourism officer/Multi-stakeholder meeting).

b) Tree nursery establishment and management

Objective:

Establish tree nurseries for conservation purposes on farm boundaries, within farms, and water sources.

- Training on seed collection, propagation and nursery establishment and management was conducted.
- 48 farmers from the six villages were selected by their village leaders to attend for the training. The aim was to ensure that every farmer has knowledge on seed collection, propagation, nursery establishment and management.

- Three villages were selected to start the nursery work. In each village two nurseries were proposed for establishment.
- 6 planning meetings for nursery establishment and management were conducted where farmers formed groups of the nursery managers.
- Five tree nurseries were established in the three selected villages (one nursery in Kwekitui village).
- Before nursery establishment a refreshing session was conducted to the farmers (managers of the nurseries). Seeds of (Gravillea 1/2kg, Pine, 1/2kg Avocado 35kg, *Markamia lutea* 1/4kg and Leucaena for each group), Polythene tubes (15 kg for each group), and Watering cans (2 for each group) were distributed.

Fig 5: One of the nurseries established in Mbelei village

Fig 6: Farmers in Kwekitui doing a nursery work together

c) Empirical Research:
Objective:

To determine the effect of harmful tree species (*Eucalyptus robusta, (Mikaratusi*) *Acroarpus fraxinifolius (Acrocarpus) and Accacia mearnisii (Wattle*) on crop yield, soil moisture and soil fertility.

What has been done:

- A literature review on the impact of different tree species. (Ongoing activity).
- Semi-structured interviews with focus groups of key informants knowledgeable about trees (indigenous, exotic) and Identification of the harmful tree species sites in the Baga watershed. *(This was done as from previous reports).*
- Identification of experimental sites, this focused the farms bordered by harmful tree species. Of Eucalyptus, Acrocarpus and Wattle. (For each of these harmful tree species four plots were identified as replicates except for Acrocarpus as only two plots were identified, this is because the acrocarpus trees are not so much spread therefore only two plots were identified. Therefore there are four plots of Eucalyptus, four for wattle and two for Acrocarpus.

Fig 7: One of the fields used for the experiment near a boundary of Eucalyptus trees

- Identification of the farm owners and met with them to discuss about what we want to do and agree with them on using their plots for the experiment. (All the farmers here agreed to use their plots for the experiment for the agreement that the crops after harvest will be theirs and so the farmers should take care of the crops as theirs).
- Field visits to the experimental sites were done by the theme I members to see the locations of the sites. The farms have been planted with maize crop. Seeds were distributed to some of the farmers who did not have the seeds to plant on the sites.
- Sampling on soil moisture, Nutrients has already been done.
- The dry weights for the crops will be taken after the crops have dried up well as now the crops are kept for drying out.

Successes:

- AHI was able to provide all the necessary materials needed in the construction of all the structures that were identified for the construction.
- Communities suggested the village technicians to be involved in the construction of the structures; this made the construction work start much earlier.
- Some of the water sources already constructed with the water collection structures have started showing positive impact as water quantity has increased which saves water fetching time to the communities. Before farmers were using half an hour to and an hour in fetching water but now they only use five minutes to ten minutes.
- There was good support on the construction activities of the water collection structures from the Water supply department from the District through their resource personnel.
- All the negotiation meetings were conducted and were successfully as all the stakeholders reached agreements.
- All the established Nurseries are doing well. More than 40,000 tree seedlings in all the nurseries have been multiplied and some have been transplanted into the fields.
- Farmers who are managing the tree nurseries are committed enough to leave some of their activities in certain days for the nursery work. Also the village leaders play a good role at mobilizing the nursery managers to manage well the nurseries.
- Some of the group nursery managers' for example the Bomo group in Mbelei has opened a Bank account number 4162300952 at National Microfinance Bank Lushoto Branch for saving the money that will be generated from the Nursery.

