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Production, management and utilization of the indigenous multipurpose fodder tree chibha (*Ficus thonningii*) in Ethiopia

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Chibha (*Ficus thonnighii*) is the most popular indigenous multipurpose fodder tree which is getting appropriate recognition among professionals and the farming community due to its good feeding value and palatability to different classes of animal in Ethiopia. Documenting the valuable information of this indigenous fodder tree is a paramount important to increase the livestock production and productivity on sustainable basis in the country. The species thrives in the altitudinal range of 1000-2500 masl and the climatic requirement of annual rainfall is 750-2000 mm. The plant could be propagated by seed, seedlings and cuttings and could grown in a wide range of soil types and fertility status but brown soil is the most convenient soil type for proper establishment. This fodder produces brows able biomass yield within two years of age but it is advisable to use it after three years of age. The female type of chibha produces seed in 5 years of age, and the plant once starts producing seed, it continues producing seed every year. During the dry periods, this fodder plant remains green for longer period because of deeper rooting system, which can tap water beyond the reach of grass roots. Due to latex content, farmers cut leaves and twigs in the morning and leave them in the sun throughout the day and feed for different classes of animals after wilting. It is an excellent feed for dry period supplementation and also can serve as potential protein supplements to enhance the intake and utilization of fibrous crop residues by ruminants. This fodder tree is preferred due to its biomass yield, adaptability, feed value and easy of propagation as compared to other indigenous and improved fodder trees. Generally, the plant has multipurpose values and it is utilized for livestock feed, food, latex, timber production, medicine, soil and water conservation, fence around homesteads and farmlands, source of fuel wood, windbreak, fiber source and other environmental protection roles. Therefore, farmers prefer this fodder due to its high biomass production, multi-functionality, long life span of the tree, high compatibility with the cropping system and high feed value as compared to other indigenous fodder trees.

Keywords: chibha, forage quality, herbage yield, indigenous fodder tree, multipurpose value

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INTRODUCTION

Livestock production play very important role in the livelihood of smallholder farmers in the mixed crop-livestock farming system. The well known livestock contributions are source of food, income, employment, draught power, manure and transport. It also serves as life insurance and bank assets at times of drought. FAO (2004) estimated that livestock contributes 18.8% of the total GDP and 44.5% of the agricultural GDP in the country. On the other hand, MoARD (2007) reported that the livestock sector accounts for 16% of the national and 27–30% of the agricultural GDPs, and 13% of the country's export earnings. Moreover, livestock contributes to the livelihoods of 60-70% of the Ethiopian population and the major agent in nutrient recycling and soil fertility maintenance but also resilience mechanism to sustain livelihoods particularly in years when crop production fails. Currently, the demand for livestock products is expected to increase by 4.2% annually as result of increasing urbanization and improved income. In many developing countries, sustained and high population growth rates combined with limited and rapidly diminishing land for food and forage production have created a need to intensify agricultural production in order to bridge the gap between requirement and supply of food to ensure proper human nutrition. Generally, livestock play a crucial role both for the sustainability and intensification of agricultural productivity of the mixed crop-livestock production system. Among the constraints facing livestock production in the small scale mixed crop-livestock farming system, inadequate feed supplies and low quality of available feeds stands are the most important (Bayush *et al*., 2008; Belay *et al*., 2013; Malede and Takele, 2014). The major livestock feed resources in the country are natural pasture, crop residues, agro-industrial by-products and cultivated pasture and forage crop species (Anteneh, 1984; Alemayehu, 1987).

