

HOLY BASIL CULTIVATION FOR DOUBLING THE FARMER'S INCOME IN SANDY LOAM SOILS

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Abstract: Effective use and management of cultivable land through cultivation of suitable medicinal and aromatic plants has become keen agenda. Tulsi has an important option for livelihoods and sustainability of farmers income in central Gujarat. Large scale Front Line Demonstration (FLD) was conducted in farmers field using tulsi accession "DOS-1". A total of 7.36 t h⁻¹ fresh leaves were harvested. On an average, farmers got ₹ 1, 28, 528 net returns per hectare from cultivation of tulsi as a sole crop. The B:C ratio over net return of 1.39 showed the suitability of tulsi as a commercial crop. The accession DOS-1 having higher leaf yield and found suitable for main as well as two ratoon crops. The results clearly gave an idea that medicinal plant like tulsi can be integrated into existing farming systems as one of the viable options for enhancing income of poor farmers.

Keywords: *Ocimum sanctum*, Tulsi, DOS-1, Net return, Cost of cultivation, FLD

INTRODUCTION

Herbal medicines are now in great demand in the developing world for primary health care not only because they are inexpensive but also for their better cultural acceptability, better compatibility with the human body and minimal side effects. Many medicinal and aromatic plants (MAPs) are known to perform well in poor or problematic land. The Directorate of Medicinal and Aromatic Plants Research, Anand had been continuously trying to sight see unexplored research areas with respect to MAPs to improve livelihood supports to the farmers. Integration of such MAPs into existing farming systems was thought to be one of the viable options for the barren and forestry lands (Thakur *et al.*, 2016).

The holy basil (*Ocimum sanctum* L. syn. *Ocimum tenuiflorum*) (Family Lamiaceae), is the most sacred herb. It is an excellent herb known as queen of herbs, native of India and is cultivated largely as a house hold species (Saran *et al.*, 2017). The most common uses of the holy basil include preparation of herbal tea, healing remedies, cosmetics and as preservative (Anbarasu and Vijayalakshmi, 2007). Essential oil of holy basil is valued due to active constituent eugenol that contributes to their therapeutic potential (Kothari *et al.*, 2004 and Saran *et al.*, 2017). Tulsi crop can be raised for different purposes like fresh leaf, dry leaf, seed and essential oil. Small and marginal farmers of central Gujarat are traditionally growing cotton, tobacco, maize, bajra and not getting profit like other developed countries, therefore, there is need to identify alternate suitable MAP during rainy season. The major menace to farmer in the region is damage caused by monkey and other wild animals,

besides the incidence of pest and diseases. Hence, in the present attempts, cultivation of tulsi was demonstrated in the farmers field in larger plots (> 1 ha) through some front-line demonstrations. The cultivation of MAPs especially tulsi is less risky in terms of wild animal, pest and diseases attack, and potentially grown even in marginal lands also and hence, this crop was selected as an alternate crop of conventionally grown crops in this area.

MATERIAL AND METHOD

The four front-line demonstrations (FLDs) were conducted during each year, 2015-16, 2016-17 and 2017-18 at the ICAR-Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand, Gujarat (India) and the farmers field in the central Gujarat. The trial activities were financially supported by the DASD, CSS, Calicut, Kerala. For creating small success stories, Mr. Bhupatbhai Patel, Palana, Mr. Jashbhai A. Solanki, Mr. Neilbhai D. Shah and Mr. Maheshbhai S. Solanki, Pandoli and Mr. Nishant M. Patel, Porda, were convinced about the profitability of tulsi cultivation (Fig. 1). These farmers decided to grow this crop. Accession DOS-1 was selected purposely due to favours the ratoon (pruning responsive), short duration, compact, profuse branching, thin stem and semi dwarf type in nature. The nursery was raised during three years at Directorate and also at farmers field (Fig. 2). The soil type of experimental sites was sandy loam supplied with 10 t/ha farmyard manures (FYM). The 49 days old seedlings were transplanted at 45 × 45 cm spacing. Three irrigations along with two hand weeding were carried out.

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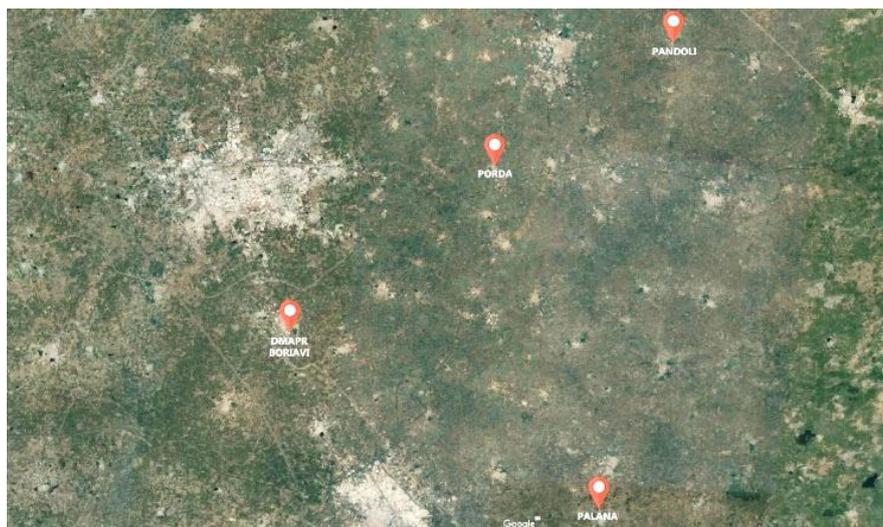


