



RESEARCH ARTICLE

INFLUENCE OF ORGANIC NUTRIENTS AND HUMIC ACID ON FRUIT YIELD AND ALKALOID CONTENT OF THUDUVALAI (*SOLANUM TRILOBATUM* L.)

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ABSTRACT

An experiment was undertaken to analyze the influence of organic nutrients and humic acid on fruit yield and alkaloid content of Thudhuvalai (*Solanum trilobatum* L.) in randomized block design replicated thrice with 13 treatments. Four different organic manures such as Farm yard manure @15, 17.5 and 20 t ha<sup>-1</sup>, vermicompost @ 2.5, 2.75 and 3 t ha<sup>-1</sup>, Coir pith compost @ 2.5, 2.75 and 3 t ha<sup>-1</sup> t ha<sup>-1</sup>, Poultry manure @ 2.5, 2.75 and 3 t ha<sup>-1</sup> along with Humic acid @ 0.1, 0.2, 0.3 per cent as foliar spray were studied under. The fruit yield parameters viz., number of flowers, number of fruits, fruit yield and alkaloid content were registered to be the highest in the treatment with application of Vermicompost (3 t ha<sup>-1</sup>) + Humic acid @ 0.3 per cent. Among the treatments, Vermicompost (3 t ha<sup>-1</sup>) along in addition with humic acid @ 0.3 per cent were found to be the best in increasing the fruit yield and alkaloid content in Thudhuvalai.

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INTRODUCTION

India has been considered as the treasure house of the world's richest source of valuable medicinal plants. In the present context of back to nature in health care, it is relevant that these variable medicinal plants are not only preserved but also multiplied and their cultivation popularized to meet the ever increasing demand of the domestic industry and to exploit export market. Shift from wild collection to cultivation of medicinal plants will also ensure purity, authenticity and sustainability in the supply of raw herbal materials required for the herbal industry. Currently global market for herbal products which includes medicine, health supplements and herbal cosmetics is estimated to be around US\$ 62 million and India's share is only two percent. Hence attention of researches need to be focused on systematic research on commercial cultivation of medicinal plants as on alternative revenue generation for the Indian farmers for augmenting the supply of herbal raw material to the drug industry as well as for export. Among the medicinal plants, Thuduvalai has attracted medium scale cultivation in recent years. Thuduvalai (*Solanum trilobatum* L.) belongs to the family Solanaceae. This crop mostly has a thorny creeper with bluish violet flower, mostly grown in tropical areas. It is commonly available in south India and widely used in siddha system of medicine. The leaves and fruit contain more amount of carbohydrates, calcium, iron, phosphorous, protein, fat, crude fiber and minerals.

The active principle in this herb is solasodine, diosogenin, sobatum, solaine and tomatidine. It is used for cardiac, tonic, carminative, asthma, cough, anti-ulcerogenic activity, antibacterial, antibiotic and anticancer activity. Use of inorganic fertilizers has resulted in ecological imbalance with consequent ill effects to the soil. It has become imperative to use all the available sources of nutrients in a beneficial way to minimize fertilizer use and at the same time to sustain soil fertility and crop productivity on a long term basis. Kalyanasundaram et al. (2008). In view of these facts, a study was conducted to find out the organic manures and foliar spray of humic acid on the fruit yield and alkaloid content of Thuduvalai.

MATERIALS AND METHODS

Field experiments were conducted at medicinal plants unit, Department of horticulture, Faculty of agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu. The experiments were laid out in a randomized block design with thirteen treatments replicated thrice. The data were subjected to statistical analysis as suggested by Panse and Sukhatme, 1985. The treatment schedule was presented in Table 1. The experimental plot was thoroughly ploughed and the clods were crushed, weeds were removed later than bunds and channels were prepared. Thirty nine plots are formed with a plot size of 1.30 x 1.90 m were formed. Uniform and healthy seedlings were transplanted at a spacing of 45 cm x 45 cm to the main

