Socioeconomic Study On *Ziziphus maritiana* Lamk. From Magway Region

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Abstract

The fruits of *Ziziphus mauritiana* Lamk. (Indian jujube) are one of the best edible wild plants and some are cultivated. It provides food, drinks, fuel and wood as a source of income from it products. The health-promoting properties of Indian jujubes are increasingly being recognized. In the present study include morphological characters, valuable uses and products of Indian jujube were described in this paper and recorded by photographs. A study of the traditional processing techniques of Indian jujubes was conducted using a questionnaire in Magway Region. Indian jujube fruits form part of the family diet and generate additional income by selling at local markets. Indian jujube fruits are dried and can be transformed into various products such as Zee toffee, Zee pyar, Zee lone, Ginn zee pyar, Zee chin suc, jam and juice respectively. Moreover, the kernels of the Indian jujube fruits are very useful for Chinese medicine and it is one of the export products. It fruits form part of the family diet and generates additional income by selling at local markets.
Keywords: products, processing techniques, socioeconomic study

Introduction

The fruit of *Ziziphus mauritiana* Lamk. (Indian Jujube) are edible and are prepared for consumption in many ways. They are eaten mostly fresh but may be pickled, dried and made into confestionery or drinks can be made from the juice. Indian jujube trees are commonly used for live fencing, fodder and planting to control soil erosion. The wood also finds a number of local uses. *Ziziphus* is one of which that is found all over the world. Different types of morphological changes are found cause to temperature and climate changes. According to their morphological change, the species names were decided. *Ziziphus mauritiana* Lamk. is one of which is grown in dry places (Morton, 1987).

Among the various Rhamnaceous, *Ziziphus* (formerly known as *Ziziyphus*) species. *Ziziphus mauritiana* Lamk. is the most common fruit tree found in the rural area of Central Myanmar around, Mandalay, Magway and Sagaing Region. Jujube is also cultivated or wild in Mgway Region. This is situated within the central dry zone of Myanmar.

The plant products produced from cultivated or wild of Indian Jujube products are abundantly found in this area. But some products are produced as commercial products and some are local only. The main uses of Indian Jujube fruits are either alone or in combination with others in the manufacture of all types. The leaves of the tree may be used for fodder and wood as household utensils. The kernels (cotyledons) are used in Chinese traditional medicine and exported to China. *Ziziphus mauritiana* Lamk. (locally known as Zee thi) the fruit is well known to people due to its products such as Zee toffee. Zee pyar, Zee lone, Ginn zee pyar, Zee chin suc, jam and juice respectively.

The optimization and control of the processing of indigenous fruit products have the potential for multiple benefits for local people through employment creation, augmentation family income. Thus, the present study emphasized virtually on

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products of Indian jujube and their uses in Magway Region in accordance with economic points of view.

The purpose of this study is to obtain data and information from the Indian jujube plants and their products on socio-economic life of local people in the studied area and to contribute towards a better understanding for future utilization of Indian jujube plants.

Materials and Methods

The research, have carried out from June 2015 to February 2016 at Magway Region. The jujube belongs to the genus *Ziziphus*, which is in the Rhamnaceae or buckthorn family. The genus includes many species of jujube plants in the study region of which the species *Ziziphus mauritiana* Lamk. For the identification of their morphology characteristics, the vegetative and reproductive parts (flowering bearing parts) of *Ziziphus mauritiana* Lamk. trees were collected at the time of their flowering and fruiting periods.

For the data collection of agronomy, harvesting, packaging and marketing, field study was recorded by investigation and interviews with growers and producers in the study areas. Production data of plants are received from growers and many producers. A market survey was carried out in local markets of Magway Region. A regular market monitoring was carried out every week from September to January to record the information.

The photographs expressing the habit of the plant, cultivated conditions and process of commercial products of Indian jujube were made carefully at study areas.