Fodder trees and shrubs continue to grow and remain green in dry season when most grasses and herbs don't perform very well. Leguminous trees and shrubs have a higher nutrient content compared to grasses during dry season. They are seen as drought reserves, being a source of protein rich fodder. Fodder trees and shrubs can play a significant role only when used as supplement to other poor quality feeds. Fodder trees and shrubs have multipurpose values that can supply a range of other products and services which are beneficial to the farmers. They are also able to fix nitrogen and thus contributing for soil improvement. Fodder trees and shrubs generally produce more yield per unit area and can be grown on very small pieces of land that are not normally utilized for other crop production. In addition, they allow for multi-storey tree-grass combinations that favor more efficient light utilization and increased productivity. Trees and shrubs offer other indirect service that does contribute to livestock productivity. However, a few problems are associated with utilization of fodder trees and shrubs. Some of the species may be mildly toxic, accessibility may be difficult as animals not feed above two meters, some fodder plants are thorny, some browsable plants have unpleasant odor which makes them unacceptable to animals, and they have the so called anti-nutritional substances which makes unsuitable for feeding. However, they are still valuable supplement diet for dry season and drought feeding (IDRC, 1990). Many indigenous fodder tree plant types are available in all agro-ecological zones of the country. Amongst all these, chibha (*Ficus thonnighii*) is the most popular indigenous multipurpose fodder tree which is getting appropriate recognition due to its good feeding value and palatability for different classes of animal production in the country. It is believed that farmers' preference of multipurpose fodder trees beyond the scientific interpretation of biomass production potential and nutritive value (ILDP, 2006). Therefore, documenting the valuable information of this indigenous fodder tree is a paramount important to increase the livestock production and productivity on sustainable basis in Ethiopia.

Descriptions of chibha

Chibha (*Ficus thonningii*) belongs to Moraceae family. It is one of 750 species in the pan tropical genus ficus. The local name is chibha (in Amharic); strangler fig, common wild fig, bark-cloth fig (in English). It is an evergreen tree 6-21 m height, with a rounded to spreading and dense crown. Sometimes epiphytic, often a strangler; trunk fluted or multistemmed. Bark on young branches hairy, with a stipular cap covering the growth tip, but smooth and grey on older branches and stems, lenticellate, often with aerial roots hanging down from branches; the whole plant exudes copious, milky latex often turning pinkish. Leaves simple, glossy, dark green, thin and papery or slightly leathery, margin smooth, elliptic or obovate, sometimes rather elongated or slightly oblanceolate, grouped at ends of twigs, 3-20 x 2-10 cm, glabrous, puberulous or pubescent; with 6-12 pairs of up curving main lateral veins; stalk rather slender, 1-7.5 cm; base cuneate or obtuse (sometimes subcordate); apex rounded or obtuse, sometimes shortly and bluntly acuminate. Stipules about 12 mm long, soon falling off (Orwa *et al*., 2009). Flowers unisexual, pollinated by small wasps, which develop in some of the flowers and live symbiotically inside the syconium. Seed dispersal is achieved by bats. In southern Africa, flowering and fruiting are observed for most of the year with the peak period in October.

Field observation has been made to check for the

availability of chibha at different agro- ecologies of the Amhara region. The species thrives in the altitudinal range of 1000-2500 masl and the climatic requirement of mean annual rainfall is 750-2000 mm. On the basis of the farmers' knowledge, the fodder plant is locally classified in to male and female types. The female type chibha has certain good attributes which makes it different from other type. The color of the leaf is deep green, the leaf does not shatter in dry season, the leaf has smooth texture which makes it palatable to animals, it grows fast and reaches maturity in few years, it gives many lateral growths while it is cut or pruned and it produces seeds are the major attributes of the female type chibha. On the other hand, the male type of chibha as opposed to the female type. The male type chibha has light green leaf and requires longer time to reach maturity. However, the above local classification should be supported with research works. Both chibha types can establish properly on wide variety of soils but favors light, deep and well-drained soils with neutral to acidic reaction and humus-rich or deep loamy soil.

