

# Characterization of Cactus Pear from Tigray, Northern Ethiopia

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**Abstract** - Cactus pear is a fruit crop which can grow in water-limited conditions, high temperatures and poor soils wherein cereals and pulses cannot survive. It is used as a source of food, forage, fuel wood, cash income, raw material for various industrial products, as live fences and soil conservation purposes. This multi-functionality of the crop identifies it as a plant that imperative to areas in arid and semi-arid regions. However, this fruit crop is not developed as in case of other agricultural crops as fruit and forage varieties due to difficulties such as lack of adequate characterization and evaluation, a few collections maintained worldwide and difficulties and costly of preservation resulted from its perennial habit and large plant size. In Ethiopia particularly in Tigray Regional State where cactus pear is dominantly growing, this fruit crop has kept ignored and not yet researched. Further, little work has done on systematic characterization and evaluation of cactus pear in the region and their germplasm is not collected and maintained. Thus, this study was conducted to describe commonly growing cactus pear varieties at south Tigray to contribute for its improvement and conservation. Accordingly, six commonly growing farmers' cactus varieties (Enfirir, Maymayo, Wedwado, Lamtsa, Harfaf and Michla) were described based on the internationally accepted and standardized descriptor methods. Characters like plant descriptor, cladode descriptor and fruit descriptors and other observation were described.

**Key words** - cactus pear, characterization, varieties

## I. INTRODUCTION

Semi-arid and arid regions are a challenge to conventional cropping systems because of limited or erratic rainfall, poor soils, and high temperatures (Le Houérou, 1996). Hence, the cultivation of conventional crops such as cereals and pulses in these areas has proven to be agriculturally unproductive. However, productivity in these areas can be increased by the cultivation of adapted crops such as cactus (*Opuntia* species), especially cactus pear (Pimienta-Barrios and Muñoz-Urias, 1995). Cactus pear is increasingly being cultivated in these areas since it can tolerate water-limited conditions, high temperatures, and poor soils (FAO, 2005). It is used as a source of food, forage, fuel wood, cash income, raw material for various industrial products, as live fences and soil conservation purposes (Brutsch, 1997; Mitiku *et al.*, 2002), source for pharmaceutical and cosmetic products (Felker and Inglese, 2003). Cactus pear is consumed as fresh fruit, flowers and mature cladodes low lignified are used as forage (Corrales-García *et al.*, 2004; Felker *et al.*, 2006).

The multi-functionality of this crop identifies it as a plant that developing countries in arid and semi-arid regions will benefit from. If developed further, this crop could contribute to sustainable food production in countries with large areas of semiarid and arid land (Felker and Inglese, 2003). However, this fruit crop is not developed as in case of other agricultural crops as fruit and fodder varieties due to several obstacles like lack of adequate characterization and evaluation of the available germplasm of cactus pear (Mashope, 2007), few germplasm collections of cactus pear are maintained at several locations around the world (Chapman *et al.*, 2002), difficulties and costly of preservation because of its perennial habit and large plant size and the difficulty in genotype identification hinders the systematic collection and evaluation of cactus pear germplasm material (Chessa and Nieddu, 1997). This is evidenced by the scarcity of published accounts of the breeding history, characterization and evaluation data of this crop (Chapman *et al.*, 2002) and thus, cactus pear identification, descriptor evaluation and conservation currently is a priority for all scientist involved in economic utilization of this plant as a crop.

In Ethiopia, this essential fruit crop is stay ignored and not researched yet although a few researches have been done on the economic importance, productivity and description through the data collected from local farmers and few studies done by researchers (Mitku *et al.*, 2002; Fetein, 2003; Tesfay *et al.*, 2011). Moreover, there are little efforts have done on systematic study conducted to identify and characterize cactus pear types grown in Tigray using internationally recognized descriptors like Tesfay *et al.*, (2011). Further, there is no cactus pear germplasm collection maintained for future breeding works. This clearly indicates that scientific studies for cactus pear improvement and development of cultivars have not been given attention in the area. Further, there is no clear breeding program aimed at production of hybrid varieties of cactus which is suited for the specific area for its multipurpose. Having this fact in mind, therefore, this study was initiated to describe farmers' varieties of cactus pear grown in Waza Adibuna Tabia (peasant association) of Hintalo Wejerat Wereda, South East Tigray, with the objective of description of farmers' varieties of cactus pear which are commonly growing in the study area.

## II. MATERIALS AND METHODS

### *Description of the study area*

This study was conducted in south Tigray which is one of the 36 districts of Tigray Regional State, Northern Ethiopia. It has tepid sub humid agro ecology and it divided into 20 'Tabias' (Peasant Associations), among which Waza Adibuna is one. It has a distance of around 25 km from Hintalo wejerat to south direction. The main crops in the area are barley, wheat, sorghum maize and teff. Of the fruits, cactus pear and some citrus species are common as a source of food, forage and income generation as well as medicinal uses.

### *Sampling Methods*

First farmers' cactus pear varieties found in the area were listed to determine their fruit and plant characters. Accordingly, six commonly growing varieties which are Enfirir, Maymayo, Wedwado, Lamtsa, Harfaf and Michla were identified for description. Non-random, purposive sampling techniques were employed in the identification and collection of the samples. For the purpose of fruit, cladode and plant characterization four plants from each variety were considered as replicates and the cultivars as treatments.

