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Farmer to farmer spread of fodder crops - an analysis on mango orchards in south India

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Introduction

India ranks first among world mango (*Mangifera indica* L.) producing countries, accounting for about 50% of world production. Karnataka in southern India is one of the important mango producing provinces of the country. The total area under mango crops in Karnataka is 160,000 ha of which 90,000 ha is in prime fruit yielding stage. In the year 2011-12 alone the area under mango crops has gone up by 10,000 ha (DoH, 2013). The usual planting distance followed by most farmers for mango is 10 m by 10 m. Intercropping, mainly with small millet is practiced until the mango trees attain a suitable height and develop canopy (at 5-6 years of age). The space between the mango tree rows which is not cultivated is estimated to be 67,500 ha (75%) and this provides ample scope for introduction of improved fodder crops in mango orchards through non-competitive land use.

Formal methods of diffusion of fodder technologies in India are not only few but are also inefficient. In such cases diffusion can be enhanced through participation of farmers (Kormawa *et al*., 2004). However farmer to farmer dissemination of technologies is a neglected area of research (Grisley, 1994). A study on diffusing fodder technologies in interspaces of mango orchards of farmers in a participatory mode was conducted in Karnataka. One objective was to develop a method to improve the fodder availability using mango orchards by encouraging farmers to be partners for better feeding of livestock in the region.

Materials and Methods

Dharwad and Belgaum districts of Karnataka were selected, based on maximum area under mango. In participatory research the process of conducting research is as important as the outcome (Krishnaswamy, 2004). The first year of the study (2013-14) focused on finalizing the research process, so only 5 mango growers were identified. Discussions with five Non-Government Organizations (NGOs) working on livestock development, and experiences gained by working with the 5 farmers were used to develop a roadmap to attain the research objective and identify the types of data to be collected. Capacity building of mango growers on fodder crops emerged as the first step. At the beginning of the second year (2004), 189 mango growers (identified by the 5 NGOs) were trained in 7 batches. This gave participating farmers an opportunity to view the fodder crops, understand their cultivation aspects and consider the pros and cons of growing them in mango orchards. Preferences for different fodder crops by the participants were elicited at the end of each training program.

The project targeted 25 acres of mango orchard in its second year (2014-15). The first 25 mango growers who approached us at the beginning of the monsoon formed the sample study group. Planting materials of fodder crops selected by them were given, along with instructions of cropping practices. Regular visits were made for reconnaissance and data collection. These mango growers were from 11 villages signifying a good spread of fodder crops across villages. Data were collected concerning the spread of these crops in the second fortnight of December 2014 and the first fortnight of January 2015, after 6 months of the monsoon, using structured personal interviews with the sample farmers.

Results and Discussion

Influenced by training on the importance of cultivating multiple fodder crops, farmers chose a wide range of fodder crop combinations (Fig. 1). Three perennial grasses (BNH, G and PS) intercropped with fodder cowpea (CP) were cultivated by 32% of mango growers, two grasses (BNH+G) by 28%, BNH alone by 12% and 8% each two grasses (BNH+PS) or one grass and one legume (BNH+CP, PS+CP), SH in mango basins and 4% cultivated 2 grasses intercropped with fodder cowpea.

