



Integration of Forage Crops in Coconut Farm Improving Productivity Through Farmer Participation Approach at Gopalapura Village of Jagalur Taluk Davanagere District

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Abstract — Smallholder farmers in developing countries face numerous limitations that hinder them from embracing improved agricultural practices and innovations with great potential for meaningful transformations of livelihoods. The present study was undertaken to encourage the farmers to cultivate fodder grasses as an intercrop in the coconut gardens. A live demonstration of fodder crops during 2015-16 was under taken in Gopalapura village of Jagalur taluk, Davanagere district, Karnataka, to educate the farmers in cultivating perennial fodder grasses in their coconut gardens as inter crops. Interested farmer were selected randomly from the Gopalapura village for demonstration of intercropping of fodder grass. The annual outcome from fodder nursery per hacter was Napier crops (DHN-6 and CO-4) was ₹ 50300/- and ₹ 55300 respectively, Guinea grass was ₹ 50450/-, Ruzi grass was ₹ 45300/- and Rhodes Grasses was ₹ 50450/-, fodder maize was ₹ 54000, Hedge lucerne was ₹ 45000 and Pilly pisera was ₹ 30000. The annual net profit per hacter of different fodder crops grown viz., Napier (DHN-6 and CO-4) was ₹ 11010/- and ₹ 16010 respectively, Guinea grass was ₹ 14810/-, Ruzi grass was ₹ 4160/-, Rhodes Grasses was ₹ 9310/-, fodder maize was ₹ 20120, Hedge lucerne was ₹ 28560 and Pilly pisera was ₹ 15560. Moreover, the farmer benefited as good quality and nutritional rich green fodder and dry fodder were available from fodder trees and fodder crops all-round the year, Increased lactometer reading, Fat and SNF and milk production of the cross bred cows and finally earn the income around the year.

Keywords — Coconut, Cost of cultivation, Fodder and Net profit.

I. INTRODUCTION

The extent of warming across India is wide spread and undisputed. It has adverse impact on wild life, agriculture, incidence of diseases, local weather, rise in sea level, more heat waves etc. Rising population, rapid urbanization, industrialization, deforestation and waste production are putting enormous pressure on our natural resource base and has led to qualitative and quantitative degradation of resources such as land, water, air, biodiversity, forests and bio-resources. Also smallholder farmers in developing countries face numerous limitations that hinder them from embracing improved agricultural practices and innovations with great potential for meaningful transformations of livelihoods. Karnataka is rich in livestock resources and has 95.16 lakh cattle, 34.70 lakh buffaloes, 95.83 lakh sheep and 47.96 lakh goats which are all dependant on

fodder resources of the state for their survival and production. Davanagere district had a 3.32 lakh cattle and 1.76 lakh buffaloes which are dependent on locally available fodder resources for their growth and production (Anon, 2015).

In many parts of the country, the farmers are growing coconut as monocropping along with one or two animals rearing in their farm land but they find it difficult to sustain their families' livelihoods from coconut income. They often face limited landholding, lower availability of fodder, declining productivity and volatile coconut prices, resulting in poverty, food insecurity and a low nutritional status. In Jagalur taluk, the coconut farmers neither provide gainful employment for the family labour round the year nor generate sufficient income to satisfy the family requirement. Low per capita availability of land, increasing population pressure, agriculture turned to be less dependable to provide adequate livelihood opportunities for a majority of rural population.

The present study was undertaken to encourage the farmers to cultivate fodder grasses as an intercrop in the coconut gardens. A live demonstration of fodder crops during 2015-16 was under taken in Gopalapura village of Jagalur taluk, Davanagere district, Karnataka, to educate the farmers in cultivating perennial fodder grasses in their coconut gardens as inter crops.

II. MATERIALS AND METHODS

The dairy farmer with the herd size of 5- 6 lactating animals was selected randomly. Shri. Ramesh S/o Sharanappa at Gopalapura village of Jagalur Taluk, Davanagere district was identified for this activity. Farmers were given 10 varieties of fodder crops and critical inputs such as fodder root slips, fodder seeds and fertilizers for establishing the fodder nursery in their farm plot and further farmers were linked to the Agriculture, Veterinary and Horticulture Departments of Davanagere district. Each fodder crop was grown in 2 gunta area respectively. The 5 different fodder varieties viz., Napier Grass (CO-4 and DHN-6), Guinea Grass (Samruddi), Ruzi Grass (Green Signal) and Rhodes Grass and 3 different fodder crop seeds such as Maize (South African Tall), Hedge Lucerne (*Desmonthus vergatis*) and Pilly Pisera (Small moondal) and a 2 fodder tree plants such as Drumstick (PKM 1) and Sasbenia (Local) were grown in half acre land. The scientific practice such as layout of the

crop, line spacing of different crop, fertilizer application and cultivation practices were adopted scientifically. Similarly the milk yield of animals, fat and SNF content were recorded from the farmer who participated in the study. The annual expenditure for fodder production was calculated for per hectare of land. The quantity of fodder root slips and fodder crop seeds for 2 gunta area provided for farmers are,