Results

Morphological characters

Scientific name	-	*Ziziphus mauritiana* Lamk.
Family name	-	Rhamnaceae
English name	-	Indian jujube
Local name	-	Zee-thi
Flowering period	-	September to November
Uses	-	Fruits, leaves, stem, bark, seed

Bushy shrub to tree, ever green or semi-deciduous, erect or spreading with drooping branches, twigs zigzag; the bark deep, longitudinal furrows, greyish brown or reddish. Leaves simple, alternate, blade elliptic, ovate to oblong-elliptic, slightly crenate or entire, with 3 conspicuous longitudinal veins; petiolate, long; spinous stipules, paired, one curved and one straight or both curved. Inflorescences fasiculate cyme was shortly pedunculate. Flowers bisexual, actinomorphic, perygynous, yellowish white, faintly fragrant; pedicelate. Sepal 5, free acute, pubscent. Petal 5, free. Stamens 5, free, alternate to the petals; filament filiform, anther dithecous, basifixed. Ovary semisuperior, bilocular with 2 ovules in each locule on axile placentae; style terminal; stigma 2-cleft, disk fleshy 10 ribbed. Fruit drupe, glabrous, globoid to ovoid, variable in size, greenish, yellowish or reddish; pulp, sour and sweet. Seed pyrene, kernels brown. (Figure 1and 2).

Figure. 1. Inflorescence of *Ziziphus mauritiana* Lamk.

Figure. 2. Habit of *Ziziphus mauritiana* Lamk.

Fruit composition

According to the literature review, major interest has focused on vitamin C content and Indian jujube pulp is considered a rich source. The richness of the pulp in nutritive compounds has been widely recognized. Nonetheless, there are no definitive values for pulp composition. Important nutritional of Indian jujube fruits relates particularly to their being sources of vitamin C and vitamin B complex in the diet. There is a range of potentially useful medicinal substances in Indian jujube.

Agronomy

Indian jujube is one of the most commonly utilized wild fruits in Magway Region. In some places, the jujube tree is grown as a hedge with its spines creating effective live fencing. Wild plants of jujube regenerate naturally by seed and frequently produce root sprouts. Indian jujube may be propagated by seeds but it also can be propagated on their roots through cutting. Spacing should be 5-6m is the best method. The trees are pruned to ensure that these shoots have adequate vigour for good fruit size and quality. Cultivars apply manure for best growth and nitrogen fertilizer is used when the fruit is established.

Harvesting

Most respondents consume fresh jujube fruits everyday during the season. Women and children usually gather the fruits in the morning, and most families spend at most two hours per day in gathering fruits. About 2-4 baskets of fruits are collected per day per family depending on the number of persons gathering the fruit. The method of harvesting Indian jujube fruits is by manually shaking or beating the tree branches to cause the ripe or mature fruits to fall to the ground. Indian jujube fruits ripen at different times even on a single tree and have a golden yellow appearance when they are fully ripe. Other more suitable methods of harvest include plucking the fruit using an iron hook attached to a long bamboo pole and handpicking the individual fruit.

Packaging

After harvest, Indian jujube fruits are brought to the under shade for cleaning and packing to extend their shelf life. The fruits are packed either for controlled storage or safe transport to local or distant markets. Correct and appropriate packaging of the fruits is essential for the safe transport of the fruits during transportation and storage.

Marketing

The harvested fruits are consumed fresh by the locals, and also in rural and urban markets. Most respondents gather fruits for sale to retailers in urban markets. The process of Indian jujube fruits ranges from approximately 2000 kyats per basket depending on the market. In Magway Region, produce fruit largely for the local rural people and local market. The farmer seller brings the fruit to the market and pats charges for transportation from the farm to the market, including loading costs.

Local Uses

The fruits are edible. The fruits are used fresh, dried or preserved and the leaves as fodder. The wood also finds a number of local uses. The kernels (cotyledons) can be produced for export to China. The fruits were mixed with sugar for making beverage, jam, Zee toffee, Zee pyar and Zee Chin suc.

Fodder

The leaves and twing of *Z. mauritiana* Lamk. can be used as nutritious fodder for livestock. Leaves of Indian jujube are readily eaten by sheep, goats and cattle. Nearly every part of *Z. mauritiana* Lamk. are also browsed by many wild animals.

Wood

The wood of *Z. mauritiana* Lamk. is reddish hard, tough, durable and planes and polishes well. It has been used to make agricultural implements, tool handles, yokes, household utensils, toys and general craftwork. The wood does not have value as commercial timber.

Processing of dried fruits

Indian jujube fruits are used to make a number of different products. One of the simplest forms of processing is dehydration, which is essential for prolonged storage of the fruit. The dried ripe fruits are sometimes ground into a powder for prolonged storage and out of season use. Both dried and fresh Indian jujube can be used for further processing. Traditionally, Indian jujube fruits are washed, drained and sun dried. The quality of dried product from different cultivars varies. Traditionally drying is carried out by spreading the fruits on the floor, mats or on polyethene sheets and leaving in the sun for 7 to 10 days. The quality of these fruit depends on the local weather and sanitary conditions. Usually, a fairly good product is obtained by sun drying.

