

# **The Beles or Cactus Pear (*Opuntia ficus-indica*) in Tigray, Ethiopia**

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## **ABSTRACT**

Tigray is in northern Ethiopia, bordering on Eritrea. Desert conditions prevail in the east, changing to semidesert, thorn savanna, and mountain savanna moving westward into the tropical highlands. More than 85% of the population is reported to be directly dependent on agriculture for a livelihood, but, with long periods of drought and unreliable rainfall, compounded by excessive human and livestock pressures on the land, famines are not uncommon, resulting in high human and livestock mortalities. It is in this context that the cactus pear plays an increasingly vital role as a source of food and animal feed. It is also used as a fuel, as a live fence or hedge, for soil conservation, and its fresh fruit as a limited source of household income. It has become an integral and impressive part of a strategy for food and feed security. However, in those parts of Tigray where it has become invasive, it is also considered to be a curse. It may be necessary to review some policies and practices, particularly with regard to plantings in rangelands, and/or to consider appropriate control measures.

## **INTRODUCTION**

Somewhat as was the case in South Africa until recent years, but depending also on area and circumstances, the cactus pear (*Opuntia ficus-indica*) in Ethiopia is viewed as both a blessing and a curse. But, more so than in South Africa, in Tigray it plays a crucial role in sustaining humans and livestock during drought and famine.

Tigray is a region of Ethiopia bordering on Eritrea. The cactus pear or beles, as it is known here, plays an important economic and cultural role, which is reflected in traditional songs and sayings, as in the following translation by Abay (1997):

"Oh my beles you spare me this summer till barley has cheerfully come to rescue me" According to Hagos (1977), more than 85% of the population of Tigray derive their livelihood directly from agriculture. Because of ever-increasing human and livestock pressures on the land, a decline in soil productivity, and recurrent drought and famine, there is increasing reliance on cactus pear to minimize risk and ensure crop and food security. "Cactus pear is playing a crucial economic role, as a source of food, animal feed, fuel wood, and, in some cases, as a means of additional income, thereby increasing the efficiency and economic viability of small and low-income farmers".

Livestock plays a major role in the economy of Tigray. The following facts (Kassahun, 1997) highlight the dependency on both spiny and spineless cactus as a source of feed:

- Natural rangeland provides only about 5% of livestock feed requirements

- About 50% of livestock are underfed and susceptible to the effects of even minor droughts
- 45% of livestock feed needs are derived from crop residues, including cactus pear
- During the 10-year period from 1983 to 1992, livestock mortalities greatly exceeded livestock sales (more than double).

Tigray covers about 80 000 square km and is estimated to have about 360 000 ha of cactus pear, of which about two thirds consists of spiny plants. About half of the existing area of opuntias was planted; the remainder has been invaded by the naturalized cactus. Despite the great extent and importance of cactus pear in Ethiopia, there is a singular lack of awareness or mention of it in the literature on cactus pear, including the recent authoritative review by Barbera et al. (1995).

Case Studies in Southern and Eastern Tigray Three localities will serve to illustrate the nature and significance of the cactus pear industry of Tigray, as well as some problems and challenges.

Figures 1 and 2 show the localities in relation to the Horn of Africa and Ethiopia. Figures 3 and 4 show mean temperatures and rainfall for two of the localities: Maichew and Adigrat.