### *Plant Characterization Methods*

Description of cultivars for vegetative, cladode and fruit characters was done followed the internationally accepted and standardized descriptors developed by Chessa and Nieddu (1997). This descriptor was developed by scientists who participated in the Food and Agricultural Organization of the United Nations' International Technical Co-operation Network on Cactus Pear in 1996, specifically by members of the working group for Plant Genetic Resources Collection, evaluation and conservation (Mashope, 2007). This descriptor involves plant descriptor, alternate bearing descriptors, habitus descriptors, cladodes descriptor, fruit descriptor and other descriptors include whether outstanding or disadvantageous characteristics of the varieties and their use.

## III. RESULT AND DISCUSSIONS

Description of cactus pear varieties growing in Hintalo wejerart south east Tigray was carried out on six varieties. The cultivars with their vernacular names are presented in table 1. Names have got meanings that are associated to their size, location, color, etc.

Table 1. Vascular name and meaning of described cactus pear varieties at Waza Adibuna

No	Vernacular name	Meaning
1	Enfirir	Small size
2	Maymayo	High water content
3	Wedwado	Big size
4	Lamtsa	Spineless
5	Harfaf	Rough
6	Michla	Area name

### *Description of cactus varieties*

#### A. Enfirir

##### 1. Growth descriptor

Plant vigor: high  
Plant size: medium  
Plant shape: round  
Alternate bearing: present  
Habitus: medium

##### 2. Cladodes descriptor

Shape: ovate  
Spines: present  
Glochides: intermediate

##### 3. Fruit descriptors

Fruit shape: round  
Position of the receptacle scar: sunken  
Fruit color: green  
Pulp colour: red  
Seed number: few  
Ripening date: June 3<sup>rd</sup> week  
Harvesting period: 40 days

##### 4. Other observations

Fruit hold in plant  
Main use: fruit  
Other uses forage fencing, soil erosion control

#### B. Maymayo

##### 1. Growth descriptor

Plant vigor: high

Plant size: large  
Plant shape: elongate  
Alternate bearing: present  
Habitus: upright

**2. Cladodes descriptor**

Shape: ovate  
Spines: present  
Glochides: few

**3. Fruit descriptors**

Fruit shape: ovoid  
Position of the receptacle scar: sunken  
Fruit colour: greenish  
Pulp colour: greenish white  
Fruit colour at commercial maturity: white  
Seed number: medium  
Ripening date: June 3<sup>rd</sup> week  
Harvesting period: 40 days

**4. Other observations**

Fruit hold in plant  
Main use: fruit  
Other uses forage fencing, soil erosion control

**C. Wedwado**

**1. Growth descriptor**

Plant vigor: high  
Plant size: large  
Plant shape: elongate  
Alternate bring: preset  
Habitus: medium

**2. Cladodes descriptor**

Shape: ovate  
Spines: many  
Glochides: absent

**3. Fruit descriptors**

Fruit shape: ovoid  
Position of the receptacle scar: flattened  
Fruit color: green  
Fruit color at commercial maturity: red  
Pulp colour: red  
Seed number: few  
Ripening date: June 4<sup>th</sup> week  
Harvesting period: 60 days

**4. Other observations**

Fruit hold in plant  
Main use: fruit  
Other uses forage fencing, soil erosion control

**D. Lamtsa**

**1. Growth descriptor**

Plant vigor: low  
Plant size: large  
Plant shape: elongate  
Alternate bearing: absent  
Habitus: medium

**2. Cladodes descriptor**

Shape: oval  
Spines: none  
Glochides: few

**3. Fruit descriptors**

Fruit shape: ovoid  
Position of the receptacle scar: flatten  
Fruit color: green  
Fruit color at commercial maturity: red  
Pulp colour: red  
Seed number: few

Ripening date: June 2<sup>nd</sup> week

Harvesting period: 30 days

**4. Other observations**

Fruit hold in plant

Main use: fruit

Other uses forage fencing, soil erosion control

**E. Harfaf**

**1. Growth descriptor**

Plant vigor: high

Plant size: small

Plant shape: elongate

Alternate bearing: absent

Habitus: up right

**2. Cladodes descriptor**

Shape: elliptic

Spines: money

Glochides: many

**3. Fruit descriptors**

No fruit

**4. Other observations**

No Fruit hold in plant

Main use: fence

Other uses: soil erosion control

**F. Michla**

**1. Growth descriptor**

Plant vigor: high

Plant size: medium

Plant shape: rounded

Alternate bearing: present

Habitus: medium

**2. Cladodes descriptor**

Shape: ovate

Spines: many

Glochides: few

**3. Fruit descriptors**

Fruit shape: rounded

Position of the receptacle scar: flattened

Fruit color: green

Pulp colour: red

Fruit color at commercial maturity: purple

Seed number: many

Ripening date: June 2<sup>nd</sup> week

Harvesting period: 70 days

**4. Other observations**

Fruit hold in plant

Main use: fruit

Other uses forage fencing, soil erosion control

**IV. CONCLUSION**

It is logic that crops like cactus pear are very important for the areas of arid and semi arid due to their ability to resist drought and can grow in less fertile soil Tigray regional state of Ethiopia where this research was conducted is endowed with this plant but it is not characterized and maintained. From this study six commonly growing farmers' varieties of cactus pear are described from Waza Adibuna tabia (peasant association) of Hintalo Wejerat one of the district of Tigray region, north Ethiopia. However, this information may not be enough to characterize the cactus pear varieties found in the area. Therefore, it could be necessary to characterize all the varieties based on morphological, chemical and molecular techniques.

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