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Hybrid Napier for Round the Year Quality Fodder Supply to the Dairy Industry- A Review

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A B S T R A C T

The dairy farming in India is becoming independent and economically viable enterprise that provides quick and regular income to the farmers from the sale of milk and its by-products. Beside, supplementing income of the farmers it also supports the livelihood in the event of crop failures, often occurred due to aberrant weather situation. However, success of dairy farming mainly depends on feed and fodder of good quality. Unfortunately, there is shortage of quality fodder in India due to less area under cultivation. The animals are largely fed on inferior quality fodders such as crop residues, straw, weeds and wild grasses from wastelands and forest. Such low quality feeding material leads to low milk productivity per animal. This situation needs to be addressed through alternative sources of fodder which could provide good quality fodder round the year so that the milk productivity as well as animal health may not jeopardised. In terms of quality and availability of good quality fodder hybrid napier proved to be a better option under Indian conditions because of its perennial nature, profuse tillering habit, high yield, palatability, nutritional value and suitability for silage making than other forage crops. Hybrid napier grass may be a boon for dairy industry on account of supply of adequate green fodder of high nutritional value with round the year availability and minimum expense on repeated fodder cultivation.

Introduction

Agriculture is facing several challenges such as frequent occurrence of droughts and floods, declining land holding size and degradation of natural resources. Under these situations farming alone may be a risky enterprise. Hence, dairy farming may be a support to agriculture to reduce the risk of crop failure. However, success of dairy farming is largely depends on the feed and fodder of high nutritional value, which accounts for 65-70 per cent expenses incurred over the animal feeds (Kumar *et al.,* 2012). Fodder is cheap source of nutrient supply than concentrate feed and needs to given more emphasis so as to make the dairy industry economically viable option. In India limited land (8.6 m ha) is available for fodder cultivation (Kumar *et al.*, 2012) and our country may face the shortage of both green as well as dry fodder by about 61.1 and 21.95, respectively (IGFRI,

2011). This forced majority of the farmers to feed their animals on poor quality crop residue or wild grasses (Hegde, 2012). Aher *et al.*, (2003) reported that about 97% of available fodder is of very poor quality, which along with inadequate availability causes decline in animal health and milk productivity. Despite the fact that India ranks first in milk production in the world (The Economic survey, 2016-17), per animal milk productivity remained very low (<1000 litre) compare to United States of America (4500 litre), Europe (7000 litre) to as high as 10,000 litres per animal per lactation in Israel (DARE, 2013). The performance of the animals depends on the quantity and quality as well as availability of green fodder at various times during the year (Hatam *et al.*, 2001). Forage crops such as maize, sorghum, oat, barley, cowpea and berseem crops are palatable and nutritious but seasonal in nature due to this there is scarcity of fodder during the remaining period of year. Besides, it also requires frequent expenses for repeated tillage operations which add to the total cost of cultivation. February and Higgins (2010) reported that grasses are advantageous than other plant species due to their adaptation and acclimatization to climate and soil.

Hybrid napier is also known as Bajra-Napier hybrid, Napier Bajra hybrids, King grass, Elephant millet, Cumbu-napier hybrid. It is widely distributed in tropical and sub-tropical regions of Asia, Africa, southern Europe and India. It is tall growing (200-300 cm), erect, stout, deep rooted, perennial grass derived from inter specific cross between *Pennisetum glaucum* and *P. purpureum*. The hybrid is a triploid and hence sterile do not produce seed. Pandey and Roy (2011) reported that among the improved fodder grass species, hybrid napier is multicut perennial grass with profuse tillering and very good tonnage throughout year. It can be grown saline soils, wastelands, bund and terraces. It grows well under arid and semi-arid region of India. Singh *et al.*, (2002) reported that it is very popular among the farmers due to its high yielding capacity, palatability, nutritive value and suitability to varying climatic and soil conditions. Besides, it also supplies green fodder at least for five years once established (Rahman and Talukder, 2015). Hybrid napier produces silage with pleasant aroma (Kung and Shaver, 2002) and of good quality due to production of lactic acid, acetic acid and butyric acid during the fermentation process (Miyagi et. al, 1993). The silage prepared from hybrid napier may be utilized during off season to mitigate the fodder scarcity. The available reviews indicated that the scientifically well managed hybrid napier grass could be a good alternative for sustained green forage supply round the year, of high quality to fulfil the nutritious fodder requirement of the dairy animals.

Agronomic practices for better quality and fodder yield of Hybrid Napier

Selection of suitable variety

Selection of variety is important to achieve high yield per unit area under various soils and agro-climatic conditions. Das *et al.*, (2000) reported that among different hybrid grass varieties, KKM-1 is more suitable under irrigated condition. Tiwana *et al.*, (2004) observed that hybrid napier variety PBN-233 produced higher green fodder and dry matter yield. Hybrid napier variety CO-3 produced highest green forage and dry matter yield under different locations (Premaratne and Premalal, 2006; Chellamuthu *et al.*, 2011; Raj and palled, 2014).

