

Abundance and use of *Vepris dainellii* (Pichi-Serm.) Kokwaro, an Ethiopian endemic plant, in Melokoza woreda, Southern Ethiopia

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Abstract

*The study on abundance, distribution and use of *Vepris dainellii* was undertaken in Melokoza woreda (administrative unit) in GamoGofa Zone of Southern Nations, Nationalities and Peoples Region (SNNPR). The objective of this study was to assess the use of this species by local communities and its current population status in its natural habitat in south-west Ethiopia where it is poorly known. The study approach was categorized into three 1) market survey, 2) informant interview and 3) species population inventory in the surrounding natural habitat. Market survey was mainly focused on market observation to estimate the amount of fruits sold in the market and its frequency compared to other food crops. Informant interview was focused on the uses of the species and its availability in the surrounding forest fragments. The adult tree species abundance and regeneration status in the existing forest fragments was estimated. The result indicates that the species is used as additives to coffee drink because of its aromatic character. Local communities supplement their livelihood by selling wild collected ripe fruit of this species for consumption. In conclusion, *Vepris dainellii* is locally very useful plant that needs attention for future research that benefits communities. Current over harvesting of mature fruit from parent-tree influenced the regeneration of this species. If this unsustainable harvesting by local people continues, the capacity of the species to maintain its wild population is significantly reduced. Therefore, management and conservation strategies that incorporate this factor is required.*

Key words: *Vepris dainellii*, Melokoza, additive to coffee drink

INTRODUCTION

From the time immemorial people started exploiting the natural environment as the source of their livelihoods. Different wild

plant species have been used as source of food, medicine, clothing, firewood, sources of different household utensils. Wild plants continue to play a central role in the

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livelihood of large proportion of the world's population (Koduku *et al.*, 2007). This is particularly true in developing countries, where wild collected food and medicine have a long and uninterrupted history of use (Koduru *et al.*, 2007).

Use of wild plants for different purposes is also an integral part of the Ethiopian culture. In the south and southwestern Ethiopia with large ethnic and cultural diversities the use of wild plants as a means of livelihood is immense. In some parts of southern Ethiopia, people use wild food-plants as a survival strategy (Guinand and Dechassa, 2000; Tilahun and Mirutse, 2010; Kebu and Fassil, 2006). There is a spatial and temporal variation in the consumption of wild edible plants. Use of wild plants as a source of food is common in food insecure areas (Tilahun and Mirutse, 2010) of the country and during the time of famine (Guinand and Dechassa, 2000). Guinand and Dechassa (2000) indicated that the Konso people in south Ethiopia withstood the crop failure due to the drought seasons from 1996-1999 by using wild edible plants. Kebu and Fassil (2006) showed that some of the wild edible plants in Derashe and Kucha Districts in south Ethiopia were used during the time of food scarcity.

Wild edible plants have been used in Ethiopia during the time of food scarcity. The ethnobotanical studies conducted in Ethiopia addressed the role played by various plant species (e.g. Ermias, 2005, Getachew *et al.*, 2005; Tilahun and Mirutse,

2010, Kebu and Fassil, 2006). Ermias *et al.* (2011) reviewed 413 wild edibles belonging to 224 genera and 77 families in Ethiopia and indicated their potential to combat food insecurity. Despite the role the wild edible plants play in combating food insecurity, the ethno botanical researches conducted so far in Ethiopia addressed only

5% of the country (Ermias *et al.*, 2011) and these are also confined to central and highland regions of Ethiopia.

Most of the studies conducted on the ethnobotany of the Ethiopian plants focused on commonly known species. Even the recent literature review on the ethnobotany of Ethiopian plants by Ermias *et al.* (2011) has not included *Vepris dainellii* in the list of 413 plant species because of lack of documented information on the species. Tesfaye *et al.* (2009) and Tesfaye and Sebsebe (2009) addressed the use of *V. dainellii* as one of the medicinal plants used by Konta and Kefficho people respectively. Tesfaye *et al.* (2009) reported that the seed of *V. dainellii* is taken for treatment of abdominal cramp. Tesfaye and Sebsebe (2009) reported that the bark and fruits are used for treatment of intestinal worms, skin diseases and tooth pain. None of the studies reported any other use of the plant so far.