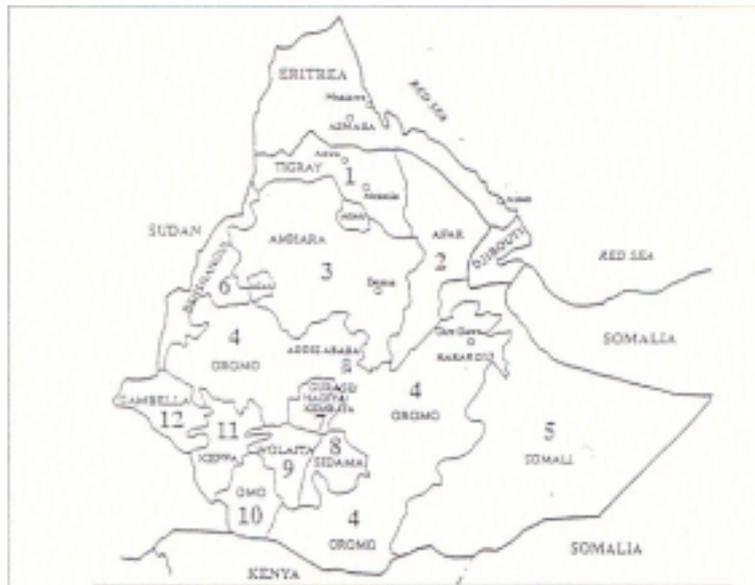


Figure 1. Location of Tigray in Ethiopia, on the Horn of Africa

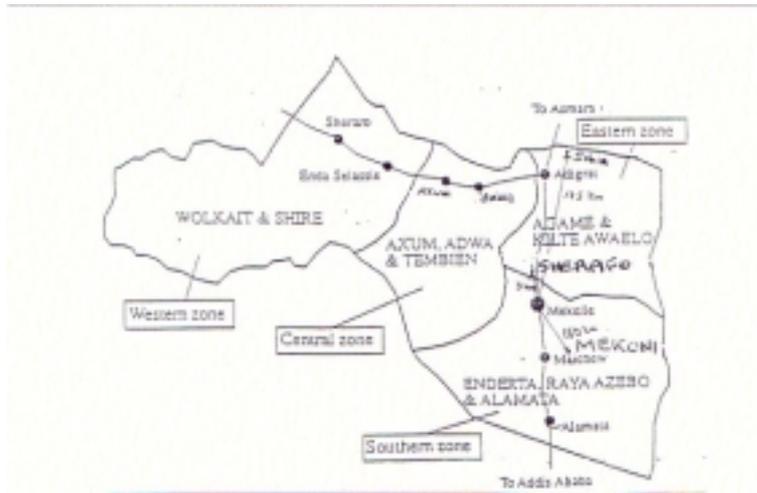


Figure 2. The Eastern and Southern Zones of Tigray, showing Sobia, Serafo, Mekoni, and Maichew

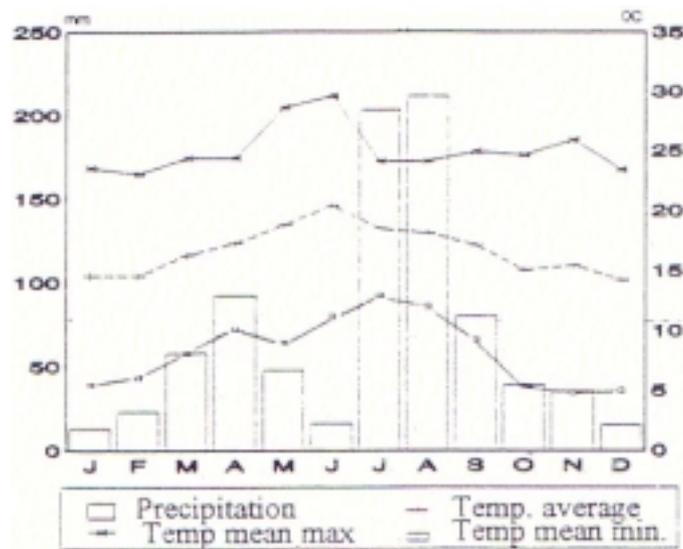


Figure 3. Mean Monthly Rainfall and Temperatures for Maichew in the Southern Zone of Tigray (After Abay, 1997)

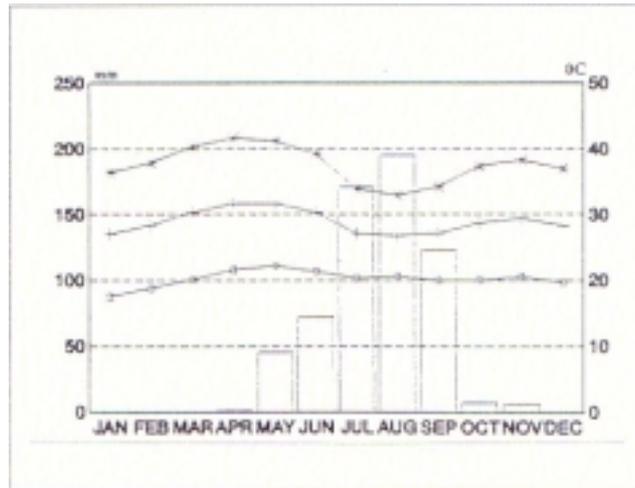


Figure 4. Mean Monthly Rainfall and Temperatures for Adigrat in the Northern Zone of Tigray (After Abay, 1997)

### ***Sherafo***

Sherafo is about 30 km north of Mekelle, the capital city of Tigray. The spineless cactus grown in almost every farmer's backyard (Figure 5) is a source of fruit (mainly from June to August), of feed for his livestock (Figure 6) and fodder for bees (Figure 7). The cladodes are fed together with barley or teff hay to selected livestock.