Challenges:

- There was poor participation from the communities as they couldn't collect all the required material for construction of the structures in time which therefore delays the accomplishment of the construction work.
- Likewise there was also poor follow-up from the village leaders to the communities and also to the village technicians which also contributed to such delay.
- The removal of Eucalyptus on replace with the proposed alternative tree species is not as short term activity as we expected but rather a long term process. As this depends on their owners conditions to remove the trees.
- Leucaena and Markamia seeds on the established tree nurseries could not develop therefore there are no seedlings for Markamia and Leucaena.

Way forward:

- Make follow-up in all the activities accomplished activities to make sure that everything goes on well as proposed and planned.
- Accomplish all other an accomplished activities.
- Expand the nurseries to the remaining villages (Kwalei, Kwehangala and Dule).

2. Water source management:

Objective:

To improve the quality and quantity of spring water through water source protection, spring-compatible forestry, soil erosion control and relevant policy and institutional measures.

Activities done so far and achievement:

- Awareness meetings on water source conservation and measures were conducted in all the villages. These meetings were fruitful as people readily collected stones, sand and contributed labor to the course
- Demarcation of the water sources around all the six villages in the Baga watershed. This was done by setting up the boundaries that demarcates the water sources from the farmlands. The activity was done by the Watershed committee members, village leaders and the Hamlet leaders.
- Planting of water of water friendly trees around all the water sources like Mikuyu, Mishai Tabwe, Mueeti, and shrubs like Jeni and Zia. Some 400 tree have been planted around water sources in the Watershed villages. These trees are those categorized by the local communities as friendly to the water sources

Fig 1: Mkuyu tree planted in one of the water sources in Kwadoe village

- Building of water collection structures along some of the water sources within the Baga watershed and one outside the Baga watershed. From each Village several water sources were identified by the village members themselves to establish the structures. A total of 30 water sources were identified, among them 26 have been constructed at 95% completion and 4 are still at the initial stages of construction.

Table 1. List of water sources reclaimed

Number of water sources

Villages involved	Completed	On-going	Total
Mbelei	4	-	4
Kwadoe	4	-	4
Kwehangala	4	2	6
Dule	3	1	4
Kwalei	6	-	6
Kwekitui	4	1	5
Total	**25**	**4**	**29**

Another water source outside the Baga Watershed in Kindundai village have been identified for reclamation. This is situated along the Mombo-Soni road where more people will be able to see and appreciate the initiative. This source is intended to sell AHI agenda and activities as the entire district of Lushoto uses the tarmac road that passes some 10 meters from this source and is visible to all people (ordinary plus leaders). So far the villagers have collected stones and sand. The initial worl has already begun.

- We have noted in many villages the women farmers report a significant reduction in the time spent to collect water. In Dule and Kwekitui the time spent has gone down from 30 minutes to 5. More data will be collected during the dry season
- In Mbelei village, one of the water sources we have reclaimed is now the only source of water for the nearby Secondary school (400 students) plus the villagers around it (80 households)
- In all the villages, we have noted a growing interest in people to participate in AHI activities. This partly associated with the presence of reclaimed water sources. Water was their number one problem during diagnostic work.

Fig 2: Kids fetching water from water source that has been constructed with a water collection

structures at Kilole Dule.

Fig 3: A water collection structures constructed at Kwadoe

3. Micro-catchments activities:

Objectives:

To improve he productivity and sustainability of resources in micro-catchments by using very attractive incentives (improve domestic water supply, income opportunities and integrate technical support) to catalyze community innovation for system-wide impact.

Activities done so far:

a. Identification of two micro-catchment areas within the Baga villages where soil and water conservation measures will be implemented. Kwekitui hamlet of Kwekitui village and Kilole hamlet in Dule village were identified as micro-catchments. The two micro-catchments were identified so as to serve as demonstration to other villages within the Baga watershed and the District at large when all the planned activities have been successfully implemented and completed.

b. Meetings on introducing the themes' plans, objectives and awareness creation on soil and water utilization and management were conducted at each micro-catchment. Within the meetings communities were given free will to decide as who want to be trained as paraprofessionals.

c. In the implementation of the activities a training of the paraprofessionals within the two micro-catchments was conducted. 12 farmers were trained and provided with facilities to assist them in their paraprofessional activities. Previously 24 more paraprofessionals were trained. Therefore the training added the number of paraprofessionals within the identified micro-catchments.

