

## **Innovative Approaches for Green Fodder Production and its Promotion in Dairy Development: Experiences of India**

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### **Abstract**

*Various initiatives have been undertaken by multifarious agencies (public, private, NGOs etc.) for promoting green fodder production and distribution of fodder seeds/root slips at institutional and farmers' level. However, there is very poor response by the farmers for green fodder production and its promotion at field conditions. In this context, World Bank funded, Karnataka watershed Development Department sponsored - Sujala III Project, implemented by Veterinary College, Bidar (Karnataka, India) in the purposively selected project villages has adopted an innovative approach for promotion of green fodder production through establishment of fodder nursery at farmers' field. These farmers' plots also serve as demonstration and training units for fodder production and are involved in distribution of fodder seeds/root slips among the farming community through integrated and participatory extension approaches for dairy development.*

*The project clearly revealed that an integrated approach of extension activities viz. training, demonstration, on-farm testing, farm literature etc. can promote adoption of scientific practices by sensitisation and improving the knowledge level of farmers about green fodder production. The programme has achieved the expected target and has convincingly demonstrated fodder development in extremely difficult situations, ensuring that farmers and communities have timely access to fodder seeds, planting materials and other inputs. There is an increase in income generation, quality and quantity of milk yield, area under fodder cultivation and horizontal diffusion of fodder production practice. Further, appropriate strategies in the similar methods must be developed by livestock agencies to create better impact and popularization of livestock technologies in general, and fodder production in particular.*

*Keywords: Green Fodder Production, Fodder Nursery, Watershed Development, Karnataka.*

### **Introduction**

Among various issues to be addressed in Indian dairy sector, fodder production and feeding has been a critical element for improved production and productivity. Over the years, although various attempts were made to promote fodder production in field conditions, there is a poor response from the farmers for fodder cultivation and feeding. This might be due to major constraints like lack of awareness and inputs, pressure on land for cultivation of food/commercial crops, poor socio-economic status of the farmers, shrinking of common property resources etc. Further, the attitude and knowledge level of the dairy farmers also plays a pivotal role in adoption of recommended animal husbandry practices including green fodder cultivation and feeding.

It should be noted that livestock producers meet their fodder requirements through a combination of crop residues, grazing (on common lands, private lands, forests, fallow agricultural lands and harvested agricultural lands) and cultivated forage crops (mostly by large landholders), while some of them purchase fodder. However, there is an acute shortage of green and dry fodder and lack of scientific information for farming community about fodder production. In this context, various initiatives have been undertaken by multifarious agencies (public, private, NGOs etc.) for promoting green fodder production and distribution of fodder seeds/root slips at institutional and farmers' level. These agencies are also involved in establishment of fodder seed production farms and fodder nurseries to support the production and availability of improved fodder varieties. These farms also serve as demonstration and training units for fodder production and promotion. The seeds/root slips of improved varieties which have a higher chance of survival are distributed at a nominal rate among the farmers thereby encouraging fodder production. On similar lines, various research and extension projects have focused

on establishment of fodder nurseries and distribution of fodder seeds/root slips among the farming community through integrated and participatory extension approaches for dairy development.

### Status of Fodder Production in India and Karnataka

The increasing number of livestock and the changing dynamics of animal husbandry practices require corresponding increase in the type of fodder needed to meet the requirements. Various studies have been carried out to assess the demand and supply of fodder resources, especially with respect to green and dry fodder. In this context, the Planning Commission's Working Group on Animal Husbandry and Dairying has estimated the demand and supply of fodder resources in India (Table 1).

**Table 1:** Demand and Supply Status of Fodder Resources in India (in Million Tonnes).

Year	Supply		Demand		Shortfall		Shortfall (%)	
	Green	Dry	Green	Dry	Green	Dry	Green	Dry
2000	385	428	988	549	603	121	61.03	22.04
2005	390	443	1025	569	635	126	61.95	22.14
2010	395	451	1061	589	666	138	62.77	23.42
2015	401	466	1097	609	696	143	63.44	23.48
2020	406	473	1134	630	728	157	64.19	24.92

(GoI, 2001).

The data reveals that the present fodder availability in India is well below the requirement. In view of the large number of resource-poor households dependent upon open grazing for their livestock, the only plausible option is to revitalize the degrading common fodder and pasture resources in the country and improve their productivity (GoI, 2011). Similarly, there is a need to emphasize cultivation of need and region-based green fodder in a big way.

The central and state governments are supporting fodder production in India through various schemes and programmes to increase the availability of nutritious feed and fodder. Eight Central Fodder Development Organizations and eight Regional Fodder Stations are located in different agro-climatic zones of the country to undertake research and extension activities specifically on fodder development. Similarly, National Livestock Mission was launched in 2014-15 during XII Plan with an exclusive component to focus on improving availability of quality feed and fodder and reduce the gap between availability and demand. Further, various state governments are also promoting similar schemes and programmes for feed and fodder development.