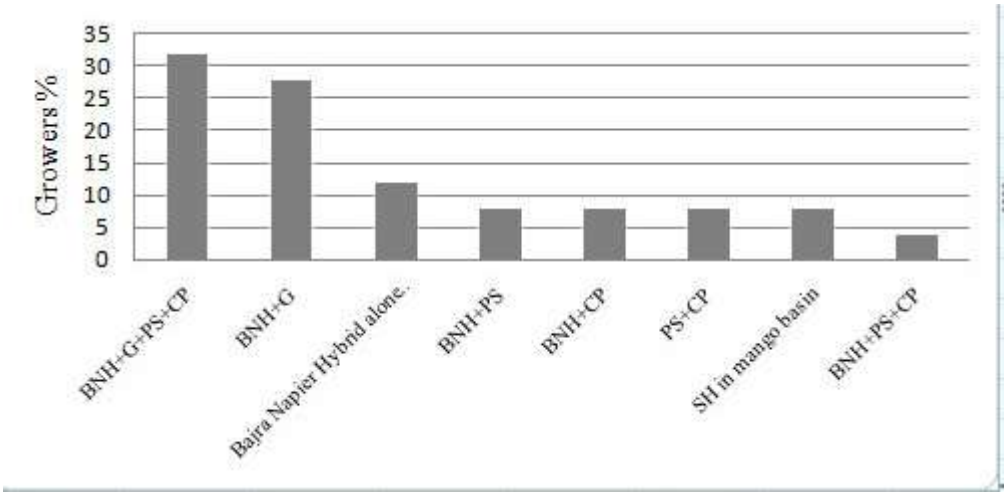

Fig. 1: Fodder crops combinations in participating mango growers' orchards

The average land holding size of participating mango growers was 16.92±4.78 acres and the average age of mango trees was 14.92±1.37 years with an average number of 284.72 trees (SE 88.13) per farmer. Shortage of green fodder (22.60±4.66%) and dry fodder (17.40±4.19%) was experienced by mango growers before participating in the project. The farmers had livestock holdings of 6.31±1.44 ACUs including 1.92±0.50 in milk animals. For grouping sample farmers, initially hierarchical cluster analysis using Ward's method (squared Euclidean distance) was performed to ascertain the number of clusters in the data. Two clusters (C_1:22 and C_2: 2; one farmer did not form part of cluster) emerged based on the maximum difference in the agglomeration coefficient values. ANOVA was performed with cluster numbers assigned for each farmer to identify which characteristics were responsible for clustering. Area under mango, family size, total land holding, herd size, animals in milking, fodder crops grown before, number of mango trees, mango yield and labour saved to collect fodder crops varied significantly between the two clusters. Cluster one had 22 farmers, indicating homogeneity of the participating farmers with regard to these variables.

From July-December 2014, intra-farmer spread of area under fodder crops in interspaces was 17 % by 24% participating farmers. Inter-farmer spread of area under fodder crops was 29%. For every participating farmer, 13 other farmers discussed with them about fodder crops, 9 farmers requested them to spare planting/seed material and 0.8 other farmer actually cultivated fodder crops on their arable land, mostly in mango orchards. The area under fodder crops was thus increased by 45%. The monthly growth of area under fodder crops was 7.5 percent (Table 1).

Table 1: Spread of fodder crops in arable lands of mango orchards from July to December 2014

Sl. No	Particulars	Numbers/area/ratio
a	Initial no of farmers participating	25 number
b	Initial area under fodder crops in mango orchards	25.05 acres
c	No of participating farmers who increased their area under fodder crops	6 (24%)
d	Area (percentage) increased due to intra farmer spread in mango orchards	4.25 acres (16.76%)
e	Area under fodder crops (b+d)	29.25 acres
f	No of other farmers discussed with participating farmers about fodder crops	323 (1:13)
g	No of other farmers requesting fodder seed material from participating farmers	216 (1:9)
h	No of new farmers who planted fodder crops by taking planting material from participating farmers	20 (1:0.8)
i	New farmers within the village	17
j	New farmers outside village	3
k	Area (percentage) under fodder crops due to inter-farmer spread	7.15 acres (28.54%)
l	Total no of farmers cultivating fodder crops (a+b)	45
m	Total area (percentage increase) under fodders	36.4 acres (45.31%)
n	Monthly growth rate in area under fodder crops	7.5%

When technology meets the farmers' preferences, they often share the technology with other farmers, thereby setting in motion an endogenous process of technology diffusion (Adesina and Baidu-Forson, 1995). In this case, farmers mainly

used fodder for their own livestock. Cooperative milk societies in villages of Karnataka provide a fair and assured market for milk, for which villages should provide a certain minimum quantity of milk production. In one village, farmers planned to increase animals and milk production to get this facility, and in that village farmer to farmer spread was more evident. Some villages which mainly grew commercial crops witnessed better spread of fodder crops. Spread of fodder crops to other farmers was absent from a few urban participating mango growers due to lack of propinquity to other mango growers. This shows that though farmers may be ideal partners in promoting diffusion of improved seeds/technology, their circumstances play an important role in its spread. This supports the technology characteristics users' model – a theoretical model of diffusion and adoption behaviour (Scoones and Thomson, 1994).

Conclusion

This study suggested that farmer to farmer methods of dissemination (in this case, inter farmer spread of fodder crop technology) may have speedier and wider impact than public or private extension systems. This important finding that farmers make the technology available to other farmers signifies that they may be ideal partners in diffusion of technologies especially for fodder technologies where extension support is either extremely weak or not available.

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