

Short Communication

Report of an Olive Lace Bug Infestation on *Olea europaea* ssp. *cuspidata* (Wall. ex G. Don) P. S. Green in *Desa'a* Natural Forest, Northern Ethiopia

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Abstract

Olea europaea subsp. *cuspidata* is widely grows in natural forests in many parts of Ethiopia. However, there is scanty information about the impact of insect pests' infestation in the natural forests of Ethiopia. Based on the outbreak of pest infestation report in *Desa'a* Natural Forest located in the border between Tigray and Afar national regional states of Ethiopia, field survey was conducted in November 2012. It has been observed that the nymph and adults of *Plerochilia australis*, attached to the underside of leaves of olea trees, were found to be responsible for yellowing and scorching of leaves that resulted in serious defoliation of tree regardless of age difference. In *Esot*, where the infestation first observed, nearly all trees were found infested and several dead trees were found. Similar infestation by *P. australis* was also observed in the leaves of *Olea europaea* subsp *europaea* seedling which were introduced in recent years to Atsebi-Wemberta District of Tigray Regional State. The level of insect infestation was observed to vary between the native and introduced trees and from one place to another based on climatic variables. Accordingly, more infestation were observed in the native than the exotic species and in warmer than cold weather. The lack of knowledge on the biology and ecology of *P. australis* in Ethiopia limited the effort to control the impact and expansion of this pest.

Key words: *Olea europaea* ssp *cuspidata*, Lace bug, Tigray

Introduction

Olea europaea subsp. *cuspidata* (Wall. ex G. Don) P. S. Green is an evergreen tree species growing at an altitude of 1250-3100 meters (Friis 1992). It is distributed in Africa, Arabia, the Himalayas and SW Asia (USDA 2012; Hedberg et al. 2003; Fehri et al. 1996). In non-

native area such as Australia, *Olea europaea* subsp. *cuspidata* is an aggressive weed (Cuneo and Leishman 2006). In Ethiopia, the species is widely grown in fields and church yards in Afar, Tigray, Gonder, Welo, Shewa, Kefa, Gamo Gofa, Sidamo, Bale and Harerge (Hedberg et al. 2003).

In December 2012, The Bureau of Agriculture and Rural Development of the Government of National State of Tigray reported to the Federal Ministry of Agriculture that unknown pest infestation has occurred and is causing a huge devastative to the natural stands of *O. europaea* subsp. *cuspidata* trees growing in natural forest in several thousand hectares of lands in Desaa'a natural forest at Atsbi Wenberta District, Eastern Tigray Zone in Northern Ethiopia. Based on the report, a field survey was carried out to determine the identity of the pest and its level of damage at Atsbi Wenberta District.

Materials and Methods

Description of study area

Desaa'a forest is a semiarid Afromontane Natural Forest situated between 13°20' and 14°10'N and 39°32' and 39°55'E in the border between Tigray and Afar national regional states. It covers more than 117,000 ha of land, where 88,890 ha of the total area is in Atsebi-wenberta district of Tigray national regional state (TNRS). The forest is situated from flatter areas and gentle slopes to steep scarps with altitudes ranging from 1500 to 2500 meters, with mean annual temperature of 15-28°C (EWNHS 1996) and rainfall of 116.3-230 mm (Gebreegziabher 1999). The District has Cambisols, Lithosols and Xerosols soil types (EWNHS, 1996). The forest is rich in *Juniperus procera* and *Olea europaea* subsp. *cuspidata* (Aynekulu et al. 2011).