### Fodder Scenario in Karnataka State of India

Fodder development is being taken up to a large extent in the institutional farms throughout the state and also in farmers' lands due to shortage of green fodder production in the state. To mitigate this deficiency, Central Minikit Testing programme, fodder production in livestock farms and training to farmers regarding fodder development programmes are implemented with the assistance of Government of India.

- The state has adequate resources of dry fodder but has a deficit of green fodder and concentrate feed. Concurrent focus has to be made for enhancing and augmenting feed and fodder resources availability. A massive programme for increased green fodder/fodder seed production, establishment of feed and fodder banks etc. has to be developed and implemented on priority.
- Forage seed production which is the key component for promoting enhanced production of green fodder has not received the desired priority. Neither any well-established institutional mechanism nor a well-designed strategy for fodder seed production is in existence at present.
- Even though fodder minikit scheme is quite popular among the farmers, the issues of insufficient quantity of kits, time of supply and supply of undesired seeds has hampered the progress of the scheme over the years to a great extent. Fodder mini kit programme needs to be relooked into comprehensively if the desired impact is to be achieved.

- About 80% of cultivated area in Karnataka is rainfed and many of the districts, especially in the northern part of the state, are drought prone with frequent crop failures. In such a scenario, ensuring adequate supply of at least dry fodder for livestock has to be given high priority. Establishing a network of fodder banks would help in tiding over situations of feed scarcity. However, this activity is not to be taken just as a part of drought relief measures and fodder banks are to be essentially created during normal rainfall years and when crop residues are available in sufficient quantity. The concept of fodder/feed blocks needs to be harnessed beneficially.

- Various initiatives are taken with regards to fodder extension for promoting green fodder cultivation. Minikits under Central Minikits Testing Programme are distributed free of cost to the farmers of the State during *kharif* and *rabi* seasons to encourage green fodder production. Root slips are distributed at a nominal rate to the farmers through departmental livestock farms thereby encouraging fodder production. Fodder demonstrations are held at veterinary institutions to enrich the farmers about different varieties of fodder.

The present study has focused on establishment of fodder nursery as demonstration plot and carrying out distribution of fodder seeds and root slips for the benefit of other farmers in the project villages. Further, this project has also addressed the constraints faced by the project staff and the farmers

### **Fodder Production in Bidar District of Karnataka, India- A Field Experience**

The project is implemented by Watershed Development Department based on flow of water channels and socio-economic conditions. Fodder production is undertaken in all the project districts through establishment of fodder nurseries and diffusion among the beneficiary farmers. The experience shared is from the project villages of the World Bank funded, Karnataka Watershed Development Department sponsored - Sujala III project, implemented by Veterinary College, Bidar from December, 2014. The study also involved individual farmers and member farmers of producer organizations (for example: Karnataka Milk Federation, private milk societies etc.).

### **Methodology of the Study**

- Purposive sampling technique was used for selecting Bidar district of Karnataka state since Sujala-III project is implemented in this district by Veterinary College, Bidar.

- A baseline survey of about 790 farmers from 14 project villages as identified by the Government of Karnataka (India) and various meetings/ awareness programmes in the project villages paved the way for creating knowledge and interest about fodder nursery establishment and green fodder production at farmers' field.

- Among all the participants, two farmers were identified for establishment of nursery in the year 2015-16 and later, two farmers in 2016-17 and four farmers in 2017-18 were identified for establishment of nursery. This nursery presently consists of five/six different varieties of fodder depending on the field conditions and farmers' situation.

- These beneficiary farmers had milking animals during the study period and they sold their milk to the primary cooperative milk societies in their villages.

- Awareness programmes, trainings, field days and demonstrations about fodder production and its importance were conducted by the multi-disciplinary teams for the beneficiaries. A before-after research design was followed for the study to know the impact of these programmes in the project villages.

- Pre-exposure and post-exposure attitude tests, knowledge tests, and adoption studies were conducted in the project villages, focusing on the objectives of the scheme, before and after conducting the awareness and demonstration programme.

### **Practices Followed**

- *Awareness programmes, trainings and demonstrations:* Multi-disciplinary teams conducted awareness programmes and trainings for the beneficiaries on fodder production practices. Demonstrations on land preparation, collection of root slips, sowing of fodder seeds or root slips, fertilizer/manure application, harvesting of fodder etc. were conducted. Further, the beneficiaries also participated in focus group discussions about different practices and issues under the guidance of experts or project staff.

