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Ethnobotanical knowledge and socioeconomic potential of honey wine in the Horn of Africa

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The traditional honey wine is a ceremonial drink made locally in Ethiopia and Eritrea. The drink is known as *Tej* in Amharic (a widely spoken language in Ethiopia) and *Mess* in Tigrigna (a widely spoken language in Eritrea). It is consumed mostly during social and religious ceremonies, albeit sold in honey wine bars. It is easy to prepare with varied tastes by local people from its main components; honey, chopped stems of *Rhamnus prinoides* or roots of *R. staddo* and water. Honey and the shrubs used for the preparation of the wine are recognized for their medicinal importance worldwide. Particularly, after the isolation of geshoidin, a bitter glycoside from *R. prinoides*, that is currently being investigated for its role in providing novel-pharmacological leads for Alzheimer's treatment. On the other hand, *R. staddo* has been investigated for potential antimalarial candidate. These with other beneficial metabolites from the shrubs call for a wider investigation into the medicinal benefits of the honey wine. Furthermore, considering its declining consumption, limited efforts to preserve the indigenous knowledge of preparing the drink and lack of adequate promotion, further research is needed to lead into the sustainability of drink for generations and its global usage.

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Indigenous fermented alcoholic beverages are a part of many traditional and indigenous communities across the world. The fermented beverages produced from fruits are known as wines while those produced from cereals are usually referred to as beers. In Africa, Tanzanian *wanzuki*, *tembo-mnazi*, *gara*, *gongo*, Nigerian *palm wine*, Kenyan *muratina* and *uraqua* popular beverages[1]. These fermented beverages have been consumed during recreational and ceremonial events, i.e., marriage, social gatherings, naming ceremonies, festivals, burial ceremonies, settling disputes etc. The beverages have been a source of calories, vitamins, essential elements and proteins in low economy countries, but also some are used as medicines for febrile diseases and other ailments by adding stem and bark of certain medicinal plants[2].

Tej or *Mess* is a home-processed honey wine of Ethiopia and Eritrea. It is prepared locally from honey, a medicinal shrub *Rhamnus prinoides* L'Hér. or *R staddo* A. Rich. and water. At household level, it is processed and consumed mostly on special religious occasions such as New Year (*Kidus Yohannes* or *Enkutatash*), finding of the True Cross (*Meskel* or *Lidet*), Epiphany (*Timket*), Easter (*Fasika*) and during social events such as wedding, festivals and inaugural ceremonies. Apart from household level, the drink is regularly sold in honey wine bars (called *Tej bet* or *Enda mess*) in villages, towns and cities. A good quality honey wine is yellowish in colour, sweetish in taste, effervescent and cloudy. However, its flavor mostly depends upon the part of country from where the bees have collected the nectar and climatic conditions. In this paper we discuss the traditional methods of making *Tej/Mess*, its ethnobotanical benefits and potential. We also emphasize on the understanding of the health benefits

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of the drink, promotion for better market and enhance its contributions to the local economy.

Methodology

Survey and interviews were conducted by visiting five honey wine bars in Mekelle and Hagere Selam towns, Tigray Province in Ethiopia and six in Asmara city in Eritrea. We interviewed approximately 15 bar owners (male and female) involved in making, processing and selling of the honey wine with the help of semi-structured open-ended questionnaire. Information was collected on the traditional preparation methods of the drink, historical drifts in the preparation methods and consumption among the countries over the years. We also interacted with approximately 30 individuals (young and old) about health benefits of the drink. In addition, literature survey was conducted on chemical and nutritional parameters of the honey wine and ethnobotanical uses of *R. prenoides* and *R. staddo*.

Result and Discussion

Preparation and ethnobotanical uses

Tej is prepared from honey, water and stems (with some leaves) of *Rhamnus prinoides* (Fig. 1A) (known as *Gesho* in Amharic) in Ethiopia. In Eritrea, to prepare *Mess*, roots of *R. staddo* (known as *Tsedo* in Tigrigna) are used instead of *R. prinoides*. Honey is the main component of the wine (Fig. 1B). Traditionally, the wine is prepared by making a grand mixture from one part of honey with five parts of water into an earthen traditional narrow mouthed vessel called *Genbo* (Amharic) or *Etro* (Tigrigna). The grand mixture is stirred till the honey dissolves completely. Chopped stems with few leaves of *R. prinoides* are boiled with water or a portion of the

Fig. 1 A — *Rhamnus prinoides* plant; B. Honey; C. Honey wine; D. Honey wine stored in plastic barrel; E. Honey wine bar/shop with red cloth sign indicating its availability; F. *Wancha*, made of cattle horn; G. *Berelle*, made of glass; H. Honey wine in *berelle*; I. Eritrean customer drinking the wine from *berelle*; J. Ethiopian customer drinking the wine from *wancha*.

grand mixture at 100ºC for about 45 min and then added to the vessel. The mouth of the vessel is then covered air tight with cotton cloth and the mixture is left to ferment while stirring on a daily basis. The fermentation could last from few days to months depending upon the taste desired, the event for which the drink is being prepared and weather conditions.