Figure 4: Farmer paraprofessionals doing a practice on a field as a part of their training as paraprofessionals

- Setting up of contours within the micro-catchments for Fanya juu and terrace construction, a task done by the trained paraprofessionals. 18,000 running meters already measured have been planted with Napier grass and also excavation of the physical structures (Fanya juu and Bench terraces) have started.

- Construction of rainwater collection structures in the two micro-catchments started where farmers were asked to participated in the construction by contributing some materials, among the materials the farmers agreed to contribute include: collection of Sand, Stones, Gravel and Bricks preparations while AHI contributes provision of Cement, Pipes, other needed construction materials including payments of the technicians.
- 5 rain water collection structures have already been constructed in Kwekitui village while at Kilole Hamlet in Dule village collection of the materials by the communities is on-going.

Appendix 1. Progress on the study of ; Effects of harmful trees on crop performance

(H. Mansoor, S. Charamila, J. Meliyo and J. Wickama)

Approach

The study was initiated on March and was designed to study the effects of 3 tree species (Eucalyptus, Wattle and Agrocopas). For Eucalyptus and wattle trees species 4 replications were used tor to monitor changes in soil moisture and crop performance while only two replications were used for wattle tree. Samples for soil moisture determination were collected after every 4 weeks while those for nutrients it were collected only once (during flowering). For this study farmers' fields were used

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According to the design

- Samples were collected from 5 points (at intervals from the tree lines) and at each sapling point soil from depth of 0 –20, 20-40 and 40-60 cm was sampled for moisture determination
- Samples were collected 5 times that covered the whole plant growth period (germination to maturity)
- In order to monitor crop performance at early crop development stages plant height of plants at each sampling point were recorded. At each point average height of three plants was recorded to represent plant height at that particular point.

Sampling of soil was done at an interval of 7m and 5m for effects of Eucalyptus and wattle/Agrocopus respectively.

Preliminary results

Effects of tree lines on soil moisture competition

Soil moisture Preliminary results indicate that there was much higher competition for moisture between plants that were adjacent to tree lines and the tree species studied. There was very little or no competition for moisture for plants that were more than 25 m away in the case Eucalyptus and 15 m in the case of Wattle. On the other hand, very little or no effects on soil moisture were observed on soil samples collected adjacent to Agrocopus tree species (Figure 3). Soil moisture content of soil samples collected near Eucalyptus and Wattle tree lines were lower than those collected away from tree lines (Figures 1 and 2).

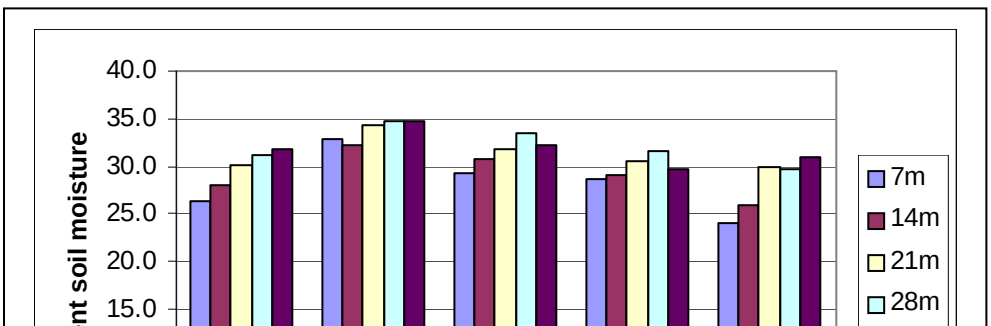

Figure 1: Soil moisture contents of soil collected at 5 different times at intervals of 7m from Eucalyptus tree lines