Nutritional quality of Hybrid Napier

Antony and George (2014) recorded that nutritional parameters viz., crude protein, crude fibre, total ash and mineral content

differ significantly under different cultivars of Hybrid Napier. Sarmini and Premratne (2017) reported that hybrid napier produced significantly higher dry matter (17%), ether extract (4.34%) and ash (16.06%) content compare to sorghum. It also produced significantly high crude protein (10.92%) as compare to maize (7.35%). Hybrid napier is quantitatively as well as qualitatively superior over other perennial grasses. Senthil *et.al*, (2016) reported that hybrid napier contains low ADF and NDF indicating low fibre and more digestibility for livestock. Kadam *et al.*, (2016) from Goregaon (Maharashtra) reported that hybrid napier varieties viz. CO-4, DHN-6 and CO-3 produces high crude protein content (11.36,10.63 and 9.86%, respectively) under heavy rainfall conditions.

Planting of hybrid napier

Pandey and Roy (2011) observed that root slips or stem-cuttings yield better if planted at a distance of 60 x 90 cm, 90 x 90 cm or 90 x 120 cm depending on the soil status. Jayanthi (2003) reported that hybrid napier variety CO-3 planted on furrow and buried in soil gave the highest green fodder yield.

Fertilizers and nutrient management

Walmsley *et al.*, (1978) reported that on an average hybrid napier grass removes 463:96:594 Kg ha^{-1} nitrogen, phosphorus and potassium, respectively. Malarvizhi and Rajamannar (2001) reported that crop should be supplied with recommended doses of manure and fertilizer to sustain crop yield and nutrients replenishment. Jayanthi (2003) reported that higher yield of hybrid napier grass could be achieved with adequate organic manure. Sidhy (2003) reported that application of 20 t ha^{-1} farm yard manure before planting of hybrid napier proved beneficial to increase overall forage production. Application of 75 Kg nitrogen/ha/cut increased the fodder yield of Napier Bajra hybrid significantly (Tiwana *et al.*, 2004). Pathan and Bhilare (2009) found that application of 62.50:50:25 kg ha^{-1} NPK and 25 kg ha^{-1} N after each cut produced higher green forage yield and dry mater yield. Raj and Palled (2014) reported that hybrid napier variety CO-3 recorded significantly higher green fodder, dry matter and crude protein yield when supplied with 300 Kg N ha^{-1}

Table.1 Yield of hybrid napier genotypes under various zones in India (Adopted from Pandey and Roy, 2011)

Genotype	Area recommended for cultivation	Green forage yield (t ha^{-1})
CO 1	South Zone	300
Hybrid Napier 3 (Swetika)	North and Central Zone	70-80
NB 21	Whole of India and tropics	100-160
Yeshwant (RBN 9)	Maharashtra	150
PBN 83	Punjab	125-170
Pusa Giant napier	Whole of India and tropics	100-160
CO 2	South zone	350
CO-3	South Zone	130-200
KKM 1	South districts of Tamil Nadu	250
APBN 1	Andhra Pradesh, Karnataka and Tamil Nadu	200
PBN-233	Punjab	375
Saguna	South district of Kerala	260
Sampoorna (DHN-6)	Karnataka	120-150

Harvesting or cutting management

Hybrid napier being a perennial forage grass, its cutting at right stage is an important aspect to obtain better quality as well as yield. Wangchuk *et al.,* (2015) reported that total dry matter plant^{-1} was higher at 80 days cutting interval compare to 40 days but reverse was the case with crude protein content. Besides, cutting interval significantly affects the total dry matter, plant height, number of tillers, leaves, and crude protein content plant^{-1}.

Hybrid napier as a better option for high yield and fodder availability

Green forages become available in plenty during rainy season and become scarce after rainy season, which affects the health and productivity of animals. In such situation, silage is the better alternative to preserve and supply the green fodder during the period of shortage of green fodder. Hybrid napier is best alternative to supply adequate fodder for the animals round the year because of its perennial nature. Delena and Fulpagare (2015) reported that good quality silage can be prepared from hybrid napier. Biradar *et al.*, (2014) reported green fodder yield of different hybrid napier varieties and found to high in case of DHN-6 (710 q ha).

Success of dairy industry depends upon the availability and supply quality fodder to the livestock. Since, most of the fodder crops are season bound and hence supply the fodder only to that particular season of the year and rest of the time animals faces acute shortage of green fodder of good quality. Under such conditions some alternate has to be developed so as to mitigate the fodder scarcity. In this context, hybrid napier could prove a better option due to its perennial nature and capacity to produce adequate green fodder round the year. This is being hardy in nature can withstand drought condition and can grow under varying soils and agro climatic regions. It provides sustained fodder yields for four to five years thus save frequent expenses on repeated tillage and sowing operations. Hybrid Napier is resourceful forage grass due to its perennial nature, high yielding ability, nutritional quality, palatability, suitability for silage making and low oxalate content than any other grasses. The excess green fodder yield of hybrid napier can be preserved as silage for mitigating the acute shortage of green fodder during lean season. Besides, it produces more nutritious fodder with good palatability, taste and succulence, which is relished by the animals. Hence, it fulfils the nutritional needs of the animals, reduces expenditure on feed procurement, increases the milk productivity and hence, makes the dairy farming more feasible and profitable.

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