Multipurpose values of chibha

Chibha is the most popular indigenous fodder tree for its good feeding value and palatability. It is adapted by farming community as feed supplement in drought season. Based on the farmers' indigenous knowledge; chibha is preferred in its biomass yield, adaptability, feed value and easy of propagation as compared to other indigenous and improved fodder trees like *Cordia africana*, *Acacia spp*, Maytenusundata and sesbania. Additionally, the leaves of chibha are highly decomposable and have high browse able biomass production (Abebe, 2008). In the highlands of Amhara and Tigray regions, chibha is utilized for livestock feed, timber production, for soil and water conservation and is planted in backyard woodlots, as homestead fence, communal wastelands, village footpath, farm boundaries for soil conservation purpose around terraces and trenches (Edema *et al*., 2008). Farmers in the highlands of Amhara region are disseminating this fodder plant through sales, exchange of labor and other seedlings for the stem cuttings of chibha as the results of efforts that has been made by the governmental and nongovernmental organizations particularly in North Gondar administrative Zone. It has good feeding value and palatability and in recent years its importance in animal feed is getting wider recognition among professionals and the farming community. Although, the time when cultivation and utilization of chibha has started is not yet known, there are some evidences suggesting that it has been started some 70 years back. According to these evidences, it was primarily established for fencing, shelter, construction and fuel wood purpose. But later on, as people started to observe animals feeding on it, they have come to recognize that it has a feeding value and started propagating it to wider areas and in such way that it gets wider recognition among the farming community. The relative importance of chibha and multipurpose merits of chibha relative to other indigenous trees are indicated on Table 1 and 2. Some of the major important multipurpose attributes of chibha are as indicated below.

Fodder: Livestock eat the dry leaves on the ground and to a lesser degree fresh leaves. Leaves and twigs are eaten by bushbuck, dikdik, elephant, giraffe, impala, kudu and nyala. Dropped fruits are eaten by baboon, bushbuck, bushpig, civet, dikdik, grey duiker, rock and tree hyrax, impala, kudu, slender mongoose, samango and vervet monkeys, nyala, porcupine and warthog. The tree has considerable nutritional importance and could play a great role for better livestock husbandry. The distribution of the tree varies among similar agro-ecologic districts largely due to the lack of transfer of knowledge on the management and values of the species and this calls for strong extension communication services to help farmers' new knowledge exchange and to practice the innovations on a wider scale (ILDP, 2006).

Food, latex or rubber: A good jam can be made from the ripe fruits of chibha. The ripe fruits are eaten by bats, barbets, bulbuls, louries (turacos), parrots, pigeons and starlings. A considerable amount of useful latex or rubber is produced from this fodder tree.

Timber: The wood is creamy brown, has a fairly uniform structure, light (510 kg/cubic m), soft to moderately hard, with a rough texture, tough, strong, easy to work; it finishes smoothly and holds nails firmly. Timber is also produced in Northern Ethiopia from chibha to utilize it for various purpose as depicted below in Figure 1.

Medicine: The bark is important in local medicine, and it is used in treating colds, sore throat, dysentery, wounds, constipation, nose-bleed and to stimulate lactation. Latex is used for wound fever, while an infusion of the root and fiber is taken orally to prevent abortion. Powdered root is taken in porridge to stop nosebleed; the milky latex is dropped into the eye to treat cataracts. Furthermore, in the Northern part of Amhara region the local community has practical experience for the treatment of bloating case of cattle by providing the crushed chibha leaves.

Erosion control/ soil improver: Truncheons can be planted close to each other to control erosion. Currently, chibha is being used for the biological treatment of gully areas in sustainable land management program. Leaf litter helps in the improvement of the nutrient status and water-holding capacity of the soil. In Uganda, the tree is intercropped with coffee and bananas. The study conducted regarding soil improvement indicated that, the