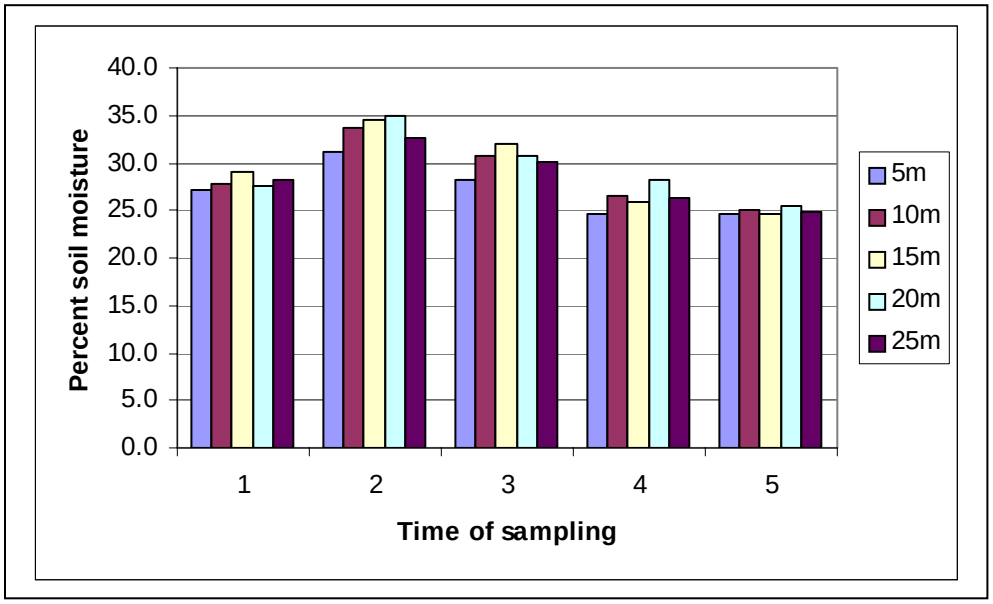

Figure 2: Soil moisture contents of soil collected at 5 different times at intervals of 5m from Wattle tree lines

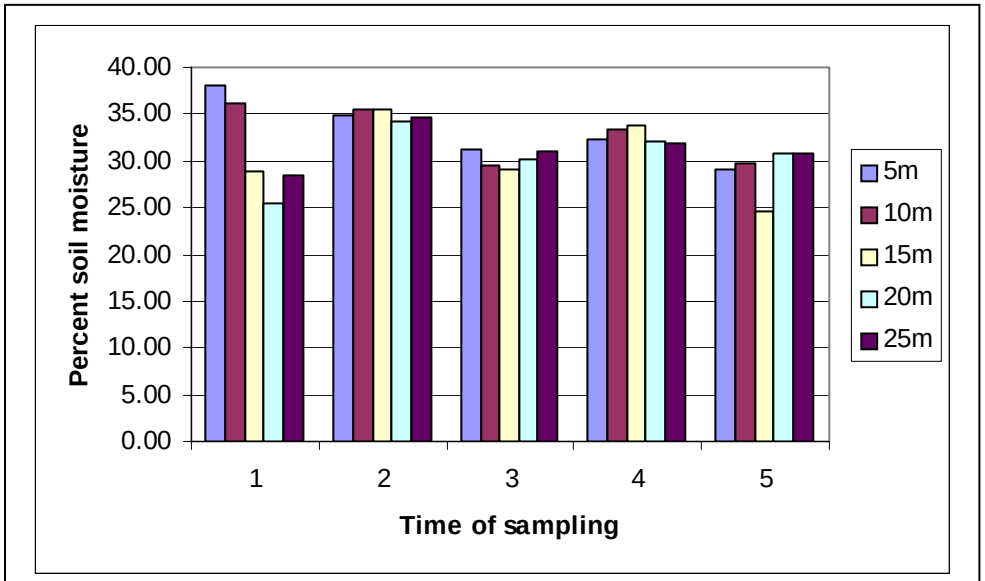

Figure 3: Soil moisture contents of soil collected at 5 different times at intervals of 5m from Agrocopus tree lines