1. Napier grass such as CO-4 and DHN-6 each was 700,
2. Rhodes and ruzi grass was 750 respectively,
3. Guinea grass was 600 and
4. Fodder maize was 1.5 kg,
5. Hedge Lucerne and pilly pisera was 0.5 kg each and
6. Fodder trees such as Drumstick and Sesbania was 250 g each.

The scientific practice such as layout of the crop, line spacing of different crop, fertilizer application and cultivation practices were adopted. The critical inputs such as fodder root slips, fodder crop seeds and fertilizer (Urea, Diammonium Phosphate and Murate of Potash) were given to the selected farmer. The farmers were educated at three different levels.

Level 1: The selected village farmers assemble at a one place and highlight the objectives of the study and interested one farmer should select. After selection of the farmer, they were highlighted on the necessity for growing fodder grass as intercrop and the benefits they will reap out of it.

Level 2: After convincing the farmer demonstration of preparation of seed bed and sowing technique was shown

Level 3: After that further transplantation of the grass seedlings and fodder crop seeds to the coconut field was demonstrated and also the method of utilization of the fodder grass and fodder crop seeds was explained.

The sowing operation of fodder crops was taken during Kharif season i.e. August month of 2015-16. Farmers were trained for cultivation, management and establishment of different fodder crops. Crop protection activities such as thinning, controlling weeds through intercultivation and manual hand weeding were operated timely. The grasses can be harvested up to 6-8 years in the fixed land. So the first cutting of fodder grass varieties were done during 85 DAP (Days after planting) and respective cutting was done at 45- 50 days interval, on an average 5 cutting were done in a year. The other fodder crops such as fodder maize, hedge Lucerne and Pilly pisera were harvested at 60-65 Days after sowing (DAS), 70- 80 DAS and 60- 70DAS respectively and subsequent cutting was done at 30- 35 days.

III. RESULTS AND DISCUSSION

Farmers face major problems of fodder shortage especially during the dry season when most pastures have dried up. This is a major constraint to milk production in smallholder dairy farming systems (Chakoma et al., 2004).

Production

The study revealed that the production/yield of fodder crops from farmer nursery plot i.e., the root slips production (total of 5 different cuttings) was found to be

for Napier grasses- CO-4 and DHN-6 1000 each Guinea grass 1500, Ruzi grass 1000 and Rhodes grass was found to be 1500 per 2 gunta area per year where as the green fodder production from the same was found to be for CO-4, and DHN-6 each was 500 and 550 kg, Guinea grass was 500 kg, Ruzi grass was 450 kg, Rhodes grass was 500 kg, Hedge Lucerne was 450 kg, Pilly pisera was 300 kg and Fodder maize (Total of two season crop) was 900 kg per 2 gunta area per year.

The production/yield from 5 different cuttings of fodder crops at Ramesh farmer nursery plot was listed below,

I. The Root slips production (No's per 2 gunta area per year):

1. Napier grass such as CO-4 and DHN-6 each was 1000,
2. Guinea grass 1500,
3. Ruzi grass 1000 and
4. Rhodes grass 1500.

II. Green fodder production (kg per 2 gunta area per year):

1. Napier grass such as CO-4 and DHN-6 each was 500 to 550 kg,
2. Guinea grass was 500 kg,
3. Ruzi grass was 450 kg
4. Rhodes grass was 500 kg.
5. Hedge Lucerne was 450 kg
6. Pilly pisera was 300 kg
7. Fodder maize (Total of two season crop) was 900 kg

Economics of fodder crops

The cost of cultivation was estimated. Since fodder crops except maize are perennial crops in nature and these can be harvested 5 times in a year (multicut). The establishment (Input) cost such as seed cost, land preparation cost, plant protection cost, labour hiring cost and finally harvesting costs were worked out to calculate the total cost of production. Then, the establishment cost was amortized to incorporate it in the calculation of annual cost. After the establishment the farmer expanded the fodder grass crops cultivation in his own plot and also sold fodder root slips (@ 0.30 per root slip). This also included for calculating economics of fodder crops.