Table 1: Relative Importance of chibha

Qualities	Ranks									Average Rank
	1	2	3	4	5	6	7	8	9	
Feed value	120	0	0	0	0	0	0	0	0	1.0
Timber quality	0	112	6	2	0	0	0	0	0	2.1
Biomass Production	0	21	21	50	9	8	11	0	0	4.0
Fencing value	0	0	21	21	50	28	0	0	0	4.7
Soil and Water Conservation	0	0	29	16	15	70	0	0	0	5.4
Ever greenness	21	0	0	0	0	91	0	0	8	6.1
Drought resistance	0	0	0	0	21	14	28	57	0	7.0
Soil fertility improvement	0	0	0	7	6	6	11	49	41	7.8
Free of shading and alelopathic effect	0	0	0	6	6	6	7	7	88	8.2

Source: Edem *et al*., 2008

Table 2: Multipurpose merits of chibha relative to other indigenous fodder trees

Scientific name	Average scores for multipurpose qualities							Overall average score
	Feed	Fuel wood	Fencing	Shading	Soil and water conservation	Source of cash	Timber	
Ficus thonningii	10.0	7.6	8.2	9.0	7.9	8.0	8.0	8.4
Cordia africana	8.0	7.6	1.3	7.7	7.4	8.6	8.7	7.0
Acacia nilotica	7.6	8.0	8.5	5.5	8.0	2.1	1.4	5.9
Rhus natalensis	5.0	8.2	7.7	7.3	3.3	8.2	7.7	6.8
Eucalypetus cameldulensis	0.8	6.9	7.8	7.0	8.4	10.0	7.1	6.9
Coroton macrostachyus	8.1	6.5	2.2	7.4	6.8	3.0	5.5	5.6
Accacia ethabica	8.6	10.0	8.3	3.2	5.4	8.8	2.6	6.7

Source: Edem *et al*., 2008; Score 10 is maximum and score 1 is minimum)

Figure 1. Timber produced from chibha

carbon, nitrogen, phosphorus and potassium content of the soil under its canopy were higher than the soil in the open pasture. The maize crop in the vicinity of the trees also showed better growth condition and crop productivity. The tree can be used in association with crops and/or pasture plants to improve physical and chemical effects on soils (Enideg *et al*., 2008).

Other uses: It is often planted to protect from the scorching sun in recreational areas, market centers and schoolyards. It also serves as shade for animals, fence around homesteads and farmlands, source of fuel wood, windbreak, fiber/rope source and other environmental protection roles.

Propagation and management methods

In the wild, the tree starts its life as an epiphyte, usually germinating from a seed dropped by a dispersal agent. Trees are commonly planted using 20-50 cm long cuttings from which most of the leaves have been removed. Rooted cuttings are planted in the nursery and kept moist; but planting cuttings directly in the field is also feasible. Seedlings raised in a nursery are also used. In Ethiopian case, of course growing of chibha in a nursery has been tried at various agro-ecological zones by the Austrian government supported project, Integrated Livestock Development Project and others. The result obtained indicated that the growing was very sluggish and taking more than six months. This species grows easily from truncheons that are left in the shade for a few days to dry before planting. River sand should be placed at the bottom of the planting hole, to prevent the bottom of the truncheon from rotting. It grows quickly into a fair-sized tree but sensitive to cold winds. In the colder regions, young plants must be protected for the first 2-3 years. Chibha could be propagated by seed, seedlings and cuttings and could grown in a wide range of soil types, fertility status, and at any place at farm (back yard, farmlands, soil and water conservation structures). Regarding the soil type, chibha can be established both in red and black soil if the soil is well drained. But the most convenient soil type for proper establishment of chibha is brown soil. It is pollinated by obligate mutualism wasps called *Alfonseila longisccapa,* and *Elisabethilla suckeerg* which hosts nematode called *schistonchus africanaus* (Berg and webies, 1992)