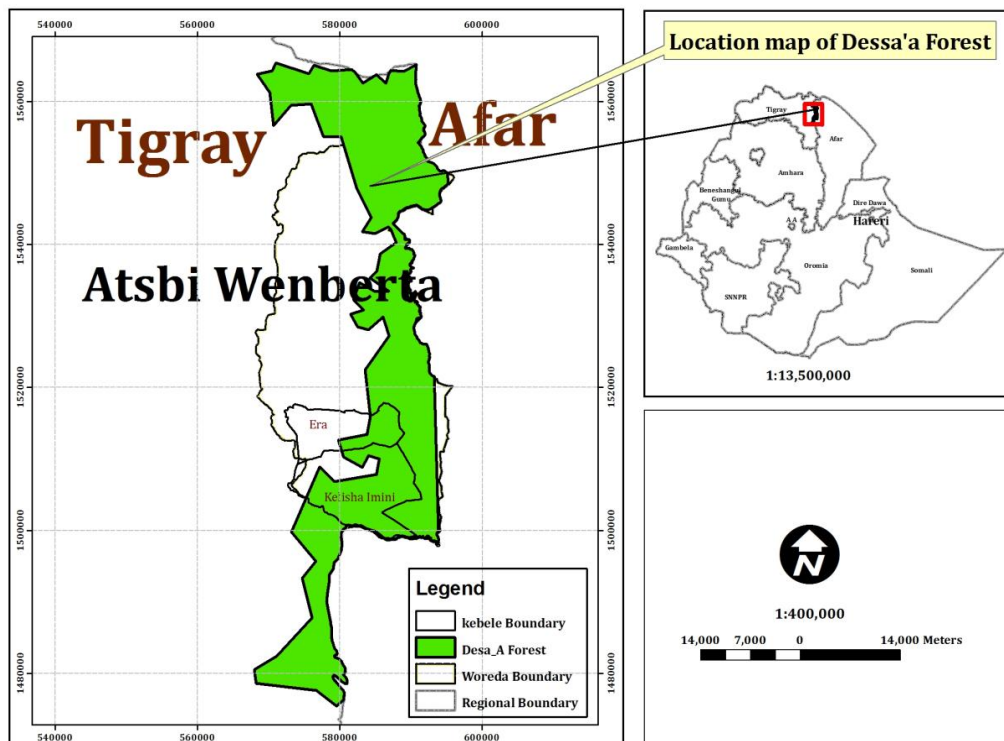


Fig. 1. Map of study area

Field observation and collecting specimens

Field survey was conducted in December 2012 to investigate the occurrence of the insect pest at Atsebi-Wemberta district. The survey focused on two localities of the District namely *Esot* and *Kalisha*. Observation was made in the natural stands of olive trees for the presence or absence of the insect, type of damage and life stages observed. Specimens of both nymph and adults were collected and brought to Forestry Research Center and Plant Protection Department of the TNRS Agriculture Bureau for identification. Further specimen were sent to Muséum national 'Histoire naturelle Département Systématique et Evolution UMR 7205 MNHN_CNRS CP50 - 57 rue Cuvier, 75005 Paris, France for authoritative identification and confirmation.

Result

Based on local information available from Development Agents, forest experts and local residents, the incidence of the insect pest infestation on *O. europaea* subsp. *cuspidata* observed soon after the rain stopped in the first week of August than the usual period in mid of September 2012. In December 2012, the level of infestation further broadened and invaded several hectares of land regardless of age of the trees. Similar infestations were also evident in the newly introduced *O. europaea* subsp. *europaea* that was planted in the highland of

Atsebi-Wemberta District in 2010. Despite that more infestation were reported in several localities in Atsebi-Wemberta District, the pest was not reported in the adjacent Enderta District.

This pest was identified as *Plerochila australis* Distant in Ethiopia and conformed in France that belongs to family Tingidae and order Hemiptera. On average, more than fourteen nymphs or adults insects were counted per leaf. These nymph and adults feed the underside of leaves of *O. europaea* subsp. *cuspidata*, and often causes yellowing and scorching of leaves that will later dry and drop to the ground (Fig 2). Consequently, severely infested trees became totally defoliated (Figure 3). Furthermore, heavy infestation and mass defoliation of trees of *O. europaea* subsp. *cuspidata* were observed in the cliff of the lowlands than in the plateau of Atsebi-Wemberta district.

Although, *P. australis* was more active in warm temperature, light hours and windy weather than vice versa, it was not observed to fly more than 3 meters under these optimum conditions in the highlands. On the other hand this pest was noticed residing in fresh plant materials that are used as tooth pick, stick to clothes of residents and body of domestic animals that routinely cross via the infested sites. Unlike the native olea species, none of the leaves of the sampled plants of the introduced olive species, *O. europaea* subsp. *europaea* were discolored and defoliated due to *P. australis* infestation.

