RESULTS OF TESTING IMPROVED TRADITIONAL

TECHNIQUE TO REDUCE FARMERS-MONKEYS CONFLICT ASSOCIATED WITH CROP-RAIDING IN ULUGURU MOUNTAINS, TANZANIA

Nyinondi, P.S. and Lutatenekwa, D.L.

Sokoine University of Agriculture, P.O. Box 3110, Morogoro, Tanzania
E-mail: pnyinondi@suanet.ac.tz

ABSTRACT

This paper presents preliminary results on initial intervention to harmonize farmers-monkeys conflict by developing monkeys' management technique on the farm-forest interfaces. In-situ monkeys' control experiment was developed, whereby dogs were trained and used to guard 20 Experimental Pilot Farms (EPF). Furthermore, another 20 Experimental Control Farms (ECF) were selected and farmers were advised to continue using the traditional techniques. The EPF and ECF farms have relatively similar characteristics in terms of location from the forests, vegetation cover, farming systems and crops grown. Farmers were responsible for recording the incidence of crop raiding. Preliminary results showed that dogs reduced monkeys crop raiding incidences from 33.3% in ECF to 12.8% in EPF. The results in ECF were relatively low compared to farmers' perceived crop raiding incidences of 37.8% and estimated crop damage up to 41.1%. The weather conditions and crop seasons seem not to be associated with monkeys' crop raiding behaviour in Uluguru Mountains. Therefore, the preliminary results suggest that the use of trained dogs in farms is cheap and can save up to 61.5 % of the current crop losses.

INTRODUCTION

About 70%of Tanzanians, Morogoro district included, live in rural areas and depend on subsistence agriculture and approximately 39% of them live below poverty line (URT, 2006). Morogoro district covers the forests of Uluguru Mountains, which form a part of Eastern Arc Mountains, a biodiversity hotspot, famous for their high species diversity and endemism. The Uluguru Mountains are ranked sixth in mainland Africa for their vertebrates (Burgess *et al*, 1998). The Mountains have outstanding various forests and landscape forms that provide numerous habitats for primates. The forests are in five patches, with 65% of their original forest cover lost due to seasonal fire, agriculture and logging, charcoal making and human settlements (Lulandala 1998).

Forest fragmentation has negative impacts on wildlife. For example, most primates like monkeys cannot cross the gap between forests, without passing human residences or agricultural fields. Albeit, monkeys are forest specialists, which are less tolerant to disturbed forests (Burgess *et al.*, 1998; Newmark, 1998). Monkeys in western slopes of lower Uluguru Mountains are confined to small shrub patches with exotic tree species, and those, which are lucky to be in closed forest reserves are blocked in there. Monkeys found in Uluguru Mountains forests are *Galago crassicaudatus crassicaudatus* (Greater Galago), *G. zanzibaricuson* (Uluguru Bushbaby) ,in the IUCN red list, *Cercopithecus mitis kibonotensis* (Blue Monkey) and *Polycomo*s *angolensis palliates* (Black and White Colobus). Unfortunately, monkeys, especially blue monkeys are in conflict with farmers who regard them as vermin as they raid crops, an attitude that may result into their local extinction.

Therefore, this study was initiated to harmonize farmers-monkeys conflict by developing management techniques on the farm-forests interface, with in-situ ecological friendly techniques for monkeys' control against crop damage.

MATERIALS AND METHODS

Location

This study was carried out on the Uluguru Mountains in four villages namely Bagilo, Tandai, Magadu and Kilakala. Uluguru Mountains, which are located in Morogoro region, approximately 180km west of Dar-es-salaam, are about 46km long and rise out of the coastal plain at approximately 300m above sea level to a peak of 2638m (Bhatia and Ringia, 1996). The Mountains are at 07°00' South and 37°40' East (Lovett and Wasser 1993). On the main Uluguru range, 50 villages touch the forest boundary and over 151,000 people are found within the mountain area.

The climate of the Ulugurus is very much influenced by the Indian Ocean from where wind laden with moisture arrives on the eastern slopes. In general, these slopes receive 2000-4000mm per year, with a decrease from East to West (Masawe 1992). The amount of rainfall increases and becomes more predictable with altitude (Lovett *et al.* 1995). Rainfall is bimodal with dry season between May to late October, a short rain season between October to the end of December and a long rain season between March and May (Masawe 1992). Temperature also changes with altitude, ranging from below 0°C to 26°C at the higher and lower altitudes, respectively. In Morogoro Municipality, the average air temperature is 24°C with the coolest month being July (21°C) and the warmest being December with 26°C (Masawe 1992).

The vegetation of the Uluguru main ridge and the outlying blocks is extremely variable. It ranges from dry lowland coastal forest habitats, to transitional rainforests, to sub-montane, montane and upper montane forest types. It also includes an area of afromontane grasslands on the Lukwangule plateau. All these habitats are rich in endemic species and are all of high conservation priority. The forests of the main ridge are quite well known biologically, although each new survey continues to find additional species. The outlying blocks are poorly known, with some having almost no biological investigation.