Effects of tree lines on plant performance

More or less similar to the trend observed in soil moisture there was much greater effect on crop performance to plants that were adjacent to tree lines. Plants that were away from tree lines (25 m in the case of Eucalyptus and 10 m in the case of Wattle and agrocopus) performed much better. Heights of adjacent to tree lines were considerably reduced (Figures 4, 5 and 6). From these preliminary results it is evident that moisture competition from tree roots directly affects crop performance. Results obtained indicate that of the three tree species Eucalyptus has much higher effects on moisture competition and crop performance and Wattle trees follow it while Agrocopus trees had the least effect. The data from soil samples analyzed are being analyzed and results will be reported in the final report.

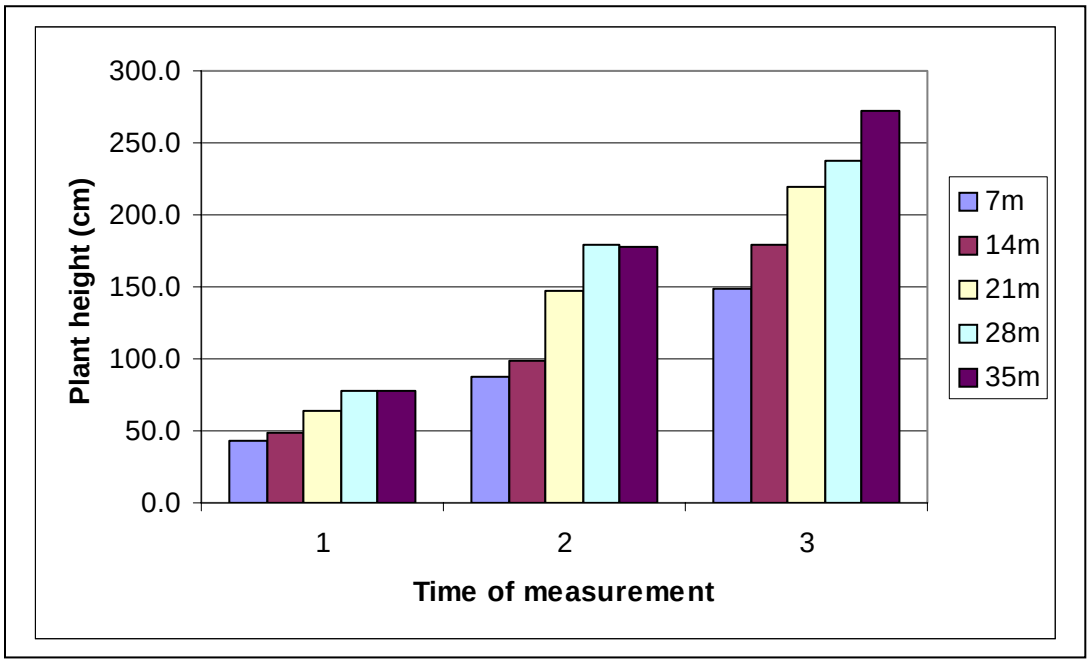

Figure 4: Plant heights of maize measured at 3 different times and at intervals of 7 m from Eucalyptus tree lines

