

## **Effect of medicinal plants as intercrop on plant and soil of Mosambi sweet orange grown in laterite soil.**

**Priyanka Nandi and S.N. Ghosh**

Department of Fruits and Orchard Management, Faculty of Horticulture  
Bidhan Chandra Krishi Viswavidyalaya, Mohanpur – 741252, West Bengal, India.

Email: profsnghosh@yahoo.co.in

### **ABSTRACT**

An intercropping trial with different medicinal plants was conducted on 8-year old Mosambi sweet orange orchard planted at 5 m x 5 m spacing in laterite soil to find out the feasibility of growing medicinal plants in established orchard and to know any effect of medicinal plants on plant and soil of Mosambi. Results from one year growing of medicinal plants clearly indicated that Pudina and Bramhi can be grown in the inter space of the orchard with no adverse effect on Mosambi. Results also indicated that Alovera plant should not be grown in the orchard while growing of Aswagandha and Sarpagandha need to be investigated further by planting before monsoon instead of post monsoon planting due to their high mortality rate.

**Key words:** Intercropping, laterite soil, medicinal plants, mosambi

### **INTRODUCTION**

The Mosambi, a variety of sweet orange (*Citrus sinensis* Osback) is most popular in West Bengal and other states of India. It requires sub-tropical, dry climate with low annual precipitation. The western part of West Bengal, covering Bankura, Purulia, Birbhum, Paschim Medinipur and part of Bardwan having low rainfall as compared to other parts of the state, is suitable for growing Mosambi sweet orange and producing good quality fruits. The Mosambi sweet orange is planted at a distance of 5 m x 5 m. where there is an ample scope for growing short duration crops. In earlier study, Ghosh and Pal (2010) concluded that the groundnut, okra, black gram, and cowpea can be grown profitably.

Realizing beneficial health effect of medicinal plants, demand of medicinal plants is at a faster rate all over world. Growing of medicinal plants in the fruit orchard would be the option to meet the growing demand of pharmaceutical industry as well as to conserve the different species without any additional land. There are many reports of growing medicinal plants in different cropping system but no report is available about their effect on plant and soil of sweet orange orchard particularly in laterite soil. The laterite soil is inherently acidic, porous, low water holding capacity and poor in organic and other nutrients content. Therefore, an investigation was taken up to know the effect of

medicinal plants intercropping on plant and soil of Mosambi.

### **MATERIALS AND METHODS**

The investigation was conducted in a private orchard at Jhargram, Paschim Medinipur during 2011-12. The intercropping trial was made on 8-year old Mosambi-sweet orange orchard planted at 5 m x 5 m spacing. The soil of the orchard was laterite having pH 5.0. The intercrops grown were Pudina (*Mentha spicata*), Bramhi (*Bacopa monniera*), Alovera (*Aloe vera*) Aswagandha (*Withania somnifera*) and Sarpagandha (*Rouwolfia serpentina*). Seedlings of different medicinal plants were placed one metre away from the trunk leaving an area of 3 sq. m around each tree. Pudina and Bramhi seedlings were planted 15 cm apart in a line and line to line distance was 30 cm (15 cm x 30 cm); Alovera suckers were planted at 45 cm x 45 cm; Aswagandha at 75 cm (plant to plant) x 75 cm (line to line) apart and sarpagandha were planted at 60 cm x 40 cm spacing. The medicinal plants were selected on the basis of their shallow root system and have great market demand for fresh consumption as well as to meet the requirement to Ayurveda or Unani medicine industry. The experiment was laid out in a randomized block design with four replications and three plants in each replication. Yearly fertilizer dose of 20 kg, cowdung manure, 300 g N, 100 g P<sub>2</sub>O<sub>5</sub> and 200 g K<sub>2</sub>O were given per sweet orange plant. The additional amount of

150 g N, 50 g P<sub>2</sub>O<sub>5</sub> and 100 g K<sub>2</sub>O / plant per year was applied for the intercrop. The intercrops were sown in October (2011) when there was sufficient soil moisture. The data of the number of fruits / plant was recorded at harvest (September, 2012), physico-chemical quality of fruit was analyzed by harvesting ten

representative mature fruits from each replication. NPK content of leaves of Mosambi was estimated in September (2012). Fertility status of soil of Mosambi orchard was also estimated from depth of 0-15 cm in September (2012) *i.e.*, one year after planting of intercrops plants.