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field. The recommended dose of inorganic nutrients were applied in the form of nitrogen was applied as urea; phosphorus g plot<sup>-1</sup> and estimated fruit yield 1232.31kg ha<sup>-1</sup> recorded in the best treatment was due to availability of nutrients present in

**Table.1. Treatments details with their symbol**

S. no	Treatments	symbol
1	Farm yard Manure (15 t ha <sup>-1</sup> ) + Humic Acid @ 0.1% foliar spray	T <sub>1</sub>
2	Farm yard Manure (20 t ha <sup>-1</sup> ) + Humic Acid @ 0.2% foliar spray	T <sub>2</sub>
3	Farm yard Manure (25 t ha <sup>-1</sup> ) + Humic Acid @ 0.3% foliar spray	T <sub>3</sub>
4	Vermicompost (2.5 t ha <sup>-1</sup> ) + Humic Acid @ 0.1% foliar spray	T <sub>4</sub>
5	Vermicompost (2.75 t ha <sup>-1</sup> ) + Humic Acid @ 0.2% foliar spray	T <sub>5</sub>
6	Vermicompost (3 t ha <sup>-1</sup> ) + Humic Acid @ 0.3% foliar spray	T <sub>6</sub>
7	Coirpith compost (2.5 t ha <sup>-1</sup> ) + Humic Acid @ 0.1% foliar spray	T <sub>7</sub>
8	Coirpith compost (2.75 t ha <sup>-1</sup> ) + Humic Acid @ 0.2% foliar spray	T <sub>8</sub>
9	Coirpith compost (3 t ha <sup>-1</sup> ) + Humic Acid @ 0.3% foliar spray	T <sub>9</sub>
10	Pressmud (2.5 t ha <sup>-1</sup> ) + Humic Acid @ 0.1% foliar spray	T <sub>10</sub>
11	Pressmud (2.75 t ha <sup>-1</sup> ) + Humic Acid @ 0.2% foliar spray	T <sub>11</sub>
12	Pressmud (3 t ha <sup>-1</sup> ) + Humic Acid @ 0.3% foliar spray	T <sub>12</sub>
13	Control	T <sub>13</sub>

**Table 2. Influence of organic nutrients and humic acid on fruit yield and Alkaloid content of Thuduvulai (*Solanum trilobatum* L.)**

Treatments	Number of fruits plant <sup>-1</sup>	Fruit yield (g plant <sup>-1</sup> )	Fruit yield (g plot <sup>-1</sup> )	Estimated fruit yield (kg ha <sup>-1</sup> )	Dry matter production	Chlorophyll content index	Solasodine content
T <sub>1</sub>	70.25	56.59	370.24	1130.83	175.28	39.99	1.61
T <sub>2</sub>	46.62	38.75	244.16	879.48	164.28	27.46	1.56
T <sub>3</sub>	75.63	60.74	395.10	1187.75	189.03	42.59	1.62
T <sub>4</sub>	65.97	53.41	350.26	1086.07	182.11	37.58	1.60
T <sub>5</sub>	56.31	46.04	305.49	983.66	174.49	31.63	1.58
T <sub>6</sub>	79.75	63.93	413.75	1232.31	193.24	44.68	1.63
T <sub>7</sub>	52.12	42.88	284.53	938.97	172.03	31.31	1.57
T <sub>8</sub>	42.33	35.56	223.44	834.59	162.26	25.25	1.55
T <sub>9</sub>	60.57	49.21	325.53	1027.79	175.47	34.70	1.59
T <sub>10</sub>	74.61	59.72	389.89	1175.06	186.51	41.31	1.62
T <sub>11</sub>	51.01	41.89	264.62	924.44	169.41	30.55	1.57
T <sub>12</sub>	61.66	50.30	330.83	1041.21	177.87	35.53	1.59
T <sub>13</sub>	38.06	32.43	203.47	789.70	158.74	21.27	1.44
SED	1.41	0.99	5.64	9.63	1.07	0.69	0.0030
CD (p=0.05)	2.86	2.03	11.47	19.94	2.14	1.32	0.0061

