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Studies on Soil Test Based Fertilizer Application on Soil Fertility Status, Leaf Yield and Quality of Mulberry

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A study was under taken at CSRTI, Mysore to evaluate the effect of soil test based fertilizer recommendation over general recommendation and farmer's practice on improvement of soil fertility, leaf yield and quality of mulberry. It was observed that soil test based fertilizer/ manure application increased mulberry leaf yield besides retaining the soil health compared to the general recommendation and farmer's practice.

Key words: Soil test based fertilizer, soil fertility status farmer's practice, yield of mulberry

In the field of sericultural science, nutrition of silkworm is primary importance because cocoon production is influenced by nutritional value of food stuff *i.e.*, quality of mulberry leaves. A balance among the essential nutrients based on crop requirement is a prerequisite to ensure quality and yield of mulberry leaves. Soil testing plays a vital role in ensuring balanced nutrition to crops and also in preventing wasteful expenditure on the use of costly mineral fertilizers and is more commonly used for quick characterization of soil fertility status and making fertilizer recommendations with the objective to increase the soil productivity and efficiency of different nutrients. A comparison among farmer's practice, general fertilizer application and soil test based fertilizer application was made in order to study the impact of different practices on soil fertility status, leaf yield and quality of mulberry leaves.

Materials and Methods

The experiment was conducted at CSRTI, Mysore with V1 mulberry under Indo-Japanese system (150cm+90cm) x60cm. The soils of both fields had medium nitrogen (350-450kg/ha), low phosphorus (9.4 -13.2kg/ha) and high potash status (275-450 kg/ha) with pH 8.1. The treatment consisted of general recommendation vs soil test. (300: 120:120 of NPK with 20MT FYM/ha/yr as one treatment and another as fertilizer applied as per soil test i.e. 300:150:60 NPK with 25MT FYM/ha/yr.) Another study was conducted on Farmers practice vs soil test : with mulberry variety V1 at 3X3 spacing with Farmers' practice as (a.) Two bags(100kg) of ammonium sulphate, one bag (50kg) single super phosphate (per crop) and one tractor load of FYM/ acre/yr(i.e.100:80:0 NPK/ha/yr with 5MT FYM/ha/yr)
(b) One bag of 17:17:17 complex (per crop) and one tractor load of FYM as treatment (*i.e.*, 85:85:85 NPK/ ha/yr with 5MT FYM/ha/yr) and another as fertilizer applied as per soil test *i.e.* Nitrogen-300kg, Phosphorus- 120-150kg, Potassium -60-90kg/ha/ yr and FYM - 20-25MT/ha/yr. Soil samples were analyzed for initial soil fertility status. Mulberry yield was collected at the end of each crop at institute and farmers' field for ten crops (2 years). Soils were analysed for, pH, EC, organic carbon, available phosphorus and available potassium (Tandon, 1993). Leaves collected during each harvest after drying at 600°C, were powdered and analysed for total nitrogen, phosphorus and potassium (Tandon, 1993). Comparison was made using Student's 't' test for statistical analysis.

Results and Discussion

In soil, significant increase in organic carbon and phosphorus content and decrease in potassium content was noticed in treatment which received fertilizer based on soil test. Organic carbon and phosphorus content decreased while potassium increased in treatment which received general recommendation (Table-1). Similar increase in organic carbon and phosphorus content was noticed in farmer's field also which received fertilizer based on soil test (Table 2a). This might be due to balanced application of fertilizer based on the soil test values which takes into account fertility of soil as well as the plant requirement. Sharma *et.al*. (2002) reported the increase in organic carbon in all treatments except control. They opined that the lowest value of organic carbon in case of control may be due to poor crop growth that resulted in poor biomass addition in this treatment. Subbaswamy *et.al.*(1998) reported that most of the mulberry gardens of Karnataka, Andhra Pradesh and Tamilnadu have medium to high range potassium and application of 90kg/ha/yr potassium is adequate to maintain the quality, yield and potassium content in mulberry leaf. The decrease in potassium content in soil test plot may be due to low addition of potassium, as soil test value earlier indicated high potassium in soil. Suja *et.al.*(2004) also observed

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Table 1. Effect of general fertilizer recommendation and soil test based recommendation on physico-chemical properties of soil, the leaf yield and quality of mulberry at CSRTI, Mysore.