**Table 1. Effect of medicinal plant inter cropping on fruit yield (by number) and physico-chemical characteristic of Mosambi fruits and yield of intercrops**

Treatment	Number of fruits/plant	Fruit weight (g)	Juice (%)	TSS (°B)	Acidity (%)	Total sugar (%)	Yield of intercrops (per sq. metre area (kg))
Mosambi + Pudina	194	146	51.7	8.0	0.41	5.7	1.60 (fresh leaf)
Mosambi + Bramhi	134	160	53.1	8.2	0.37	5.8	0.90 (fresh leaf)
Mosambi + Aloe vera	109	131	48.8	8.3	0.32	6.6	45.0 (hole plant)
Mosambi + Aswagandha	184	143	52.9	7.5	0.39	5.6	Most of the seedlings were dead
Mosambi + Sarpagandha	138	161	51.3	7.6	0.35	5.6	Most of the seedlings were dead
Mosambi (sole)	166	135	48.4	7.1	0.32	4.3	-
<b>C.D. at 5%</b>	<b>6.5</b>	<b>4.1</b>	<b>0.8</b>	<b>N.S.</b>	<b>N.S.</b>	<b>N.S.</b>	<b>-</b>

**Table 2. Effect of intercropping pH, N, P, K content in soil and foliar NPK status of Mosambi**

Treatment	Soil content 0.15 cm)					Foliar Content		
	pH	Organic carbon (%)	Nitrogen (%)	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O (%)	Nitrogen (%)	Phosphorus (%)	Potassium (%)
Mosambi + Pudina	5.8	0.78	0.078	0.008	0.004	2.23	0.44	1.75
Mosambi + Bramhi	4.9	0.46	0.056	0.013	0.005	1.78	0.36	1.48
Mosambi + Aloe vera	4.7	0.56	0.046	0.010	0.002	1.70	0.29	1.38
Mosambi + Aswagandha	5.3	0.58	0.058	0.011	0.004	2.47	0.34	1.57
Mosambi + Sarpagandha	4.9	0.50	0.050	0.012	0.003	1.80	0.42	1.42
Mosambi (sole)	4.5	0.56	0.056	0.011	0.003	1.95	0.40	1.87
<b>C.D. at 5%</b>	<b>0.02</b>	<b>0.04</b>	<b>0.002</b>	<b>N.S.</b>	<b>N.S.</b>	<b>0.05</b>	<b>N.S.</b>	<b>N.S.</b>

## RESULTS AND DISCUSSION

### Fruit yield of Mosambi

It was seen from the data in Table 1 that fruit production in Mosambi was significantly varied due to growing of different medicinal plants. Highest fruit number (194) was counted from the plans with Pudina followed by Aswagandha (184) and lowest from the plants with Aloevera (109). Minimum fruit number counted from the plants with Aloevera may be due to production of heavy biomass which in turn exhausted the soil from NPK as observed from the data in Table 2 where Mosambi soil under Aloevera showed lowest value of N, P and K with lowest foliar NPK status.

### Physico-chemical characteristics of Mosambi fruit

Fruit weight of Mosambi was significantly improved due to growing of medicinal plants and highest fruit weight (161 g) was measured from the plants with Sarpagandha closely followed by Bramhi (160 g) and lowest from the Aloevera. Fruit quality in terms of TSS acidity and total sugar content did not vary significantly due to growing of different medicinal plants and the result is close conformity with the findings of Ghosh and Pal (2010) in Mosambi sweet orange; Kanwar *et al.*, (1993) in citrus and mango.

### Effect on soil pH and N, P K

A beneficial effect of medicinal plants on orchard soil pH was noted (Table 2). Soil pH was improved in all the plots under medicinal plants as compared to sole plot (no inter cropped). Soil nitrogen content under Pudina was highest (0.078%) and lowest in Aloevera (0.046). Phosphorus and potassium content in the soil did not vary significantly in different inter cropped plots.

### Foliar N, P K status of Mosambi

Maximum foliar nitrogen content was estimated from the Mosambi plants under Pudina (2.23%) and minimum in Aloevera (1.70%) (Table 2). Higher nitrogen content in the Mosambi leaves indicate the beneficial effect while lower N content indicate the adverse effect of growing medicinal plants in Mosambi orchard. Phosphorus and potassium content in leaves of Mosambi did not vary significantly due to growing of different intercrops and the result was close conformity with the findings of Ghosh and Pal (2010).

### References

- Ghosh, S.N. and Pal, P.P. 2010. Effect of intercropping on plant and soil of Mosambi sweet orange orchard under rainfed conditions. *Indian J.Hort.*, **67**(2): 185-190.
- Kanwar, J. S., Brar, S.S. and Chopra. H.R. 1993. Status of intercropping of orchards in the Punjab. *Punjab Hort. J.*, **33**:109-15.