There is a good experience in propagating the chibha stem cuttings by planting in a potted plastic tube at Amahara national regional state at East Estie which is supported by the sustainable land management program as depicted in Figure 2. It is a good opportunity for the future expansion of the fodder plant in areas where there is scarcity of this indigenous fodder plant. It can be planted in the rainy season since it develops root system. There are certain safety measures that should be considered while cutting and planting this indigenous planting material. The bottom part of the cuttings which is to be planted should have uniform cutting, give serious attention not to plant fractured cuttings, don't use sharpening materials to compact the soil while planting to protect the bark damage, remove stone and other sharpening materials beneath the mother plant to protect stem cuttings damage while fall down to the ground, during dry season plant the fresh stem cuttings immediately, in wet season it is possible to plant cuttings that stayed three or four days, use additional soil and then ash above the pit after planting the stem cuttings to protect the percolation of much rain water, be sure that the planting depth of the pit (hole in the ground) is not less than 50 cm and don't plant immature stem cuttings. Branches should not be cut away from young trees (two or three year old), to allow them to first develop a strong root system and it is equally important to not damage the bark or split the stem when cutting.

As evidenced from outcomes of assessment; the proper time of plantation is from April to May and extends to June when the soil is not getting too wet. In dry season, it is better to plant the stem cuttings as soon as it is pruned from mother tree because it has milk like liquor or latex that helps for the establishment of the plant. It is also possible to plant it in the month of October and onwards. However, the herbage produced on those planted during this time is less than that planted in April to May. The size of planting material often varies depending on availability of the required sizes. If there is precipitation, we can plant the cuttings and put the soil first and then the ash on the upper part so as to protect the percolation of water. Due attention should be given not to plant small sized stem cuttings (immature type) because it takes longer time for establishment, gives less herbage yield, does not resist dry season and requires more attention till it gets established well. Preliminary assessment was conducted in the mid and high altitude areas of North Gondar administrative zone to evaluate the survival rate of the planted cuttings. Accordingly, the result obtained so far indicates that the survival rate of the fodder plant cuttings ranges from 87-94 %. This is the most salient feature which makes it different from the improved fodder tree legumes and helps as a nucleus for future expansion. In areas where fertilization and animal manure is used, the survival count rated was higher.

Seed production

From the assessment made, female type chibha produces seed in 5 years of age, and the seed reaches maturity from December to May. In one pod/husk there are about 70-80 seeds. The plant once starts producing seed, it continues producing seed every year. Seed production performance of chibha is indicated in Figure 3.

Herbage yield production and feeding system

The planted cuttings will establish within 2-3 months and then young shoots starts to emerge. According to farmers' experience, chibha produces some amount of biomass within two years of age. However, if used in this

Figure 2. Chibha stem cuttings multiplied in a nursery site after four months

Figure 3. Seeds of chibha

Figure 4. One year old chibha establishment

stage, it will have deleterious effect on its growth and also will not have enough biomass for the next year/season. Hence, it is advisable to use chibha after three years of age. It needs protection against animals at early stage of the growth. Growth performance of one year old chibha as indicated in Figure 4. Chibha starts flowering after 4-6 years to release fruits. With regard to the feeding system, most of the farmers feed their animals solely. Although it is not common, some farmers have experience in feeding of chibha with mixture of crop residues. If animals are supplied chibha and crop residues at the same time, the animals prefer to feed the chibha first. Consequently, it is better to provide hay and crop residues first and then supplement with chibha until farmers adopt mixture feeding. The number of cuttings depends up on the availability of the planting material, feed requirement of animals and the number of animals owned by the farmer. The amount of biomass produced at various growing year is not studied yet. However, on the basis of farmers' experience two chibha fodder tree can feed 2-3 cattle per week on the average. Based on this assumption, one has to plant 84 stem cuttings to feed his animals year round. There are certain mechanisms noted to maximize the biomass yield. Applying of compost or manure for enrichment of the soil while planting and pruning of matured chibha (3 years and above) which helps to grow many lateral branches. The plant requires wide spacing because of its spreading crown. It should be protected from browsing at the initial stages of establishment.

