Ethiop. J. Biol. Sci., 4(2): 215-218, 2005
© The Biological Society of Ethiopia, 2005
ISSN: 1819-8678

SHORT COMMUNICATION

THE MOUNTAIN NYALA AS A SEED DISPERSAL AGENT OF *SOLANUM MARGINATUM* L. (SOLANACEAE) IN THE BALE MOUNTAINS NATIONAL PARK, ETHIOPIA

Addisu Asefa[1]

ABSTRACT: *Solanum marginatum* L. is an indigenous plant species to Bale Mountains National Park. However, it is threatening the area's biodiversity. Investigation of the dispersal agent of *Solanum marginatum* in Dinsho hill was made during April – May 2003. In order to identify the dispersal agent, 68 samples of droppings of four larger herbivores of the area, the Mountain Nyala *(Tragelaphus buxtoni)* (25), Common Warthog *(Phachocorous africanus)* (24), Menelik's Bushbuck *(Tragelaphus scriptus meneliki)* (11) and Bohor Reedbuck *(Redunca redunca)* (8) were collected. Only 40% of the samples of Mountain Nyala contained intact seeds of this plant. The results showed that Mountain Nyala was one of the dispersal agents of this plant in the Dinsho hill.

Key words/phrases: Indigenous species; Dinsho hill; Dispersal agent; Mountain Nyala; *Solanum marginatum.*

INTRODUCTION

Solanum marginatum L. (Family: Solanaceae, Vernacular names: 'Hiddi' in Afan Oromo, 'Embuay' in Amharic) is a much branched shrub growing to a height of about 1.5 m. Nearly all parts of the plant (stems, petioles and lower surface of leaves) are heavily armed with straight yellow prickles, and stems, petioles, lower surface of leaves and inflorescence are white with very dense sessile stellate hairs. The leaves are alternate, often very different in size along the branches, ovate, 8-22 x 5-16 cm, sinuate to shallowly lobed, armed with straight prickles on nerves, upper surface dark green, lower surface white tomentose as stems, with a faint white tomentum along the margin on upper surface, otherwise glabrescent (Friis, in press). It is an indicator of a degraded area and occurs in disturbed areas at altitudes between 2000 m and 3000 m a.s.l. It is also reported as a species not edible to wildlife (Fichtl and Admasu Adi, 1994; Williams, 2002). All members of the family Solanaceae contain a chemical substance called solasodine, which is reputed to have anti-spermatogenic properties. On the other hand, the steroidal glycosides, abundant in plants of this family have haemolytic

[1] Bale Mountains National Park, PO Box 107, Bale-Goba, Ethiopia.

properties (Dawit Abebe *et al.*, 2003). Even though data on the abundance of the plant is not available, information obtained from the local community indicated that it was rare in the past. However, it has been expanding at an alarming rate in the northern woodlands of the Bale Mountains National Park (BMNP) since the last three years.

Based on a report by the World Bank (2002), invading organisms are widely considered as the second greatest threat to biodiversity, next to direct habitat destruction. They also threaten ecosystem services and sustainable development with serious economic and environmental costs. Thus, in order to control the expansion of *S. marginatum* in the BMNP, there is a need to design a strategy for any range management actions to be taken. This requires understanding of the dispersal mechanism of this species, and hence, the present investigation was planned to assess its dispersal agent in the area.

MATERIALS AND METHODS

Description of the study area

The BMNP is situated in the southeast highlands of Ethiopia at 6°30'-7°00' N, 39°30'-39°55' E, about 400 km away from the capital Addis Ababa. It encompasses an area of 2200 km^2. The area contains a landscape ranging from 1500 to 4377 m a.s.l. The soils are mainly derived from the basaltic and trachytic parent rocks (Hillman, 1993; Miehe and Miehe, 1994). Five vegetation zones are observed in this national park: the northern grassland, the northern woodlands, ericaceous forest, the Afroalpine moorland and grassland, and the southern Harenna forest. Seventy-eight mammal and 278 bird species have been recorded for the area; of these, 17 mammal and 6 bird species are endemic (Addisu Asefa, 2004).

The area experiences two rainy seasons, heavy and small rains. The heavy rain lasts from July to October, with the highest peak in August, while the small rain lasts from March to June, with the highest peak in April. Records show that this area experiences temperature extremities during the dry season. The highest temperature is 18.4°C in February and the lowest is 1.4°C in January (Hillman, 1993; Befekadu Rafera and Afework Bekele, 2002).

The present study was undertaken in Dinsho hill (located at 7°05' N, 39°47' E and 3150 m a.s.l.) where the headquarters of the park was located and of which about 1.5 km^2 was fenced. This area is characterized by *Juniperus procera* and *Hagenia abyssinica* dominated woodland. It harbours a larger

number of herbivorous animals. Recently, *S. marginatum* has invaded the area and is expanding at an exponential rate.