The spineless cactus plants are grown in rows and protected from livestock by means of stone walls and/or jute plants (*Agave sessalina*).

All this represents a fascinating integrated approach to the use of cactus pear which could be emulated to good advantage in many other African countries. It has apparently evolved over a period of 50 years in this area.

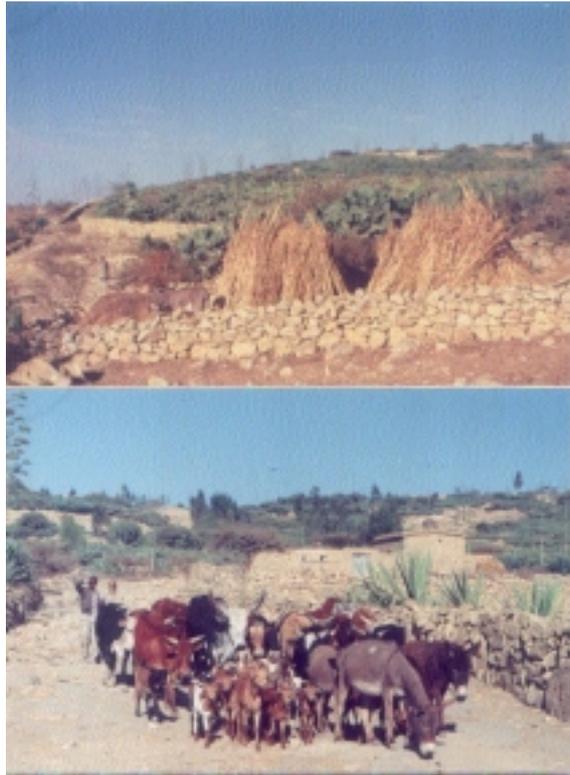


Figure 5. Serafo, a Typical Settlement, with Spineless Cactus Pear Enclosed by Stone Walls. Note livestock and protected stacks of teff or barley hay.



Figure 6. Chopped Cactus Pear Cladodes  
Fed with Barley Hay to Cattle



Figure 7. Beehive Inside the Kitchen. Bees have access to the hive from the outside; the owner has access from within the kitchen.

### ***Sobia***

Situated about 175 km from Mekelle, Sobia is close to the Eritrean border. Both the spiny and spineless cactus are found here, although the former is more widespread. They are used very much as at Sherafo but do not seem to be as well managed. They are planted next to homesteads and in the rangelands as a fodder bank for times of drought, but being predominantly spiny they are not protected from livestock as at Sherafo. Spines are removed by burning hay/straw close to the cladodes, but this is wasteful because the hay is in itself a precious commodity. The agricultural authorities also see the merits of the cactus pear in soil conservation in this heavily overgrazed rangeland.

### ***Mekoni***

Mekoni is situated about 160 km south of Mekelle and 20 km east of Maichew (for which climatic data is presented in Figure 3) but with different topography and climate. Maichew is representative of the tropical highlands of South Tigray where cactus pear has become invasive. Mekoni is in the lower-lying and much warmer fertile plains which are important for dryland field crops during the short rainy season. However, where dense, virtually impenetrable stands of predominantly spiny cactus pear (Figure 8) have formed and are considered by the farmers to be a curse, except for their fruit and in times of drought. Some of these dense stands are being occupied by the poor and landless people who partially clear them (Figure 9). Cactus pears are an important source of fruit and income, producing an out-of-season crop (Figure 10). Cactus on its own, or in conjunction with *Euphorbia abyssinica* (Figure 11), is used as a live fence or hedge. Young cladodes, and older ones with the spines burned, are eaten by livestock, including camels. Old, woody and dried cladodes are used as a fuel (Figure 9).