Feeding value and season of feeding

The feed value of a forage is a function of its nutrient content and digestibility, its palatability (which determines its consumption level) and the associative effects of other feeds. The nutritive value of chibha is studied and reported by Sisay, 2006 and ILDP, 2005. According to Sisay report, the crude protein (CP) content of chibha is found to be about 13%, neutral detergent fiber (NDF) 54.09%, acid detergent fiber (ADF) 40.23%, Ash 12% and *in-vitro* dry matter digestibility (IVDMD) 66.47%. Additionally, the nutritive value of chibha is reported by Integrated Livestock Development Project and thus the CP content is found to be 14%. Fodder trees that have NDF and ADF content below 30 and 40 % respectively are believed to have high digestibility (Norton, 1994). A research conducted in abroad indicated that the nutritive value of chibha is higher in CP content (20.51%) and lower in a NDF (55.79%) as compared to *Panicum maximum*. Additionally, the digestibility values were generally good at different proportion of the fodder tree, 25, 50, 100 percent mixed with *Panicum maximum* and highest at 50 percent proportion (Musibau *et al*., 2010). The nitrogen balance (g/d) and retention (%) of the fodder tree were highest and similar in both 50 and 75 percent proportion of the fodder tree and lowest in solely grass fed goats. Thus, there is no practical limitation to the utilization of this fodder plant in ruminant feeding either solely or in mixture with grass.

Figure 5. Animals feeding on chibha

The fodder tree is consumed and utilized even as sole forage, implying that it will be a good insurance in alleviating feed scarcity problem for ruminant animals in the dry season. During the dry periods, this fodder plant remains green for longer period because of deeper rooting system, which can tap water beyond the reach of grass roots. The most critical months of feed shortage vary. However, we can be generalized the period with prolonged feed shortages start from late April to end of June. During this period, when the availability of grass decreases as it dries up and its protein content declines, the fodder plant is still green and can provide the required energy and protein. This indigenous fodder plant is fed to most types of livestock during the dry season and drought as a supplement. The leaves and twigs of this fodder tree are consumed by all types of animals as indicated in Figure 5. Surprisingly, animals consume immature twigs regardless of availability of leaves with it. Due to latex content, animals suffer from swallowing fresh leaves of this species. Thus, farmers cut leaves in the morning and leave them in the sun throughout the day and feed after wilting. In general, chibha is an excellent feed for dry period supplementation and also can serve as potential protein supplements to enhance the intake and utilization of fibrous crop residues by ruminants.

Pests and diseases

The larvae of several Lepidoptera and Coleoptera (long-horn beetles) make tunnels in the branches and sometimes the trunk. Many leaf-eating beetles (Coleoptera) and caterpillars (Lepidoptera) damage foliage. Branches, leaves and fruit may be attacked by scale insects and mealybugs (Homoptera), which suck the sap. The larvae of fruit flies *Dacus spp*. and *Ceratitis spp*. (Diptera) feed on the pulp of fruits, resulting in rotting and premature drops. Other pests include *Drosophila spp*., *Acrina spp*., *Aceria ficus* and a sawfly (Hymenoptera). At least 30 species of fungi attack the genus Ficus. These include root rots, branch wilt and canker, leaf rusts, branch and foliage blights, fruit surface mould and spot rot, internal fruit rot, mould and smut and fruit souring. Most of them are minor importance and can be controlled by chemical sprays. The tree is susceptible to nematodes, hence should not be planted in infested soils.