Sun-drying is the simplest and cheapest form of drying fruits. However, it is very weather dependent and does not always produce the highest quality dried fruit. Various driers could be used to improve the quality of the product, but their use very much depends on the intended use of the fruit. High value fruits would be dried using mechanical driers. (Figure 3 and 4)

Figure. 3. Mature fruits of *Ziziphus mauritiana* Lamk.

Figure. 4. Dried fruits of *Ziziphus mauritiana* Lamk.

Processing of Zee phyaw yi (Indian jujube juice)

Ingredients

- dried fruits of Indian jujube
- jaggeries
- salt
- clean water

Dried fruits of Indian jujube can be used for the preparation of a fruit juice. The dried fruits are washed in clean water and torn into small pieces. The stones can be removed if desired, although they will be sifted out at a subsequent stage. The jaggeries are boild with clean water for a few minutes until they have thickened. The fruit pieces are boiled with water for 20 to 30 minutes until the fruits are softened. The fruit pulp is passed through a bamboo sieve and pushed them with hand to produce a clear juice. The juice is sweetened by adding a little thickened of jaggeries liquid and small amount of salt with clean water. The Indian jujube mixture is then boiled for 5 to 10 minutes and filtered again through a muslin cloth. The clear juice is hot filled into presterilised bottles which are capped using a corking machine. (Figure 5 and 6)

Processing of Zee yo (Indian jujube jam)

Ingredients

- dried fruits of Indian jujube
- jaggeries
- salt
- clean water

Dried fruits of Indian jujube are the best types for jam making. The dried fruits are washed in clean water and torn into small pieces. The stones can be removed if desired, although they will be sifted out at a subsequent stage. The jaggeries are built with clean water for a few minutes until they have thickened. The fruit pieces are boiled with clean water for a few minutes until they have softened. The soft fruit pulp is passed through a bamboo sieve and pushed them with hand to obtain a smooth pulp, free of skins and stones. A little thickened of jaggeries liquid and a small amount of salt is added to the pulp and mixed well. The mixture is heated in a pan, gently at first to dissolve the sugar and then rapidly to reduce the water content and the thickens. The mixture should be stirred to prevent it from sticking to the base of the pan and burning. The jam should be removed from the heat. The jam is capped in allowed to cool. (Figure 7 and 8)

Processing of Zee toffee

Ingredients

- dried fruits of Indian jujube
- sugar
- salt
- clean water

Dried fruits of Indian jujube are the best type for Zee toffee making. The dried fruits are washed in clean water and torn into small pieces. The stones can be removed if desired although they will be sifted out at a subsequent stage. The fruit pieces are boiled with clean water for a few minutes until they have softened. The soft fruit pulp is through a bamboo sieve and pushed them with hand to obtain a smooth pulp, free of skin and stones. A little amount of salt and water are added to the pulp and mixed well. The mixture is filtered again through a muslin cloth. The mixture is heated in a pan, gently at first to reduce the water content and the mixture thickens. The mixture should be stirred to prevent it from sticking to the base of the pan and burning. After that the mixture of Indian jujube is sun dried, then it is placed in a tray with sugar and rolled into a rounded shape. (Figure 9 and 10)

Figure. 5 Bottles of Indian jujube juice

Figure. 6 Boiling of Indian jujube fruits

Figure. 7 Bottles of Indian jujube jam

Figure. 8. Sieving of Indian jujube pulp

Figure. 9. Zee toffee

Figure. 10. Rounded shape of Zee toffee

Processing of Zee pyar and Zee chin suc

Ingredients

- powder of Indian jujube
- jaggeries
- salt
- clean water

The powder of Indian jujube fruits is passed through a bamboo sieve by furry to obtain a clear powder and a suitable amount of salt is added. The jaggeries are boiled with clean water for a few minutes until they have thickened. The powder of fruits are added to the jaggeries liquid and mixed well. The thickened mixture is chilli are pressed by roller with butter oil. (Figure 11 and 12)