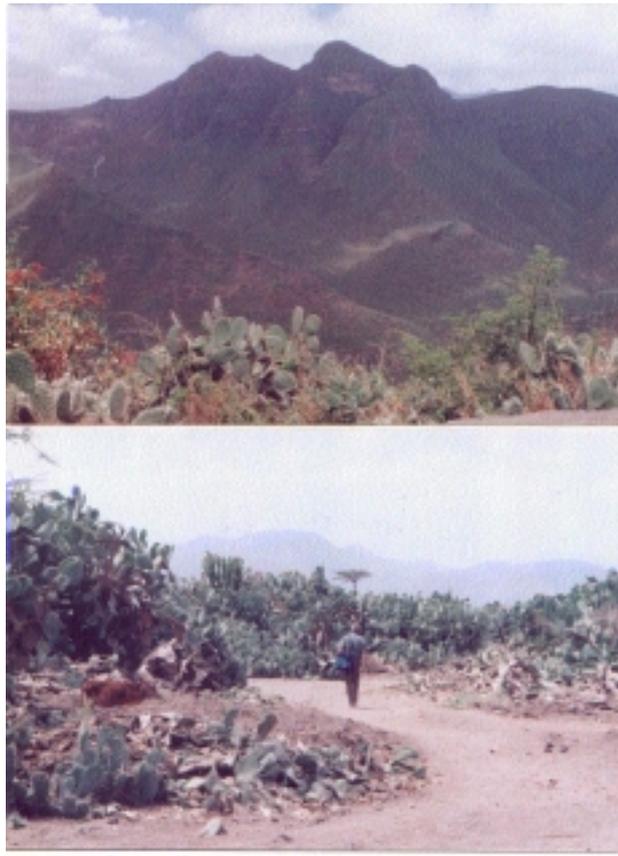


Figure 8. Naturalized Invasive Opuntia as Far as the Eye Can See  
Top: Highlands Near Maichew. Bottom: Plains Near Mekoni.



Figure 9. Clearing Dense Stands of Cactus Pear near Mekoni  
Top: for Dryland Cropping. Bottom: for a Homestead (Note the dry  
Opuntia stems for domestic fuel.).



Figure 10. Out-of-season Fruit near Mekoni

**Left:** Fruit is carried on the head in home-made basket.

**Right:** Devices for harvesting the fruit; note the damage to the fruit caused by the hook.



Figure 11. *Opuntia ficus-indica* and *Euphorbia abyssinica* as Livestock Barriers

### DISCUSSION AND CONCLUSIONS

1. The cactus pear has become an integral part of the culture and economy of Tigray and is utilized in many ways, although not as a vegetable. Nor is it processed much. These uses also need to be developed and researched.
2. Tigreans will continue to rely on the cactus pear but, in view of its propensity to be invasive, they may need to revise the practice of planting it rather indiscriminately in rangelands in some regions.
3. In areas where it has become strongly invasive it may become necessary to introduce appropriate control measures. This could be in the form of specific and less drastic biocontrol agents such as *Cactoblastis cactorum*, or labor-intensive physical clearing, possibly linked to intensified utilization. Brutsch and Zimmermann (1995) have reviewed the control and utilization of the wild cactus and Zimmermann (1997) outlined some strategies for control that could be considered in Ethiopia.
4. The fruits seem to be harvested rather primitively, particularly when hooks are used that pierce the fruit, and with little regard to maturity stages (the fruit is often overripe). If the fruits were to be marketed more effectively within Ethiopia and, as an export crop, this would have to change.
5. Large-scale commercial production of cactus pear as a fruit crop does not seem to exist. One or two such enterprises, or co-operatives, could spearhead the development of an export market for Tigrean cactus pears.
6. Improved selections of saltbush (*Atriplex* spp), as exist in South Africa, need to be considered as a useful drought-tolerant fodder crop that effectively complements cactus pear as a livestock feed.
7. The multifaceted use of cactus pear in Tigray, as at Sherafo, could be emulated elsewhere in Africa (e.g., East Africa) but with the added use of young cladodes as a vegetable, as in Mexico. Of course the cactus pear is already important in parts of North and South Africa.

8. The invasive qualities of Opuntias, in the absence of biocontrol agents, need to be borne in mind as well as the consequences of introducing biocontrol agents where the target plant has considerable socioeconomic merit.

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