- *Fodder Nursery and demonstration plot established:* Two farmers were identified for establishment of nursery and demonstration plot in the year 2015-16 and later, two farmers were identified in the year 2016-17. The nurseries in 2015-16 (July and November, 2015) consisted of nine fodder varieties at farmers' field with 2 *guntas* (202.4 sq.m) for each variety. However, it was realized that only five varieties were suitable in the project area. With this experience, the fodder nurseries initiated in the year 2016-17 (July, 2016) and 2017-18 consisted of only six different varieties each viz. Dharwad Hybrid Napier-6 (DHN-6), Hybrid Napier Co-4, Multi-cut sorghum CoFS-29, *Stylosanthus hamata*, Guinea grass, Rhodes grass and *Sesbania grandiflora*. Presently, fodder production yield and area under fodder production has increased over a period of time and is discussed in this good practice.



**Figure 1:** Fodder nursery and fodder plot of beneficiary farmer in project area.

- *Farm literature and video:* The farm literature and reading materials were distributed to all the beneficiaries. Further, a video was developed in vernacular language and was displayed for the benefit of the farmers. This video is available at <https://www.youtube.com/watch?v=I2LV2y2zWGw&t=21s>.





**Table 2:** Details of fodder nursery and fodder production in project area of Bidar District, India

Year	Farmer Name	Area (guntas)	Varieties	Yield (Tonnes)
2015-16	Mr. Kallappa Jakka	30.5	9 & 6	36.50
	Mr. Sharnappa Biradar	12	5	7.10
2016-17	Mr. Vithal Allure	10	5	15.82
	Mr. Nagreddy	08	5	15.00
2017-18	Mr. Eknath	06	6	4.10
	Mr. Gopal	06	3	2.90
	Mr. Chander	05	3	0.40
	Mr. Nagreddy	06	2	1.20

Note: 40 *guntas* = One acres; 2.5 Acres = One hectare.

- *Horizontal diffusion of fodder production practices:* The fodder nursery establishment and fodder production in the project villages has motivated other farmers to adopt this practice. A total of 15 farmers have procured about 11,000 root slips and stem cuttings from the beneficiary farmers within the project villages indicating horizontal diffusion of the practice. Further, other farmers not under the project villages have also procured these seeds and root slips for cultivation. These newly adopted farmers have cultivated fodder from a range of 2 *guntas* (202.4 sq.m) to 20 *guntas* (2024 sq.m) in their field. This result indicates that farmers have realized the importance of green fodder production in dairying.

- *Preference for fodder cultivation:* There was a positive change in the attitude of beneficiaries about green fodder production and establishment of fodder nursery. Initially the farmers thought that this practice was non-profitable and difficult to adopt at field condition due to non-availability of inputs and lack of scientific knowledge. Presently, good number of farmers in the project area have inclination towards fodder cultivation and feeding due to field days and awareness programmes. Initially, all the farmers preferred to cultivate food crops and never allotted the land for fodder production. But, with the introduction of the project, beneficiaries have initiated fodder production due to realization of minimal investment in terms of land and labour.

- *Improved economic returns:* Interventions carried out in this project for increased availability of green fodder were aimed at increased milk production and reduction in the cost of milk production thereby resulting in increased economic returns to livestock producers. Major key characteristics were its low cost of establishment, relatively short wait for benefits, preference to perennial type of fodder varieties, and observable benefits. The farmers have varying range of income benefits depending on the area under cultivation and the fodder varieties cultivated. Furthermore, the farmers have saved money which they normally spent for purchasing the green fodder from other sources.

**Table 3:** Economic returns of fodder nursery establishment in project area.

S.N	Name of farmer	Yield (Tonnes)	Economics for one year (INR) (1 USD= 65 INR)			Net Income (for one acre)
			Expenditure	Income	Net Income	
1	Mr. Kallappa Jakka	36.50	8460/-	37300/-	28840/-	37,823/-
2	Mr. Sharnappa Biradar	7.10	3650/-	7700/-	4050/-	16,200/-
3	Mr. Vithal Allure	15.82	6800/-	16620/-	9820/-	39,280/-
4	Mr. Nag reddy	15.00	5750/-	15880/-	10130/-	50,650/-

Note: One USD = 65 INR; 40 *guntas* = One acres; 2.5 Acre = One hectare

- *Improved knowledge level of dairy farmers:* Overall knowledge level of the beneficiaries about fodder production and its importance has increased after imparting trainings and various programmes through the project. Further, the knowledge retention level was found to be about 68 per cent after 30 days of the trainings and field visits.

- *Silage making by beneficiary farmers:* The project beneficiaries who had established fodder nurseries also practiced silage making realizing the importance of conserving surplus green fodder. The demonstrations were conducted by project team in the villages and the inputs like silo bags were provided to the farmers to encourage silage production.