The grand mixture can be kept for months (for superior quality and strong taste) for social events such as wedding, New Year celebration and annual religious pilgrimage. For this, *R. prinoides* stems can be removed completely from the vessel after few weeks of fermentation and fresh honey topping into the grand mixture is conducted every few days. In warm weather conditions, four to five days of fermentation could be sufficient to get a good quality honey wine (Fig. 1C). In cold weather conditions, fermentation that leads to a good quality honey wine may require a week or more. The honey wine can be prepared in three tastes i.e., strong, medium and soft. The strong honey wine (traditionally known as *Derek Tej* in Amharic and *Derek Mess* in Tigrigna) is prepared by fermenting the grand mixture for long duration (weeks to several months). The medium honey wine (*Makakalagna Tej* or *Maekelay Mess*) is prepared by fermenting the grand mixture for short duration (a few days to a week). A mixture of honey and water consumed straightaway or after a day or two without fermenting with *R. prinoides* or *R. staddo*, is known as soft honey wine (*Laslasa Tej* or *Birze*). Note that, in addition to the fermentation period, the quantity of the shrubs added is directly related to the strength (bitterness) and intoxication of the drink.

Before 1970, traditionally, the superior quality honey wine fermented for months was only prepared by the members of the royal family and better-off people. Wooden barrels (known as *Yetawla bermele* in Amharic and *Zingrar* in Tigray) were used to prepare large quantity of wine, whereas the earthen vessels were used to prepare small quantity. Now a day, plastic barrels are preferred due to low cost and easy availability (Fig. 1D). The honey wine was served (Bar/shops Fig. 1E), after filtering the wax and scum using a white cotton cloth, in cups made from cattle horns (known as *Wancha* Fig. 1F, 1J). *Wancha* was quite expensive and people use to carry their own *wancha* in ceremonies and parties. Later to fascinate by the aesthetic value of the drink, *Berelle* was introduced (Fig. 1G, H). *Berelle* is a narrow-necked glass flask with a capacity of holding 350 mL of the drink. Drinking the honey wine in *berelle* is a bit classy (middle finger of hand is placed below the *berelle* neck to support, index finger above the neck and thumb is placed near lips) and used to avoid flies and dust from the wine (Fig. 1I). The honey wine is considered to be very refreshing and potent and is available at 3-6$/litre. It contains carbohydrate (1.49-3.73 mg/mL), lipid (0.31-1.34 mg/mL), protein (0.33-4.66 mg/mL) and reducing sugar (0.46-2.09 mg/mL)[1] (Table 1). *Saccharomyces cerevisiae, Kluyveromyces bulgaricus*, *Dearomyces phaffi* and *Kluyveromyces veronae* are dominant yeast species reported in fermented *Tej*[3].

Rhamnus prinoides, a shiny-leaf buckthorn, is a spineless evergreen shrub which may reach 9 meter in height. Leaves alternate, simple, elliptic to oblong elliptic; mature leaves glossy dark green. Flowers greenish-yellow, small, pentamerous, inconspicuous; fruits are drupe, ovoid to almost circular and dark red. The plant belongs to family Rhamnaceae found in

Table 1 — Mean values of chemical and nutritional parameters in various samples of *Tej* from different production units*

Unit	pH	Titratable acidity (g/100 mL)	Alcohol (%)	Fuse oil (g/100 L)	Carbohydrate (mg/mL)	Lipid (mg/mL)	Protein (mg/mL)	Reducing sugars (mg/mL)
A	3.47	0.57	10.85	ND	1.49	1.34	0.39	0.58
B	3.95	0.40	10.17	22.91	3.08	0.31	0.43	1.18
C	3.89	0.52	8.33	13.90	2.81	0.56	0.33	2.09
D	3.82	0.34	9.80	13.58	3.21	0.98	0.43	1.69
E	3.63	0.60	9.58	23.47	2.99	0.64	1.47	1.36
F	3.68	0.44	8.25	19.80	1.81	0.44	3.32	0.46
G	3.58	0.43	8.17	15.49	2.10	0.36	4.66	0.99
H	3.80	0.42	10.05	27.38	3.73	0.71	1.90	1.72
I	3.82	0.43	6.98	25.72	3.52	0.87	1.62	1.71
J	3.87	0.40	8.12	23.12	2.89	0.73	1.40	0.92