Processing of grinding of Indian jujube seeds

The hard endocarps along with cotyledon kernels were mechanically cracked. Waste product seeds and very dried fruits were taken, ground in a motor and pestle and portions were exported and also used for fuel. Then the seeds are separated by the separatable machine to get seed coats and kernels of seed. The powder of dried fruits pulp, the stone hull of seeds and the kernels of seed are mixed. These are passed through an iron sieve of the machine. Two types of mixture are formed from it. The mixture of powder pulp and powder seed coat are used for fuel to apply hot-brick formation (ou-hpou). Another mixture of the kernels of seed the stone seed coat is filtered again through a bamboo sieve and these are separated by furry for the kernels of seed to clean. Later only the kernels of seed are collected by hand. Many stone seed coats can be used for fuel to using snack work. The kernels products can be used for exports to China. (Figure 13 and 14)

Figure. 11. Zee chin suc

Figure. 12. Preparation of Zee chin suc

Figure. 13. Kernels of Indian jujube

Figure. 14. Production of Kernels of Indian jujube seeds

Figure. 15. Snacks of Indian jujube

Market outlet of *Z. mauritiana* Lamk. products

Men, women And children → **Middle men**

Villages → **Local markets** → **Regional markets** → **Other parts of the country**

Wholesaler → **Wholesaler** → **Wholesaler**

Table 1. Daily income and total income (one month) of ***Z. mauritiana*** **Lamk.** in rural people of Magway Region

Village Name	**One day income per family (Kyats)** **mean ± sd**	**Total income per family (Kyats) for one month** **mean ± sd**
Kan-pyar	**3460 ± 482.70**	**136840 ± 18521.02**
Gway-pin	**3520 ± 233.30**	**153290 ± 12611.32**
Myit-chae	**4520 ± 412.20**	**214530 ± 15663.53**

Means ± standard deviation

Discussion And Conclusion

Z. mauritiana Lamk. are considered to be multipurpose plants although the use of the fruits is the major focus of interest. They are of increasing use in agroforestory. The composition of the fruits is therefore of importance especially since they are produced by a limited number of species which have been cultivated for promoted. There is a great deal of published data on the potential of the species for ethnobotanical uses (Arndt and Kayser, 2001).

Pareek (2001) noted that although different parts of the plant have medicinal value due to their constituents their usage appears to be sporadic and not common place. Important nutritional properties of jujube fruits relate particularly to their being sources of vitamin C and vitamin B complex in the diet. Although there is a range of potentially useful medicinal substances in Indian jujubes. There is Limited interest from large pharmaceutical companies because many of the useful constituents can be obtained from other botanical sources.

Indian jujube trees fit very well into agroforestry systems when the companion species suited to the same agroclimatic conditions of the location are selected. However, appropriate spacing and management systems should be used.

Compared to other fruit trees, jujubes provide nutritious fruits at relatively low costs but they remain under-utilised despite their multipurpose uses whichever cultivated species is considered and wherever cultivated. In many areas, fruits are still gathered from wild stands. Especially for Indian jujube a great deal of known – how exists on production techniques. Improving production and utilisation where the trees have long been cultivated so that enhanced production can be sustainable and economic. Improving socio-economic impacts by proving incomes for a range of farm activities related to marketing and processing.

Work on harvesting and packaging of fruits has been undertaken and a number of recommendations exist. However, standard grading related to end use has hardly

been implemented, not only on the economics along with the producing to consumption chain but on the socio-economic benefits particularly those affecting the well-being of family producers.

The Indian jujube is an important source of food and a vital source of cash income for poor households. The fruit is usually purchased by middlemen, transporters and retailers from village and other large towns for resale at markets.

Processing methods require standardization with attention to cost effectiveness and marketability of products from fruits. This requires additional research, especially if processing is to be at the community level. Incomes will be increased when processing methods to develop standard products acceptable in the markets are refined, standardised and downstream.

The pericarp of Indian jujube is consumed either fresh or dried while its seeds are usually discarded as waste. The dried fruits together with the seeds are pounded using pestle and motor and are separated to the kernels and the seed-coat (hull) can be used for fuel, but the kernels in the hard endocarp are very useful for Chinese medicine and it is one of the export product.

Indian jujube fruit plays an important role in the livelihood of the rural *Z. mauritiana* Lamk. cultivated or wild in Magway Region with respect to the view of economic botany. It has been observed that this studied area is one of the valued regions of Central Myanmar because of its agricultural products are very useful products for Myanmar people and to increase the use of underutilized crops for food, nutrition, medicinal and industrial products.

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