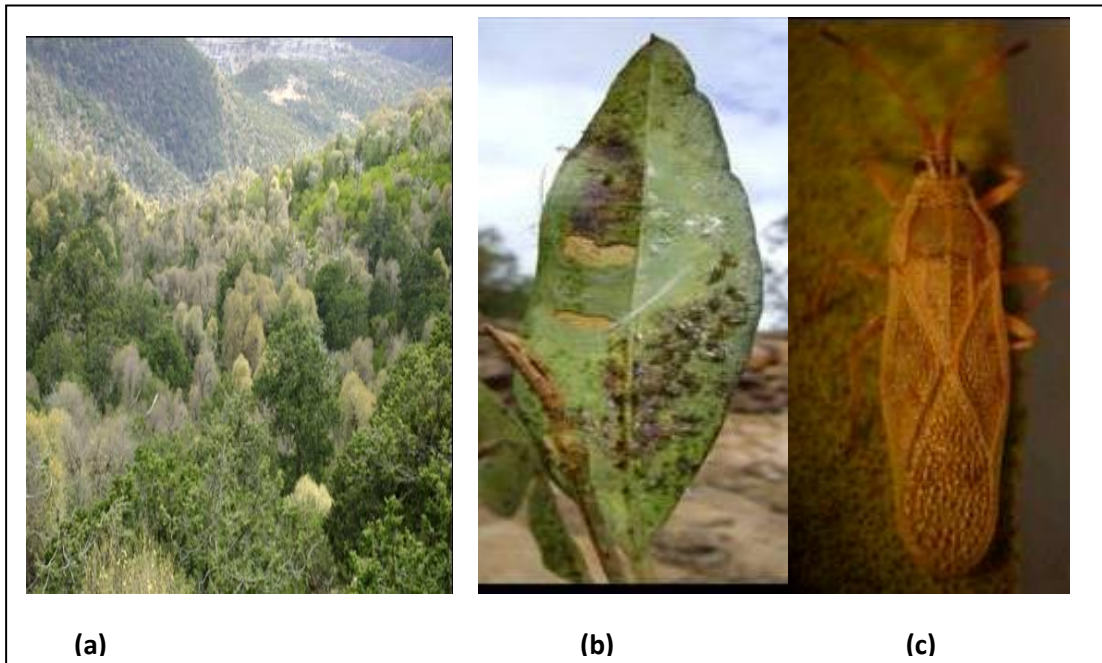


Figure 2. (a) *O. europaea* subsp. *cuspidate* infested with *P. australis* at Esot, Atsebi-Wemberta district. Note defoliated trees and trees with yellowish colour indicating serious infestation in the area; (b). Nymph of *P. australis* on leaves; (c) *Plerochila australis*



Figure 3. Regenerating native Olive tree after severe *P. australis* infestation at Eso, Atsebi-Wemberat District (Picture taken on 6th of April 2013).

Discussion

In Atsebe-Wemberta district both the native and exotic olea species were seen to host *Plerochila australis*. This sucking insect imparts severe damage on the leaves of native trees than the introduced olea saplings. This variation might occur due to environmental factors, management practices and genetic resistance between the two species.

The nymph of *Plerochila australis* resemble that of aphids, and feed gregariously on underside of olive tree leaves or shoots, where accumulated honeydew may promote sooty moulds (Picker, et al., 2004). *P. australis* is a small grey-brown sucking insect about 4mm in length, with faint network of wing veins where wing tips meet (Picker, et al. 2004). According to Cook (1964) it is diagnosed as oblong, moderately wide, grayish stramineous, sometimes with a few veinlets brownish or fuscous; body beneath brown to dark fuscous; buccal and sternal laminae of rostral sulcus brownish testaceous. Antenna is pale brown with distal two-thirds of fourth segment blackish. Legs pale brown. It has a length of 3.50-4.00 mm and a width (elytra) 1.45 mm. The head of *P. australis* is very short, with two basal spines thick, pale, and appressed; frontal spines short and porrect. Antennae smooth, measurements: segment I, 22; II, 14; III, 85; IV, 35. Rostrum is brownish, that extends to the meso-metasternal suture. The pronotum is not much swollen, less convex than in other members of genus, distinctly punctate; median carina prominent, long; lateral carinae absent on pronotal disc, distinct and parallel on triangular prolongation of hind margin of pronotum; hood very small, not extending forward in front of anterior margin of collar; extending backwards between calli, paranota narrow, either bi-or triseriate, reflexed, each covering about one-third of its respective side of pronotal disc.

Several authors reported the presence of *P. australis* in South Africa, Kenya, Mozambique, Ethiopia, and Madagascar, Mascarene Islands such as Mauritius (Picker, et al., 2004; Cook, 1964; Drake and Hill, 1964). In Ethiopia, *P. australis* was reported from Eastern Ethiopia in 1963 (Drake and Hill, 1964) that is far away from Atsebe Wemberta. In South Africa, the

insect is sometimes considered as a minor pest on olives causing defoliation and dieback of young shoots (Mikize, 2009; Lotter, 2004). Furthermore, *P. australis* was also found on cultivated olive trees (Picker, et al., 2004).

