

## **Quality fodder from fruit trees for sustainable forage production in semi-arid tropics**

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### **Introduction**

India being at the crux of exploding livestock population in the world, needs to reorient agroforestry potential by inducing the fruit trees based hortipastoral systems to minimize the existing gap between fodder supply and demand from arable farming system. It is realized that in some part of the country probably more animals are depending on shrubs and trees than on grass and legume based pastures. At this juncture of main farm resource limitations, the community can exploit fruit trees to a considerable extent for fodder along with the supplementary benefit from fresh and/or processed fruits. Interestingly, the leaves which usually obtained from such trees are more nutritious than the trees used for fodder, fuel, and timber. The tannins which are considered as anti quality factor above the level of 5% is also found under control in fruit trees except few. These trees can also be used as dry and/or lean period fodder resources.

### **Materials and Methods**

The abstract is based on the information available in literature. The information was collected and compiled from different sources and being presented here for the researchers and policy makers to think over and use for sustainable fodder production and utilization.

### **Results and Discussion**

Many researchers have shown the fodder potential of fruit trees and the present synthesis is based on the work of some researchers (El-Siddig *et al.*, 2006; Pareek, 1983; Saha *et al.*, 1998; Swami *et al.*, 2012; Wood *et al.*, 2000). The nutrient on dry matter basis available in the leaves of different fruit trees which are being dealt here is presented in Table 1.

Mulberry (*Morus alba*) is reported to be a good quality leaf fodder and can be profitably utilized as a supplement to poor quality roughages. It coppices and pollards very well. It can withstand light frost. It is susceptible to browsing damage. Leaf yield varies with fertility of the soil, irrigation and frequency of plucking of the leaves. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total carbohydrates, total ash, calcium and phosphorus. The tannin accounts for 0.80 per cent.

Lasoda (*Cordia dichotoma*) is another fruit tree of which leaves yield good fodder and are lopped for this purpose. It coppices and pollards well. Young plants are susceptible to browsing damage and fire, but they exhibit good power of recovery from such injuries. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus. The tannin is about 0.84% in the leaves.

Bael (*Aegle marmelos*) is a good fodder tree. It has shallow root system, coppices well and produces root suckers in abundance. It is resistant to drought and can grow in dry localities. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus. Tannin content of leaves is 1.21 percent.

Jackfruit (*Artocarpus heterophyllus*) seedlings and saplings are readily browsed by cattle and tree coppices well. Leaves are lopped for fodder in Kerala, Maharashtra, Odisha and West Bengal. Ripe fruits can also be fed to cattle. Elephants also eat the bark besides leaves and fruits. Young plants are very badly browsed by deer and domestic cattle. The chemical composition of leaves varies with the locality and the season of lopping. They contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus. Crude protein content decreases as the leaves mature. October lopped leaves have higher crude protein than November lopped ones.

Gular (*Ficus glomerata* Roxb./ *F. recimosa* Linn.) coppices well with slow growth rate and its leaf is generally rated as good fodder. The seedlings and saplings are easily browsed by cattle. It is extensively lopped for fodder in Assam, West Bengal, Madhya Pradesh, Maharashtra, Odisha, Punjab and Uttar Pradesh. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus. The tannin accounts for 0.76% in dry leaves.

Mahua (*Madhuca longifolia*) seedlings and saplings are readily browsed by cattle and wild animals. The tree coppices well if felled in the hot season. The tree is lopped for lead fodder in Madhya Pradesh, Maharashtra, Odisha and Uttar Pradesh. In Maharashtra, it is lopped only in times of scarcity. Its flower and fruits can also be fed to cattle. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus on dry matter basis.

Mango (*Mangifera indica*) is shade bearer and unable to withstand severe frost or drought. It grows well in moist warm climate. The mango tree is lopped for fodder during fodder scarcity. The chemical analysis of leaves resulted that it has crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus.

Khirni (*Manilkara hexandra*) is a light demander and seedlings and saplings suppressed under heavy shade. The seedlings and saplings are susceptible to browsing. It pollards but shows poor coppicing power. It is reported to be lopped to feed buffaloes in Maharashtra. The leaves contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus.

Jamun (*Syzygium cumini*) has good coppicing power and a large numbers of shoots arise along the cut stump. Even large stumps produce coppice shoots. The leaves are lopped for fodder and the nutritive value of the leaves differ according to the locality. The leaves contain crude protein, crude fiber, total ash, calcium, phosphorus, total minerals (5.31%), reducing sugar (2.40%), total sugar (6.89%) and starch (15.90%). The tannin in the leaves constitute about 7.57 percent.