Good and bad attributes of chibha

The salient features of chibha which makes very important for future expansion are: naturally it is resistant to drought, stays for longer years, the herbage is

Table 3: Perceptions on indigenous fodder trees and shrubs (IFTS) with special reference to chibha

SN	Group	Negative aspects	Positive aspects
1	Farmers' perceptions	Most IFTS requires a large space (particularly trees)	IFTS are used to fill feed gap during the dry seasons and droughts
		IFTS have long gestation period, do not provide Immediate production	Some IFTS have multiple uses such as medicinal values for human beings and livestock and timber for sale or local uses
		Some IFTS compete with crops	
		Most IFTS have slow growth rate	
		Unavailability of land for further expansion of IFTS	
		Existing enough number of trees in the farms	
		Lack of planting materials	
2	Researchers' perceptions	The nutritional values and anti nutritional factors not known	IFTS are adapted to local conditions
		Lack of promotion of IFTS	IFTS play a big environmental role as soil and biodiversity conservation and climate change
		IFTS have slow growth rate	
		Replanting of IFTS is not common practice; farmers usually depend on natural regeneration	
		No appropriate feed mixture	
		Some IFTS are difficult to propagate and establish	
		Low fodder yields	
		Lack of planting materials	
3	Extension workers' perceptions	Slow growth rate	IFTS are adapted to local conditions
		Seed/seedling unavailability	IFTS play a big environmental role such as soil and biodiversity conservation and climate change
		Poor promotion for integrating IFTS	
		Long gestation period	

Source: Alemayehu Mengistu, 2005. Study on IFTS at Metema area. Integrated Livestock Development Project (ILDP) Gondar, Ethiopia

palatable for most animals, requires less labor and cost for establishment, does not require watering in the dry season, suitable in all agro-ecological zones, improves the soil fertility and increases the milk and meat productivity. On the other hand, the bad attributes are as compared to improved forages it does not matured early, sometimes it is attacked by pest in the dry season, and naturally the root development of chibha remains on the top soil part. Hence it is exposed to for falling down easily by wind. Farmers, researchers' and extension workers' perception on indigenous fodder tree and shrubs with special reference to chibha is indicated in Table 3. In general, farmers prefer chibha due to its high biomass production, multifunctionality, long life span of the tree, high compatibility with the cropping system and high feed value as compared to other indigenous fodder trees.

Issues for future reflections/considerations

As depicted above, chibha is widely accepted in the farming community. Farmers have creatively identified the plant as feed source and its use so far is based on their experience and knowledge acquired over the years. Farmers generally possess valuable knowledge about indigenous fodder plants that can lead to the identification of pertinent research questions that help focus research and speed up the development process. Accordingly, for the better use of the plant and further intervention and intensification of activities there are still other important issues to be covered. The research highlight which needs urgent considerations are: digestibility of the plant material, preparing feeding system and/or developing package with various crop residues, conduct study in

nursery site whether seedling production is possible or not, determining the amount of herbage available at various ages of the plant/estimation of biomass at different age and time of cuttings and making economic comparisons between improved forage legume and chibha in various features. In general, it can be explained that farmers appreciation towards such fodder tree extends beyond the conventional researchers view of nutritive value, biomass production and soil fertility improvement. The availability and expansion of such fodders by enlarge strengths the feed resource base. However, the present scientific knowledge of this species is too limited as depicted above to support promotion at farm level. Even in some instant, it can be unfamiliar to researchers and development professionals, although indigenous knowledge at research inception process is a vital to offer a wider dimension of opportunities for the development and acceptability of a technology by farmers

CONCLUSION

In many developing countries, sustained and high population growth rates, combined with limited and rapidly diminishing land for food and forage production, have created a need to intensify agricultural production in order to bridge the gap between requirement and supply of food. Chibha is one of the indigenous fodder tree which can adapt easily in all agro-ecological areas of the country. It has a good feeding value and palatability and currently its importance in animal feed is getting wider recognition among professionals and the farming community. There is no practical limitation to the utilization of this fodder plant in ruminant feeding either solely or in mixture with grass. Trees and shrubs are generally deep rooted and able to obtain nutrients and water from lower levels. As a result they are less susceptible than pastures to seasonal variation in moisture availability and temperature. Therefore, this multipurpose fodder tree become a good insurance in alleviating feed scarcity problem for ruminant animals in the dry season.

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