Tesfaye et al (1977) and TFAP (1966) reported that this native olive tree encountered 24-109 death per hectare of land in Desa'a forest without acknowledging the contribution of insect pests to this death. However, the dry weather as a result of insufficient rainfall in and around Desa'a forest (Gebreegziabher, 1999); the presence of settlement and farming in and around the forest favors the movement of humans, animals and plant materials especially in market days via the pest infested sites definitely allowed further expansion of *Plerochila australis* in Atsebe-Wemberta district. Meanwhile the reprofuting of already infested olive trees at *Esot* locality could be good news if the insect failed to re-infest reprofuting olive trees or if the insect did not enter into diapausing phase (Figure 3).

Recommendation

Since *P. australis* was considered as minor pest on olive trees elsewhere, so far our knowledge on *Plerochila australis* biology, ecology and its natural enemies is limited. Therefore, side-by-side to the implementation of an internal quarantine measure on the movement of people, animals and planting materials, further research should be conducted in looking for potential natural enemies at the current place of infestation and even from areas where *P. australis* had been reported on olives in Ethiopia.

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Reference

- Aynekulu, E., Denich, M., Tsegay, D., Aerts, R., Neuwirth, B. and Boehmer, H.J. 2011. dieback affects forest structure in a dry afro-montane forest in northern Ethiopia. *Journal of Arid Environments* 75: 499-503
- Cook, E.F. 1964. Scatopsidae (Diptera nematocera): Parc National de la Garamba. –Mission H.de Saeger. *Fasciule* 44(4).
- Drake, C.J. and Hill, B.G. 1964. Some Ethiopian Lacebugs (Hemiptera: Tincjidae). Volume XXIV Dec. 31, 1964 Nos.3-4. *The Great Basin Naturalist* Published at Provo, Utah Brigham Young University
- EWNHS (Ethiopian Wildlife and Natural History Society). 1996. Important Bird Areas of Ethiopia, A first Inventory, EWNHS, Addis Abeba.
- Fehri, B., Aiache, J.M., Mrad, S., Korbi, S. and Lamaison, J.L. 1996. *Olea europaea* L.: stimulant, anti-ulcer and anti-inflammatory effects. *Boll.Chim.Pharm.* 135 (1): 42-49
- Friis, I. 1992. *Forests and forest trees of Northeast Tropical Africa*. London.
- Gebregeziabher, Z. 1999. Dessa'a Protected Area: an assessment of Human Impact, Evolutionary pattern and options for sustainable management. A Research Report. Mekelle, Ethiopia. www.org/mab/doc/mys/97/Zenebe/report.pdf
- Hedberg, I., Edwards, S. and Nemomissa. 2003.. *Flora of Ethiopia and Eritrea*. Volume 4, part 1. Apiaceae to Dipsacaceae. Addis Ababa, Ethiopia; Uppsala, Sweden. EMPDE. Ministry of Education, Addis Ababa, Ethiopia.
- Hill, D.S. 1989. *Catalogue of Crop Pests of Ethiopia*. Alemaya University of Agriculture Bulletin No.1. First edition. Richaprint Ltd., Freiston, Boston, U.K.
- Lotter, W.D. 2004. The establishment and ecological impact of the leaf-sucking lace bug *Gargaphia decoris* on *Solanum mauritianum* in Kwazulu-Natal. Magister Technologiae: Nature Conservation Dissertation paper. Department of Natural Conservation Faculty of Agriculture, Horticulture and Nature Conservation, Tshwane University of Technology.
- Mikize, N. 2009. Insect pests of cultivated and wild olives, and some of their natural enemies, in Eastern Cape, South Africa. PhD thesis, Rhodes University.
- Picker, M., Griffiths, C. and Weaving, A. 2004. *Field guide to insects on South Africa*.
- Tesfaye, K. Fikru, M. and Mulugeta, A. 1997. *Climate, Vegetation and Current Land Use Inventory for Dessa'a Forest Area*, Ministry of Agriculture, forest and wildlife conservation and Development department, Addis Ababa, Ethiopia.
- TFAP (Tigray Forestry Action Program). 1996. Main Report, Regional Government of Tigray USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network-(GRIN) [Online Database]. National Germplasm Resources-Laboratory, Beltsville, Maryland. <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?410990> (26 December 2012).