V. dainellii from *Rutaceae* family is medium-sized, shade tolerant afro-montane tree species endemic to Ethiopia. It typically grows as an understory tree mixed with other small tree and shrub species in forests but sometimes seen growing at margin of afro-montane forest and open forest areas recently modified by humans. The plant occurs in altitudinal range of 1050-2500m above sea level. It is distributed in Kefa, Ilubabor, Welega, Bale, Shewa, Sidamo and Gojam in Ethiopia, but not known elsewhere in the world (Gilbert,

1989). In the IUCN threat category, *V. dainellii* is under species of least concern (Vivero *et al.*, 2005).

This study was initiated to be conducted on *V. dainellii* for the following reasons.

1. To care for the plant, for it endemic to Ethiopia and if it is lost due to

mismanagement we never get it anywhere.

2. To make an observation of the fresh fruit/seed of the plant in the local market.
3. To identify the way the people harvest the fruits/seeds for market as well as domestic use.
4. To identify egger to know its population density in the wild. Because the mismanagement during harvesting the fruits/seeds for market may affect the survival of the plant in the wild.

The major objective of this study was, therefore, to assess the population status of the plant in its natural habitat and document its use by the community in Melokoza wereda.

METHODOLOGY

The study area

The study area was located in Melokoza wereda, GamoGofa zone, in Southern Nations Nationalities and Peoples Regional State (SNNPRs). It is one of the remote woredas in Gamogofa zone with infrastructure problem and until recently it has been one of the least visited areas in the zone for scientific study. The wereda falls within latitude 6° 32' 30.67" and longitude 36° 39' 14.31". It is bounded by Omo River in the northwest and Ergeno River in the east (Figure 1). The elevation range from 700 m to 3200 m and is characterized by three agro climatic zones-Dega (highland) (22%), Weynadega (middle land) (43%) and Kola (lowland) (35%). The area gets rain for nine months (February – October). The annual rainfall data (1200-1300mm) obtained from Basketo special wereda which is very close to Melokoza may be representative for this area. The annual average temperature of the wereda is 22°C on average.

The vegetation type comprised woodland mixed with lowland bamboo in the lowland and moist forest in the higher altitude which composed of *Pouteria adolfi-friedericii*, *Sapium ellipticum* and different riparian vegetations like *Ficus sur* and *Syzygium guineense* sub sp *guineense*. The forest floor is covered by *Afromumum cororima*, *Culcasia falcifolia* and *Piper capense* similar to south western moist forests of Ethiopia those located in Kafa and Illubabor Zone.

The human population of Melokoza wereda is 112,723 (Melokoza wereda, 2008). The wereda is inhabited by different nationalities including Melo, Basketo, Gofa, Oromo and Amhara.

Data collection

Ecological data

The system of Mueller-Dombois and Ellenberg (1974) was used in establishing sample plots. Data on density of the adult tree of *Vepris.dainellii* was collected from 20 m x 20 m releve while the seedling and sapling abundances were collected from five 5 m x 5 m subplots laid at each corner and the center of the 20 m x 20 m releve.

Interview

Four elders were selected from the community based on purposive sampling technique (Bernard, 2002). These key informants were selected for interview based on the assumption that they are members of the community most knowledgeable about the species. Group as well as individual interview was conducted with them. The interview was semi-structured and based around a pre-determined set of questions that were designed as to gather information about the use of species, how it is collected from the wild and which community member uses or depends on it (Appendix 1).