Fig. 1. Map showing farmers field selected for FLDs at four different locations of Anand Districts



Fig. 2. Nursery raising at DMAPR and farmers field for QPM production

The primary data were collected from sample households on various parameters through well-structured and pre-tested questionnaire. The widely used cost concept in farm management studies such as variable cost, fixed cost and total cost were used for computing cost of cultivation and cost of production of tulsi crop in the present study. The returns were calculated as per standard methods. The first harvest of the crop was done two months after transplanting in third week of September and subsequently two ratoons were harvested at one-month interval. On an average fresh leaves were harvested 7.36 t ha^{-1} from one main crop and two ratoon crops. The produce was sold at the rate of ₹ $30,000 \text{ t}^{-1}$.

RESULT AND DISCUSSION

It is a story of Anand District of Gujarat which has emerged as a tulsi cultivator in rainy season. The story of this crop in village Pandoli started with the plantation of one *bigha* by farmer Sh. Neilbhai D. Shah as consulted with Dr. P.L. Saran, Sr. scientists, ICAR-DMAPR, Boriavi and cultivating tulsi from last three years. Next year onward other farmers showed interest for the same. The cultivation of tulsi (DOS-1) as a sole crop set an excellent example for doubling farmers income. After three years of cultivation, farmers achieved good amount of profit in sole as well as system crop (Fig. 3).



Fig. 3. Field view of tulsi (DOS-1) as sole and ratoon crop at different farmers field under front line demonstrations

The total cost of cultivation per hectare of tulsi was ₹ 92, 272 and overall per hectare variable and fixed cost was ₹ 79, 209 and ₹ 13,063, respectively. Among the different items of cash expenditure, the cost of harvesting of leaves ranked first with ₹ 30,000 followed by weeding and hoeing ₹ 12,000. On an average, these farmers got 7.36 t ha⁻¹ fresh leaf

from one main crop and two ratoon crops (2.75, 2.80 and 1.81 t ha⁻¹, respectively). Net returns from marketing of fresh leaves was ₹ 1,28,528 and the B:C ratio over gross return and net return was 2.39 and 1.39, respectively. Similarly, the cultivation of tulsi in Tamilnadu was also reported economically profitable (Ajjan, *et. al.*, 2009).

Table 1. Components of cost and returns for *tulsi* cultivation (average of 3 trials/farmers)

Sr. No.	Particular	Value (₹)
1.	Land preparation	6,213
2.	Planting material (45000 seedlings @ ₹ 25/100)	11,250
3.	Transplanting	3,015
4.	Manures	3,600
5.	Irrigation (three)	1,506
6.	Weeding and hoeing	12,000
7.	Leaves Harvesting	30,000
8.	Family labour	7,750
9.	Miscellaneous costs	2,054
10.	Interest on working capital	1,821
A.	Variable cost (1 to 10)	79,209
11.	Depreciation	1,096
12.	Rental value of own land (4 months)	10,000
13.	Interest on fixed capital (prevailing bank rates)	1,967
B.	Total fixed cost (11+12+13)	13,063
14.	Main crop fresh leaf yield (t/ha)	2.75
15.	1 st ratoon crop fresh leaf yield (t/ha)	2.80
16.	2 nd ratoon crop fresh leaf yield (t/ha)	1.81
17.	Total fresh leaf yield (t ha⁻¹)	7.36

The first harvest was done after 62 days of planting and subsequent harvests were done keeping 30 days' intervals. The average harvest yield was 2.75 and 2.80, 1.81 t ha⁻¹ achieved from main and subsequent ratoons. Similarly, B:C ratio over gross return in *Ocimum sanctum* as herbage (1.44) and essential oil

(2.44) crops were reported under Gujarat conditions (Thakur *et. al.*, 2016 and Saran *et. al.*, 2017). *Rama tulsi* in general and DOS-1 in particular can be commercially cultivated as potential sources for doubling the farmer's income in sandy loam soils of central Gujarat.

Table 2. Economics of *tulsi* cultivation in central Gujarat

Sr. No.	Particular	Value (₹)
1.	Gross return (Fresh leaves @ ₹ 30,000/tonne)	2,20,800
2.	Total cost (₹ ha ⁻¹)	92,272
3.	Net return (₹ ha ⁻¹)	1,28,528
5.	B:C ratio over gross return	2.39
6.	B:C ratio over net return	1.39

CONCLUSION

In this study, a *tulsi* accession DOS-1 has been cultivated for fresh leaf purpose due to better response as a sole and ratoon crop. On an average, farmers got returns ₹ 1, 28, 528 ha⁻¹ with B:C ratio over gross return was 2.39 in a short duration of 122 days after transplanting.

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