was applied as a single super phosphate, while potassium was applied as muriate of potash. Half dose of nitrogen, full dose of phosphorus and potassium were applied in 90 days after planting. As per the treatment application of organic manures viz., Farmyard manure, vermicompost, coirpith compost and poultry manure were applied before planting. The required quantity of Humic acid were taken, dissolve in water and given as foliar application as per the treatment. This foliar spray was given at 60, 90 and 120 days after transplanting. Plants were irrigated whenever necessary. Five plants are randomly selected from each plot were tagged for the purpose of recording observations on growth and yield parameters. Data of three replications were averaged and recorded.

## RESULTS AND DISCUSSION

All the parameters were significantly due to various organic manures and humic acid @ 0.3 per cent foliar spray at 60, 90 and 120 DAT ay of. The Table 2 shows the effects of nutrients which may be attributed to the fact that under increasing fertility levels by the application of organic nutrients there would be luxuriant growth of the plant, which lead to production of more number of branches, leaves and ultimately resulting in higher fruit yield ha<sup>-1</sup>. The results are similar to the findings of Sendhilnathan and Karuppaiah (2008) in periwinkle. Vermicompost improve the soil physical condition and promotes organic matter, which in turn, produce organic acids, which inhibits particularly IAA oxidase enzyme, resulting in enhancing the promotive effect of auxin-IAA, which has direct effect on plant growth, herbage yield (Umehsa et al., 2010). The reasons for maximum number of number of fruits 79.75 plant<sup>-1</sup>, fruit yield 63.93 g plant<sup>-1</sup>, fruit yield 413.75

organic manure and foliar spray of humic acid in which activated the vegetative development of plants and quick nitrogen uptake by the plants vigorously which leads to better performance. Similar findings were also reported by Sailaja et al., (2010) and Jyoti Nema et al., (2008) in medicinal coleus. It can be interfered from the data tabulated in Table (2) that there were significant differences among the various treatments with regard to dry matter production, chlorophyll content index and solasodine content. Incorporation of vermicompost promotes the lush growth of plants which may be due to the presence of plant growth promoters like auxins and cytokinins in vermicompost which are responsible for cell division and cell elongation. This was due to the positive role played by nutrients on growth and metabolic of plants, which increased the accumulation of dry matter content in the plant as reported by Anilkumar et al., (2007). Organic might have provided a continuous supply of nutrients and might have enabled the leaf area duration to extend, thus providing an opportunity for the plants to increase the photosynthetic rates, which could have led to the higher accumulation of dry matter and chlorophyll content. Similar findings were also reported by Manivannan and Kudiyaarsi (2010) in *Gymnema*. The highest solasodine content (1.63 %) was recorded in T<sub>6</sub> and it was followed by T<sub>3</sub> which registered a value of 1.62%. The solasodine content was minimum in the treatment T<sub>13</sub> (control) which was registered 1.44 % respectively. The possible reasons for the acceleration in solasodine content due to application of optimum dose of fertilizers might be attributed to the higher dry matter which would have invariably determined the alkaloid content as it required metabolites to the filling sink. Further, the enhanced dry matter production would also have invariably determined the alkaloid content. Higher availability and uptake of nutrients

would have enhanced the higher photosynthetic activity and accumulation of photosynthates at the sink, which in turn, correspond to the higher amounts of alkaloids. Similar findings were also reported by Kalyanasundaram *et al.* (2008) in Sweet flag, Padmapriya *et al.* (2010) in *Gymnema sylvestre*. Based on the present investigation, it can be concluded that the application of Vermicompost (3 t ha<sup>-1</sup>) along with humic acid 0.3 per cent foliar spray was found to be beneficial in improving the fruit yield and alkaloid content of Thudhuvalai.

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