Sampling techniques

To identify the dispersal agent of *S. marginatum*, droppings of the herbivorous mammals of the study area were collected from April to May 2003 after fruiting period (Fichtl and Admasu Adi, 1994). A systematic transect line sampling technique was used to collect data for the required items. The main road from the main gate of the Park's Headquarters to the research building was the base line. Perpendicular to the base line, 16 transects were laid out at a distance of 100 m on either side, alternatively. Along each transect, three sampling points were randomly located for the left side transect and one sampling point for the shorter right side transect. The maximum and minimum distances between the sampling points were 200 m and 100 m, respectively. At any sampling point, a 10 m x 10 m quadrat was, laid choosing the site of the quadrat on either side of the transect by tossing a coin. At each sampling point, those droppings defecated at the same spot (piled droppings) by a specific animal were put together (considered as one sample) in a polyethylene bag. On each collected sample, transect and sampling point numbers were recorded.

Each sample was identified to which animal species it belonged so as to compare with the already prepared dropping of reference specimens. The presence or absence of *S. marginatum* seed in each sample droppings was identified by dispersing the droppings. The seeds observed in the samples were further confirmed by comparing them with known reference *Solanum marginatum* seeds. The result was expressed in percentage for each mammal.

RESULTS AND DISCUSSION

Sixty-eight samples belonging to four mammal species were collected. Of the total samples, 25 belonged to Mountain Nyala while 24, 11 and 8 belonged to Common Warthog, Menelik's Bushbuck and Bohor Reedbuck, respectively. Among the samples analyzed, ten of the 25 samples collected and analyzed for Nyala (40%) had intact seeds of this plant.

The presence of intact seeds of *Solanum marginatum* in Mountain Nyala droppings indicated that Mountain Nyala acted as a dispersal agent. Analysis of the stomach contents of a dead male Mountain Nyala (BMNP, 2003) also indicated that Nyala fed on the fruits of this plant. The preliminary result showed that seeds of this plant were not observed in the

droppings of the other mammals studied. They might not use it as a food source, or it might have been digested.

CONCLUSION AND RECOMMENDATION

The unusual growth and the serious expansion of the plant can have a profound ecological impact on the ecosystem. Apart from competing for food and space with other plants, the canopy structures could influence cropping rates of grazers that feed on the understorey grasses. Therefore, appropriate measures should be taken to curtail the extent of expansion.

ACKNOWLEDGEMENTS

I am grateful to Professor M. Balakrishinan, Department of Biology, Addis Ababa University, and to Mr Anteneh Shimelis, Ethiopian Wildlife and Natural History Society, for their valuable advice.

REFERENCES

Addisu Asefa (2004). Avifauna and Ornithological Significance of Bale Mountains National Park. Office Report. Oromiya Rural Land and Natural Resources Administration Authority, Dinsho, 39 pp.

BMNP (2003). Post-mortem Data Report. Bale Mountains National Park Office Document (BMNP), Dinsho.

Befekadu Rafera and Afework Bekele (2002). Diurnal activity pattern of Mountain Nyala (*Tragelaphus buxtoni*) in Bale Mountains National Park, Ethiopia. *Ethiop. J. Biol. Sci.* **1:** 63-72.

Dawit Abebe, Asfaw Debella and Kelbessa Urga (2003). **Illustrated Checklist: Medicinal Plants and other Useful Plants of Ethiopia.** Ethiopian Health and Nutrition Research Institute. Addis Ababa.

Fichtl, R. and Admasu Adi (1994). **Honeybee Flora of Ethiopia**. Margraf Verlag. 510 pp.

Friis, I. (in press). Solanaceae. In: **Flora of Ethiopia and Eriterea** (Hedberg, I., Edwards, S., Ensermu Kelbessa and Sebsebe Demissew, eds.). Vol. 5. The National Herbarium, Addis Ababa University, Ethiopia and Department of Systematic Botany, Uppsala, Sweden.

Hillman, J.C. (1993). **Ethiopia: Compendium of Wildlife Conservation Information.** Vol. 1. Wildlife Conservation in Ethiopia. Ethiopian Wildlife Conservation Organization, Addis Ababa.

Miehe, G. and Miehe, S. (1994). **Ericaceous Forest and Heath Land in Bale Mountains of South Ethiopia**: Ecology and Man's Impact. Traut Warnke Verlag, Hamburg.

Williams, S. (2002). **Bale Mountains: A Guide Book.** Ethiopian Wolf Conservation Programme, Addis Ababa.

World Bank (2002). **Conservation of Biodiversity in Mountain Ecosystems at a Glance**. The World Bank, Washington, D.C.