The Ulugurus have very high species richness like other Eastern Arc Mountains and their share of endemic species includes six globally threatened birds including the Uluguru Bush Shrike, two globally near-threatened birds including Love ridge's Sunbird and six other forest birds of extremely restricted range (Bhatia and Ringia 1996), two shrew species, three mammal species all in 1994 IUCN Red list of threatened animals (Lyamuya *et al.* 1994). Of the 22 reptile species known to occur in the Ulugurus, six species are endemic. Levels of endemism are also high in plants (Lyamuya *et al.* 1994).

The farming system in the surrounding villages is peasantry, producing crops for food and sale. Main crops are bananas, maize, cassava, rice, cocoyam, oranges and pineapples, Farming methods commonly practised are mixed cropping, as well as intercropping. Mixed cropping and intercropping are preferred as they save time, and more efficient land utilization. Intercropping also helps in reducing heavy run off caused by heavy rainfall and the steep slopes (Hymas 2000). More agricultural land is required every year, because of continued population growth since the Waluguru people arrived in the area about 200 years ago. Population density on the slopes of the Ulugurus is as high as 150persons/km^2 (Lyamuya *et al.* 1994), with 2.6% population growth rate. The high density is mostly a result of favourable microclimate in the mountains, which favours agriculture since relatively low temperatures, reduced water loss, and lack of pronounced dry season lower the risks of crop failure.

Experimental treatments, designs, establishment and management

Participatory and demand focused experiments that were researcher-farmer designed and farmer-managed were set on 02 to 06 March 2007. Twenty Experimental Pilot Farms (EPF) and another 20 Experimental Control Farms (ECF) were selected. The EPF and ECF farms have relatively similar characteristics in terms of location from the forests, vegetation cover, farming system and crops grown. Dogs were used to guard farms of defined shapes and size. One dog was assumed able to detect monkeys in an area of about 50m^2. On the first day, a team of farmers using dogs drove monkeys away from their farms into the forests and thereafter tied dogs on forest-farm interfaces. Expectation was that dogs would bark to monkeys crossing the border to the farms and alert the farmers, who in turn release dogs and scare the monkeys back to the forests.

Farmers were recording the incidences of monkeys trying to cross the farm or raiding crops. In case of crop raiding, farmers would also record the nature of crop destruction and crop variety. Farmers were also advised to record other wild animals raiding crops in similar way to monkeys. Inform short discussions with farmers during visits to farms and villages, and after harvest workshops, provided opportunities to monitor activities and get feedback.

The recorded data complemented initial questionnaire survey with farmers which intended to acquire background information about farm characteristics as well as qualitative data in relation to perceptions. Data collection was done from morning (7.00hours) to evening (18.30 hours) all days of the week as the traditional guarding of farm against monkeys was normally done. Field Assistants monitored

ECF and recorded the crop raiding incidences by wildlife species.

Results and Discussion

The sum of 28 monthly mean incidences of monkeys tying to cross the forest-farm interface were recorded, among which 3 incidences monkeys succeeded to raid crops. However, a total of 218 crop raiding incidences involving 9 wildlife species were observed over 10 months in 20 EPF. Table 1 summaries observed crop-raiding incidences for the first month (March) of the experiment in the four sampled villages. Magadu village which has high level of forest degradation has high number (8) of crop raiding incidences, followed by Kilakala (6), Tandai (5) and Bagiro (2). Table 2 summarises the mean observed crop-raiding incidences in EPF by month for each group of wild animal.

Table 1 :   Crop-raiding incidences in March 2007

Village	Observed crop-raiding incidences: March 2007				
	1st Week	2nd Week	3rd Week	4th Week	Total
Tandai	1	2	1	1	5
Bagiro		1	1		2
Magadu	2	2	1	3	8
Kilakala	1	2	2	1	6

Table 2 :   Crop-raiding incidences by wild animals and month in EPF

Species	Mean observed crop-raiding incidences: March to December 2007										
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monkeys	5	2	3	3	1	4	2	4	3	1	28
Birds	4	6	8	7	19	13	5	3	4	3	72
Baboon	1	1	2	3	4	2	3	1	2		19
Wild rats	4	5	20	17	9	5	7	11	1	6	85
Bush pigs	2*				1*						3
Dik dik	1				1					2	4
Cane rat					1		1				2

*   Crop raiding was done tonight

Contrary, to EPF in ECF monkeys involved in 141 crop raiding incidences out of 423 total crop raiding incidences involving 9 groups of wild animals per ten months.

Table 3 summarises the mean observed crop-raiding incidence by month for each group of wild animal in EC.