**Figure 3:** Demonstration about silage making and adoption by project beneficiary farmer

- *Improved quantity and quality of milk:* Field level observations have confirmed that problem of less milk yield and low fat and solids not fat (SNF) content was solved to a greater extent due to feeding of high-quality green fodder to their dairy animals. These farmers are also getting higher prices for milk as compared to other farmers in the project villages. Further, these farmers are following scientific feeding practices which include dry fodder, green fodder, concentrate feeding, chaff cutting, conservation of surplus fodder etc. As expected, the consumption of this green fodder has improved the overall health status of the dairy animals.

- *Promotion of suitable fodder variety:* Among 10 varieties which were introduced in the project villages, only 5-6 varieties could grow better in the field conditions. The farmers also shared their experience that Dharwad Hybrid Napier-6 (DHN-6) and *Sesbania grandiflora* had very good yield and were highly palatable for dairy animals. This is a multi-cut, hardy, perennial fodder which can be harvested once in about 80-90 days. On the basis of field level experience, these fodder crops are being promoted in the project area for the benefit of farming community and is being communicated to field level extension officers.

### Lessons Learnt and Challenges Faced

The project clearly revealed that an integrated approach of extension activities viz. training, demonstration, OFT, farm literature etc. can promote adoption of scientific practices by sensitization and improving the knowledge level of farmers. The programme has achieved the expected target and has convincingly demonstrated fodder development in extremely difficult situations ensuring that farmers and communities have timely access to fodder seeds, planting materials and other inputs. There is an increase in income generation, quality and quantity of milk yield, area under fodder cultivation and horizontal diffusion of fodder production practices. However, during the initial phase, this project has faced various problems and challenges which are depicted below.

- Project beneficiaries were not aware about the importance of growing fodder crops and hence, cultivated food/cash crops in their land. Addressing the farmers about fodder production and creating this as a felt need in the initial period was a challenging task for the project team. The project team made efforts to motivate the beneficiaries and strengthen their scientific knowledge.

- It was very difficult for the project team to convince the beneficiaries about the difference between fodder nursery, demonstration plot and conventional fodder production plot. Although farmers

were informed about the objective of fodder nursery, they harvested it for feeding their dairy animals and hence required regular follow-up and field level observation.

- The project faced the problems of poor commitment from the farmer, lack of irrigation facilities and prevailing drought in the region ultimately leading to discontinuation of fodder nursery. Few beneficiary farmers had completely replaced the fodder nursery with other agricultural crops. This indicated that environmental factors play a major role in fodder nursery establishment and promotion of fodder production.

- Heavy rain in September and October, 2016 in North Karnataka (Bidar and Kalaburgi districts) created damage to the fodder production plots in the project area. Among five/six fodder varieties, the plots were left with either two or three varieties in the fodder plots and recovered after considerable period of time. Ultimately, drought and heavy rain have affected fodder production in consecutive years.

### **Policy Implications and Strategy for Future**

Though the project received poor response from farmers initially, integrated extension approaches helped the project team in improving the knowledge level of farmers and adoption of fodder production practice with very low investment. A policy shift emphasising delivery of inputs and regular follow-up for carrying out an integrated extension approach is very critical to enhance production and productivity.

- There is a need to focus on promotion of region-specific and palatable fodder varieties based on the field experience. Further, the efforts to utilize the common grazing lands are urgently required to maximize the benefits to farming community.

- On the same lines, commercialization or entrepreneurship in green fodder production can also be developed to meet the fodder requirements of adjoining regions. The existing department fodder farms need to be strengthened for production of foundation and certified seeds. The foundation seeds must be further multiplied by the certified seed growers to increase the availability of seeds suitable for different agro-climatic zones.

- Based on this experience, the State Departments have to emphasize fodder production to a larger extent by supporting farmers through inputs delivery and need based extension approaches since farmers have only a very limited understanding about fodder production and its importance.

- The horizontal diffusion of fodder production practices i.e distribution of fodder seeds and root slips among the farming community would continue for a long term since farmers have realized the importance of fodder production. The nearby farmers have also made an attempt to contact the concerned farmers or institutions to adopt this practice since it is essential for enhancing profits in dairy farming. Further, this interest of farmers and adoption of fodder production practice is expected to continue even after the completion of this particular project in the project villages.

- Training, demonstration and field visits of field staff and other stakeholders must be taken-up on timely basis to update their knowledge and carry out further dissemination to farming community. These programmes can even focus on effective fodder utilization practices like silage making, dry fodder enrichment etc.

- Suitable models towards integration of fodder species with the intensive agricultural practices needs to be developed using GIS mapping/ remote sensing in collaboration with research institutes or universities and can be promoted on large scale.

- Availability of reliable data on fodder cultivation will be useful for better planning of livestock development in the state. Concerted efforts should be made by the government departments to systematically collect and publish data on fodder cultivation

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