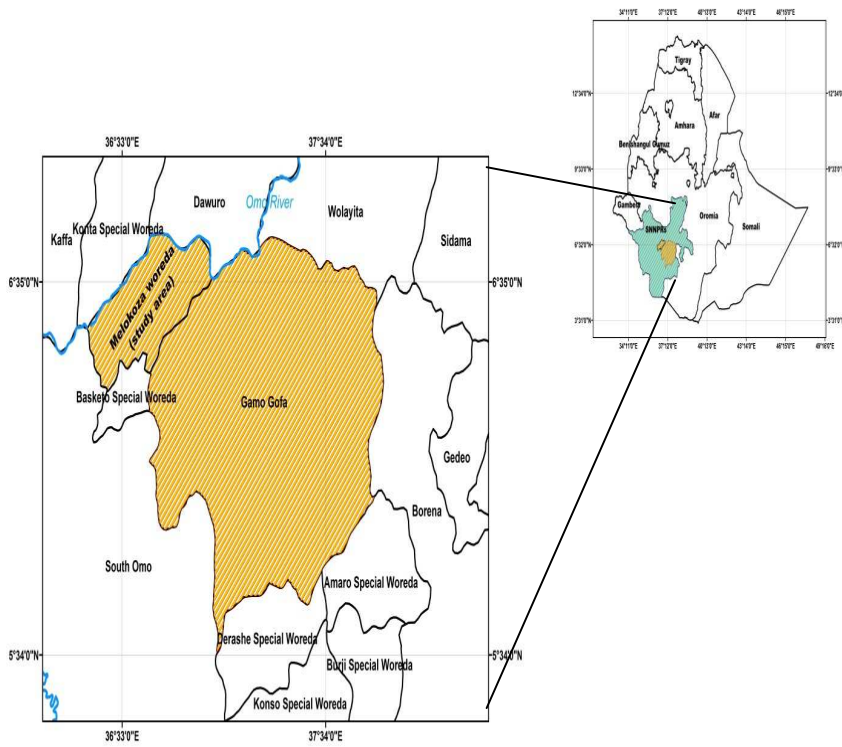


Figure 1. The location of the Southern Nations, Nationalities and Peoples Regional state (SNNPR) and the Melokoza study area showing with respect to GamoGofa Zone

Data analysis

In data analysis excel-spreadsheet was used to calculate the abundance, ratios of the seedling and sapling density to the adult tree and the frequency of occurrence of the species in the study plots. The abundance of *Vepris dainellii* recorded in 24 plots was described by its stem density (number of stems/ha) and frequency (the proportion of the plots in sampled forest that it was present in). The total seedling and sapling were counted from the 5 m x 5 m sub-plots and described by density per hectare. The interview obtained from the informants was evaluated qualitatively.

RESULT

Vepris dainellii is one of the most commonly used wild tree species in Melokoza woreda. The plant was not reported from Gamogofa floristic region in the previous studies of Ethiopian plants

and, therefore; this study is reporting the plant from Gamogofa for the first time.

The plant is among the gift of nature for the indigenous people in Melokoza. It is used as additives to coffee drink because of its aromatic character and very pleasant smell and taste. The fruit is widely sold in the local market and serve as a means of income generation to support the livelihood of the local people.

Due to high demand and value by the community people started keeping *V.dainellii* as semi-domesticated species around their home garden witnessing that there is still a process of domestication of wild plants in south Ethiopia. The species is widely used in the local market as a means of income earning by women. The fresh fruits in the local market (Figure 2) justify this fact.



Figure 2: Fresh fruits of *V.dainellii* as displayed in the local market in Melokoza

Distribution and abundance of *Vepris dainellii* in its natural habitats

In this study *V.dainellii* was recorded in 91.6% of the plots showing that the species is widely distributed in the study area. The total stem density was calculated to be 137.5/ha (Appendix 2). The ratio of juveniles (seedlings and saplings) to adult trees is inconsistent along the plots (Appendix 2). Juvenile: adult ratio indicates that each adult tree contributes 0.72 to juvenile pool.