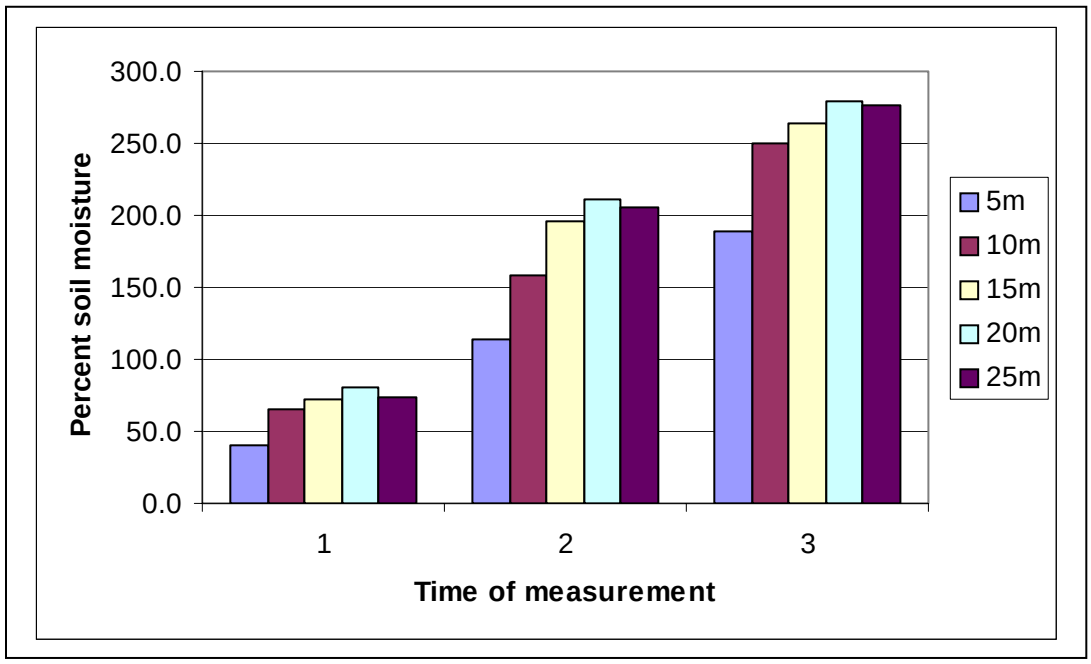

Figure 5: Plant heights of maize measured at 3 different times and at intervals of 5 m from Wattle tree lines

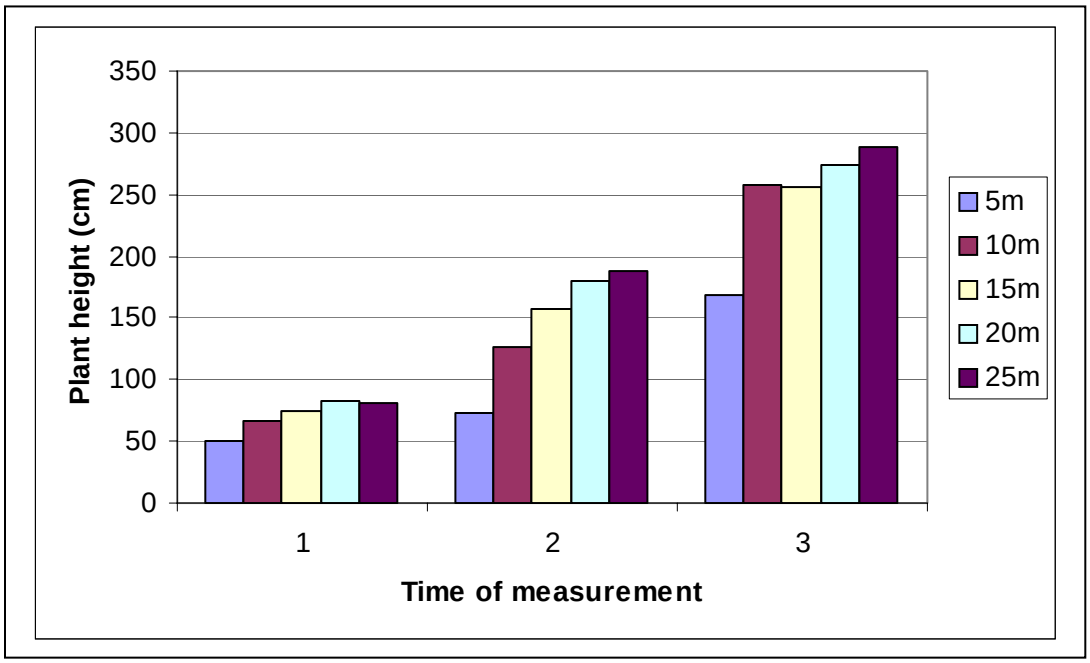

Figure 6: Plant heights of maize measured at 3 different times and at intervals of 5 m from Agrocopus tree lines