Sl. No	Parameter	At the end of Study		't' test
		General fertilizer recommendation	Soil test based recommendation	
1	pH	7.9	8.00	1.91NS
2	Electrical conductivity (mmhos/cm)	0.32	0.39	1.95NS
3	Organic Carbon (%)	0.58	0.68	2.83*
4	Available Phosphorus (kg/ha)	15.6	22.15	2.78*
5	Available Potassium (kg/ha)	386	292	2.81*
6	Yield (MT/ha)	45.60	46.25	1.97NS
7	Nitrogen (%)	2.12	3.45	3.02*
8	Phosphorus%	0.08	0.30	7.11**
9	Potassium (%)	2.10	1.31	2.82*

low potassium in soil after second year of experiment due to both uptake and leaching losses. Sadananda and Mohapatra (1973) also recorded similar results.

Significant increase in total nitrogen and phosphorus content while decreased potassium content in leaf noticed in soil test fertilizer applied treatment. However, the total nitrogen and phosphorus showed decreasing trend while potassium content increased in general fertilizer applied treatment (Table 1). Similar values for leaf nutrient were observed in farmer's field also, where fertilizers were applied as per soil test (Table 2b), this may be due to *ad hoc* application of fertilizer by farmers. Difference in leaf yield in two treatments was non significant in the experiment conducted at Institute (Table 1). However, increased yield was recorded in farmer's field where the fertilizers were applied as per the soil test (Table 2b).Soil test approach of fertilizer application takes into account the inherent fertility status of soil and sufficiency and deficiency of particular nutrient or nutrients while fixing the fertilizer dose of balanced plant nutrition for achieving the higher yields. Soil testing approach of fertilizer application was reported to establish a proper balance of nutrients and eliminate any nutrient deficiency in soil (Prasad and Prasad, 1994). On the other hand, application of fertilizers on *ad hoc* basis does not take into account the inherent fertility status of the soil and as such application of fertilizers might cause imbalance of nutrients in soil causing antagonistic nutrient interaction with resultant reduction in response of the crop to fertilizers. Superiority of fertilizer application based on soil test over *ad hoc* and general application was also reported by Verma *et.al*.(1987)

Table 2a. Effect of farmer's practice and soil test based recommendation on physico-chemical properties of soil

Sl. No	Parameter		At the end of Study		't' test
		Initial soil Status	Farmer's practice	Soil test based recommendation	
1	pH	7.4 - 8.00	7.5 - 7.9	7.4 - 8.00	1.98NS
2	Electrical conductivity (mmhos/cm)	0.15 - 0.56	0.30-0.55	0.32- 0.60	2.03NS
3	Organic Carbon (%)	0.35 - 0.49	0.35-0.55	0.54- 0.78	2.83*
4	Available Phosphorus (kg/ha)	8.60 -32.50	8.0-23.6	20.60- 32.60	2.79*
5	Available Potassium (kg/ha)	225 - 412	220 - 406	180 - 302	2.80*

Application of fertilizers based on soil test, not only helps in judicious application of chemical

Table 2b. Effect of farmers' practice and soil test based recommendation on the leaf yield and quality of mulberry at farmer's field.

Sl. No	Parameters	Farmer's practice	Soil test based recommendation	't' test
1	Yield (MT/ha)	22.5 - 30.60	42.60 - 43.65	2.97*
2	Leaf Nitrogen (%)	2.02 - 3.20	3.56 - 3.80	3.01*
3	Leaf Phosphorus%	0.05 - 0.20	0.28 - 0.31	7.18**
4	Leaf Potassium (%)	1.80 - 2.25	1.19 - 1.65	2.81*

* Significant at 5%

** Significant at 1%

fertilizers and organic manures but also helps in maintaining soil fertility and soil health in mulberry. Thus soil testing is an important diagnostic technique that should be adapted to test the soils prior to planting and subsequently at periodic intervals (once in two years). Interpretation of soil analysis data taking into consideration the crop need would help to move towards the best practice of scientific sericulture.

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