Regeneration of *Vepris dainellii* in its natural habitat

The seedling and sapling densities were 49 ha⁻¹ and 51 ha⁻¹ respectively. Other regeneration strategies were not observed in the species other than regenerating through seed germination. The seedling to adult, sapling to adult and juvenile (seedling + sapling) to adult ratio are 0.36, 0.37 and 0.72 respectively.

DISCUSSION

Vepris dainellii is an endemic plant species in Ethiopia and mostly recorded in seven floristic regions of the country i.e. Illubabor, Wollega, Shewa, Bale, Kafa, Sidamo and Gojam (Gilbert, 1989) and categorized as species of least concern by IUCN (Vivero *et al.*, 2005, 2006). The species was not reported from Gamogofa Floristic region in the former studies of Ethiopian vegetation. This study is reporting the species as a new record for Gamogofa floristic region, and its use and population density in the wild. It usually grows as understory tree species in moist montane forests (Gibert, 1989; Tadesse, 2003; Dereje, 2007).

The use of wild plants has been reported by various authors (Samyurari, *et al.*, 2012; Debela *et al.*, 2011; Mirutse *et al.*, 2009; Tesfaye *et al.*, 2009; Tesfaye and Sebsebe,

2009; Institute of Biodiversity Conservation (CBD), 2007; Getachew *et al.*, 2005). The use of *V.dainellii* as traditional medicine was reported by Tesfaye *et al.* (2009), and Tesfaye and Sebsebe, 2009) but its use as additives had not been reported in previous research works. The indigenous people in Melokoza use the seed of *V.dainellii* as additive in coffee drinks. The use of seed in treatment of abdominal cramp was reported by Tesfaye *et al.* (2009) and the use of bark and fruit was reported by Tesfaye and Sebsebe (2009).

The seed of *V.dainellii* as additive of coffee drink is prepared by roasting and grinding exactly similar to traditional coffee preparation for drink. During coffee preparation, equal amount of coffee (*Coffea arabica*) and *V.dainellii* are mixed and boiled together. According to informants, coffee drink served without *V.dainellii* is like *injera* (Traditional Ethiopian bread) served without stew.

In addition to its use as ingredient in coffee drink, the fresh fruit of *V.dainellii* is also sold in the local market and supplement the income of the local poor. Even though it requires detail study to estimate the volume collected per household per-week then per-year it is evident that the demand in the market is high. During market survey we observed that the species was widely sold in the local market in Melokoza woreda as much as other crops such as coffee, bean, pea, sorghum, banana, mango and orange indicating that the species is highly demanded. The collection of the fruit from the natural forest is usually undertaken when it is fully matured and ripened. Like coffee, most of the fruits produce two seeds per fruit. However, the nutritional value and mineral content of the fruit/seed of this species was not included under this study

and entails future investigation with consent of local users.

The present study indicated that the seedling and sapling densities of the species are very small (~49 and ~52 ha⁻¹ respectively). Dereje (2007) from Bibita forest in southwest Ethiopia reported 170 seedlings and 153 saplings of *V.dainellii* per hectare. The total number of juveniles recorded in the natural habitat is less than the number of adult trees. Seedling to adult ratio is 0.36, sapling to adult is 0.37 and the total density of seedling and sapling together (juvenile) to adult tree is 0.72. This may be attributed to the unsustainable harvesting of mature fruit by the community. People break the whole fruiting branch when they harvest the fresh fruits for local market as well as for home use (Figure 2 above).

The re-sprouts from stump as in the case of other species was not observed as regeneration strategy in this species. This plant is a shade tolerant species and the fragmentation and area reduction of patch may also have impact on the wild population of the species.

CONCLUSION AND RECOMMENDATION

In conclusion, *Vepris dainellii* is the most locally useful endemic plant that needs attention for future research. Current over harvesting of mature fruit from parent-tree influenced the regeneration of this species. The inability of adult to establish large number of seedling and sapling population due to early harvest by local people will be conservation concern that needs attention for future management. If the unsustainable harvesting by local people continues, the capacity of the species to maintain its wild population will be significantly reduced. Therefore, management and conservation

strategies are essential to be put in place to save the species.

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