1. The average of annual input cost per hacter of fodder grass crops such as Napier (DHN-6 and CO-4), Guinea, Ruzi and Rhodes Grasses was 39,000/- each and average of annual output cost was 50,000/-. The net profit per hacter was 11,000/- of each grass crops. (Table 1)
2. The fodder maize was grown as a single crop, the annual input cost per hacter was 34,000/- and the annual output of green fodder production was 54000/-. The net profit per hacter was 20000/-(Table 1).
3. Further, the annual input cost per hacter of hedge Lucerne and pilly pisera was 17,000/- and 15,000 respectively and the annual output production cost was 45,000/- and 30,000/- respectively. The net profit per hacter of Hedge Lucerne and Pilly pisera was 28,000/- and 15,000/- respectively (Table 1).
4. The total annual input cost per hacter of established fodder nursery was around 2,60,000/- and the annual output cost was 3,80,000/-. The annual net

profit per hacter per year of fodder nursery was 1,20,000/- (Table 1).

Advantages of selected former got:

1. Green fodder and dry fodder were available from fodder trees and fodder crops all-round the year for their own animals in dairy farm. Similar results were obtain in the studies of Salam & Sreekumar (1990) and Jayashree and Suneetha (2010).
2. Good quality and nutritional rich green fodder were available to the farm animals. The objective of introducing the fodder shrubs was to provide a low-cost, easy-to-produce protein source that could also contribute to sustainable land management (Franzel et al., 2008).
3. Increased milk production of the cross bred cows with 1.5-2.0 l/ day similar results observed in the Wambugu study at East Africa. Where they experienced 0.6-1.4 l increase in daily milk production per animal.
4. Improved lactometer reading(degree level) to 26 to 27
5. Green fodder helps the animal health to be in good and productive
6. Improving the Fat and SNF content of the milk
7. Earning the income around the year

Direct benefits of the fodder nursery to the farmer:

1. The economics produce from a dairy unit of about 6 milch cattle can realize a net income of 75,000 to 1,00,000 every year. Similar results were obtained in the studies of Jayashree and Suneetha (2010).
2. He can also cow dung and cow's urine that could be effectively recycled manure preparation and used as source of nutrient for fodder crops and also other crops. Similar results were obtained in the studies of Jayashree and Suneetha (2010).
3. With this demonstration Farmers have definitely observed that their livestock had performed better with the forages and they will sustain their animals in the dry season. This study was effective in creating an impact on the dairy farmers and this has to be popularized in a large scale in this area of shrinking agricultural fields and the demand for good quality milk and milk products

IV. CONCLUSION

Participatory forage bank technology development and evaluation may be the key to improving adoption of forage crops at smallholder farmer in Gopalapura village. This Research would increase the nutritional value of the feeds, reduce the risk of pests and diseases and promote local biodiversity. Working with farmer may enhance adoption of the forage technologies as the farmers can share experiences and cost of inputs required for the technologies to succeed. Commercial seed production and distribution are slowly emerging in project areas; however, it is not clear if seed production will continue to grow and meet local demand.

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Table1. Production and economics of different fodder crops.

Sl. No.	Fodder crop	Production		Economics		
		Root slips (No./ha)	Seed/ Green/ dry fodder (kg/ha)	Input cost (₹ / ha)	Output cost (₹ / ha)	Net profit (₹ /ha.)
A	Napier grass					
1	DNH-6	1000	550	39,290	50,300	11,010
2	CO-4	1000	500	39,290	55,300	16,010
B	Guniea grass	1500	500	35,640	50,450	14,810
C	Ruzi grass	1000	450	41,140	45,300	4,160
D	Rhodes grass	1500	500	41,140	50,450	9,310
E	Fodder maize (South African Tall)	-	900	33,880	54,000	20,120
F	Hedge Lucerne	-	450	16,440	45,000	28,560
G	Pilly pisera	-	300	14,440	30,000	15,560
	Total			2,61,260	3,80,800	1,19,540

Note: The costs were adopted for calculating the economics was listed here, grass root slips 0.30/root slip, 2 per kg of all green fodder, 1.2/kg of maize green fodder, 20/kg of fodder maize seed, 0.75 per kg of dry fodder, labour wage 260/day, Land preparation 300/hr, Fertilizer such as Urea, DAP and MOP was 6.4, 21.6 and 19.0/kg and Bullock pair was 400/pair/day and Seed cost for sowing such as Root slips was 0.75/root slip, 500/kg of hedge Lucerne seed, 250/ kg of pilly pisera and 40/kg of Fodder maize