Ber (*Zizyphus spp.*) leaves are considered to be a good fodder for cattle and goats and in some part of Rajasthan it forms almost the sole green fodder available to the animals. The tree has remarkable power of recovery from injury by frost, fire or grazing. The tree coppices and suckers well. The leaves of *Zizyphus nummularia* contain crude protein, crude fiber, N-free extract, ether extract, total ash, calcium and phosphorus whereas analysis of *Zizyphus mauritiana* leaves resulted crude protein 15.37%, crude fiber 15.76%, total minerals 6.66%, reducing sugar 1.87%, total sugars 7.57%, starch 16.84% and tannin 1.79% in dry matter of leaves.

Imli (*Tamarindus indica*) leaves are regarded as good fodder and the chemical composition of leaves varies with the locality and season of lopping. The tender leaves of imli contains moisture 70.50% and crude protein 13.14%, fat 2.10%, crude fiber 17.70%, N-free extract 52.40%, ether extract 7.00%, total ash 9.50%, other carbohydrates 18.20% and minerals 1.50%. The other constituents are calcium 101, magnesium 71, phosphorus 140, iron 5.2, copper 2.09, chlorine 94, sulphur 63, thiamine 0.24, riboflavin 0.17, niacin 4.1, and vitamin C 3.0 mg/100gm.

**Table 1:** Leaf nutrition (percentage on dry matter basis) available in different fruit trees.

Fruit tree	Crude Protein	Crude Fiber	N-free Extract	Ether Extract	Total Ash	Ca	P	Tannin
<i>Morus alba</i>	15.00-27.64	9.07-15.27	47.98-49.70	2.30-8.04	14.32-22.87	2.42-4.71	0.23-0.97	0.80
<i>Cordia dichotoma</i>	12.37-15.13	16.45-26.76	41.93-52.83	1.53-2.87	12.56-17.41	2.37-4.24	0.24-0.30	0.84
<i>Aegle marmelos</i>	15.13-15.33	16.45-18.14	48.37-52.83	1.36-1.54	14.05-16.80	4.24-4.79	0.14-0.30	1.21
<i>Artocarpus heterophyllus</i>	11.18-14.19	18.72-22.83	46.33-57.66	2.31-3.48	8.33-14.22	0.52-2.15	0.11-0.30	-
<i>Ficus racemosa</i>	12.27-16.50	12.27-16.50	55.52-59.00	2.23-2.87	11.88-18.39	1.73-2.96	0.16-0.45	0.76
<i>Madhuca longifolia</i>	9.10-9.81	18.66-20.31	59.36-60.73	3.80-4.07	6.72-7.80	1.53-1.58	0.12-0.22	-
<i>Mangifera indica</i>	7.75-9.75	21.01-24.35	51.63-54.33	2.11-3.65	11.83-13.06	1.87-2.24	0.17-0.33	-
<i>Manilkara hexandra</i>	9.39	23.14	54.97	6.05	7.45	1.49	0.35	-
<i>Syzygium cumini</i>	19.1	17.00	-	-	6.00	1.3	0.19	7.57
<i>Zizyphus nummularia</i>	12.90-16.90	13.50-17.10	55.30-56.70	1.50-2.70	10.20-11.70	1.42-3.59	0.21-0.33	1.79
<i>Tamarindus indica</i>	13.14	17.7	52.4	7	9.5	-	-	-

## Conclusion

During the era of concern over sustainable natural resource management, the farming community and other interested person must have the wider options to choose the better resource alternatives as time and space dictates. Fruit trees are generally considered to be nutrition garden for human but timely view on its potentiality as a fodder resource obviously will be treated as an intelligent choice and judicious agro-managerial option for the future.

## References

- El-Siddig, K., H. P. M. Gunasena, B. A. Prasad, D. K. N. G. Pushpkumara, K. V. R. Ramana, P. Vijayanand and J. T. Williams. 2006. Tamarind (*Tamarindus indica*). Southampton Centre for Underutilized Crops, Southampton, UK
- Pareek, O. P. 1983. *The Ber*. Published by ICAR, New Delhi.
- Saha, D., V. Kumar and S. Kumar. 1998. Fruit trees as fodder resources. *Indian Farmer Times*, 15 (10): 21-23.

- Swami, S. B., N. S. J. Thakor, M. M. Patil and P. M. Haldankar. 2012. Jamun (*Syzygium cumini* L.): A review of its food and medicinal uses. *Food and Nutrition Sciences*, 3: 1100-1117.
- Wood C. D., R. Methewman, V. C. Badve and C. Canroy. 2000. A review of nutritive value of dry season feeds for ruminants in Southern Rajasthan. *BAIF Bulletin*.