Table 3 :   Crop-raiding incidences by each group of wild animals and month in ECF

Species	Mean observed crop-raiding incidence: March to December 2007										
	Mar	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Monkeys	24	17	11	15	9	21	11	20	9	4	141
Birds	5	8	10	9	23	16	6	4	5	3	89
Baboon	4	7	5	12	15	13	12	6	8	7	89
Wild rats	4	6	23	16	8	6	8	7	2	7	87
Bush pigs				1							1
Dik dik								1	3	2	6
Cane rat						1					1

The comparison of mean crop raiding incidences by monkeys observed in EPF and ECF shows that dogs are more efficient in farm guarding than other traditional means employed in Uluguru Mountains. Dogs reduced crop raiding incidences monkeys from 33.3% in ECF to 12.8% in EPF. Interestingly, in EPF the crop damage was estimated to be 1.4 % compared to 22.1% percent in ECF. Farmers had earlier reported crop raiding incidences to be 37.8% and estimated crop damage up to 41.1%.

The evidence from ECF shows that when monkeys are left alone, they are likely to come into the farms every day, because with all farmer efforts of guarding their farms and using scaring postures, still monkeys raided crops at least once every two days. However, if dogs are used monkeys are likely to come once per week, depending on the level of surrounding forest degradation. Observed crop-raiding incidences were distributed relatively equally across ten months, with the exception of December. The rise and fall of raiding frequencies may partly be attributed to increased human presence on and around farms and the intensity of farms guarding. Figure 2 shows the distribution of crop raiding incidences between March and December 2007 and the raiding differences in ECF and EPF.
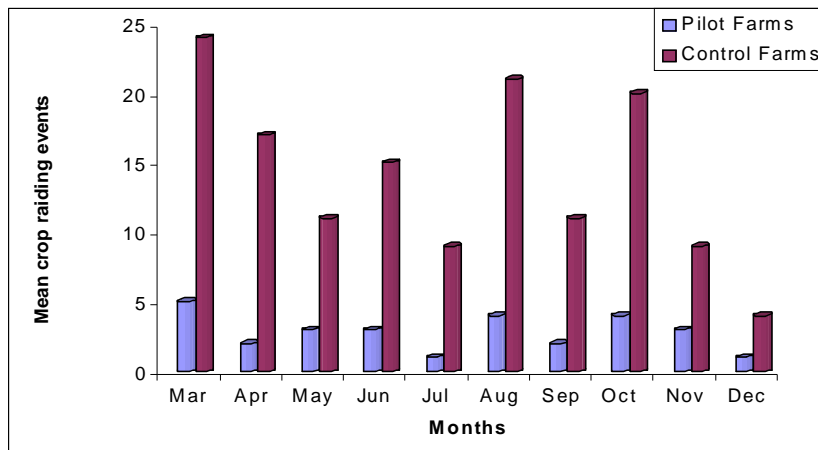

Figure 2: Distribution of crop raiding by monkeys incidences in ECF and EPF

Furthermore, it was observed that peak crop raiding by monkeys peaked in the morning at 8 to 10 hours and later at 15 to 18 hours. The number of monkeys per troop ranges from 20 to 80 composed of adults, juveniles and young. The weather conditions and crop seasons seem not to be associated with crop raiding behaviour of monkeys in Uluguru Mountains.

The technique of using dogs was developed in this study to control monkeys. However, results showed that the incidences of crop raiding by baboons were also reduced significantly in EPF. On otherhand, crop raiding incidences by birds, rats, bush pigs, mongooses and squirrels were inadequately reduced with the use of dogs (Figure 3). This may be due to size of animals and time of raiding.
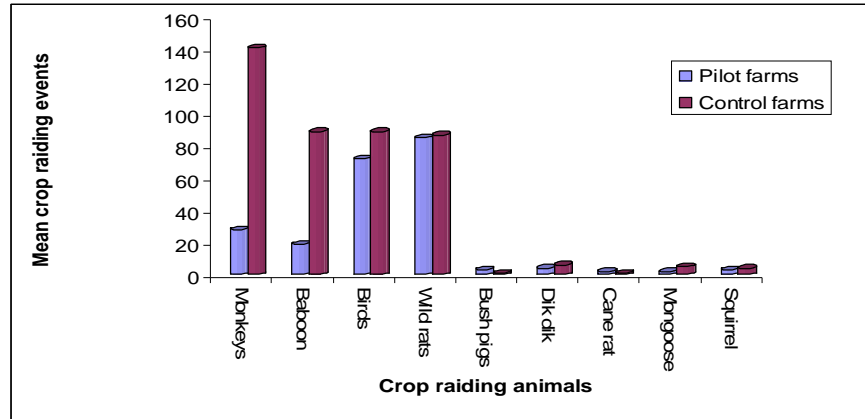

Figure 3:   Dsitribution of crop raiding by different wild animals incidences in ECF and EPF

CONCLUSION

The general conclusion is that dogs can be used to control monkeys from causing crop damage.

This serves as an entry point to address the farmers–monkeys conflicts associated with crop raiding. On socio-economical aspects, dogs are acceptable, cheap, available and easy to adopt in Ulugurus. Therefore, if the study will continue to prove that dogs are more efficient for controlling monkeys, we shall advocate and recommend to farmers to adopt the technique.

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