*Source (Bahiru et al., 2001), ND= No data

Table 2 — Ethnobotanical uses of *Rhamnus prinoides*

Plant parts	Ethnobotanical uses
Roots	Sexually transmitted diseases (e.g. syphilis & gonorrhea), arthritis, flu/cold, back pain, stomach ache, pneumonia, brucellosis, strength/nutrient supplement, enhancing/facilitating digestion[4], typhoid, stomach ache[9], ear, nose, throat infection[10], malaria, prostate[11], snakebite[12]
Stem	Typhoid, stomach ache[9]
Leaves	Diarrhea, external parasite[13], tonsillitis[14], ear, nose, throat infection[10], scabies[15], itching, skin rash[16], eczema[17], animal hepatitis[18]
Branches	Herpes, diabetes, HIV related infections, bladder and kidney problems, pulmonary TB, pneumonia, blood purifier, protective charm, colic, muscular rheumatism, purgatie[19], hepatitis[20]
Seeds	Tinea capitis[16]

Table 3 — Ethnobotanical uses of *Rhamnus staddo*

Plant parts	Ethnobotanical uses
Roots	Tuberculosis, polio, gonorrhea, snakebite[21], sexually transmitted infection, infertility, malaria, diabetes, asthama[22], typhoid, back pain, joint pain, male libido[23]
Leaves	Head ache[21], sexually transmitted infection, infertility, malaria, diabetes, asthama[22]

Central, East and West Africa at an altitude of 1400-3200 m above sea level. It has been utilized extensively in Africa for ages for its medicinal and aesthetic values. Decoction of its root is used to treat sexually transmitted disease (gonorrhoea and syphilis), malaria, rheumatism, pneumonia, cold, flu, back ache, brucellosis, purifies blood and improves digestion (Table 2). Leaves are applied as a liniment to sprains. Decoction of leaves mixed with bark of *Erythrina abyssinica* is used to alleviate colic[4,5]. More than 20 secondary metabolites and essential elements have been isolated and identified from the shrub[6,7]. A unique compound known as geshoidin metabolite has been identified that provides bitter taste to the wine[8]. *R. prinoides* possess antioxidant and anti-inflammatory activities and recent reports reveal its possible role in providing novel poly-pharmacological leads for the treatment of Alzheimer's disease[3]. To our knowledge in pharmaceutical industry there is no cure and effective medication to the disease so far. On the other hand, in South Africa the shrub is used as protective charm to ward off lightning and evil influences from home and crops, and to bring luck. *R. staddo*, a small bushy rigidly branched evergreen shrub or small tree, may reach 7 meter in height. Leaves narrowly elliptic, narrowly obovate, shiny above, margin entire or obscurely dentate. Sepals 1.5 mm, triangular; petals 1 mm long, shorter than stamens. Fruit 5 mm in diameter and somewhat fleshy. The plant grows in rocky places in Ethiopia, East Africa, Zaire and south to Zimbabwe. In Eritrea, it occurs on the eastern escarpment as well as in the northern and central highlands at an altitude of 1500-2300 m above sea level. Roots and leaves are used against sexually transmitted infections, infertility, malaria, diabetes and asthma (Table 3).

In Ethiopia and Eritrea, little has been investigated about the medicinal benefits of drinking the honey wine. Traditionally, the local people we have held discussion with believe that consuming the wine regularly provides at least three major benefits, i.e., i) honey wine drinkers tend to remain look younger for long years than people who do not consume the wine, and have attractive skin tone particularly on the face (as it is said in Amharic, *Tej melke yabej birr bayfej)*, ii) in parts of Tigray province, people believe that pregnant woman consuming moderate amount of the honey wine after few months of pregnancy would give birth to a child with an attractive brownish skin tone, and iii) men regularly consuming a moderate amount of the honey wine tend to have a strong libido. However, these benefits have not been corroborated with experimental evidences. Further, there is a need to conduct research studies to confirm whether consuming the honey wine helps to reduce infections documented including malaria, rheumatism, pneumonia, back ache and Alzheimer's disease. Likewise, research is needed to investigate the documented benefits of drinking the honey wine for purification of blood and to improve digestion.

Conclusion

Considering its possible health benefits, the honey wine can uplift the economy of Ethiopia and Eritrea by expanding it to the global market. Ethiopia and Eritrea have a number of tourist destinations due to peculiar topography, ancient history and varied culture. Millions of tourists visit the two countries

annually and this can help local *Tej/Mess* makers, traditional honey producers and *R. prinoides* and *R. staddo* farmers to tap in to the tourist market by reaching to a wider consumer. However, the challenge is the knowledge of preparation of the drink and its uses are confined to a small section of the population due to fondness of the young generation towards international drinks, i.e., beer, and lack of market promotion. Hence, considering the high medicinal potential, sociocultural and economic values there is an urgent need of more research on the honey wine. Better knowledge advancement (e.g., to increase shelf-life and marketing) is required to improve the product's global acceptance and promote it to national and international markets, while keeping the traditional preparation method strictly followed. Ethiopia in particular has the largest honey bee population in Africa and ranked ninth in the world for its honey production.

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