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Effect of organic amendments and fertigation on growth, yield of watermelon (*Citrullus lanatus* Thunb.) and soil of physico-chemical properties of *Theri* land (Red sand dune) of southern Tamil Nadu

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Abstract

The present investigation was carried out at Thirumaraiyur village, Sattankulam taluk, Thoothukudi district to study the effect of organic amendments with recommended dose of fertilizers on growth and yield of watermelon and physico-chemical properties of *Theri* soil (red sand dunes) during the year 2017 and 2018. The experiment was laid out in Randomized Block Design with Factorial concept (FRBD). In all there were three factors as organic amendments with 6 treatment combinations for each factor, which were assigned at random in each plots with three replications. The recommended dose of fertilizers in treatments were two levels as 75 and 100 per cent. Among the treatment combinations, the tank silt application @ 100 t ha⁻¹ with 100 per cent recommended fertilizer as 200:100:100 kg of NPK ha⁻¹ through fertigation at 7 days interval (A1N5) produced maximum number of branches (10.67), longest vine (362.0 cm), number of fruits plant⁻¹ (2.57), weight of fruit (5.27 kg), fruit yield (68.77 t ha⁻¹), gross return (₹4,09,320/ha), B:C ratio (2.45) and improved the physico-chemical properties viz., particle density (2.45 Mg m⁻³), bulk density (1.31 Mg m⁻³), per cent pore space (48.33%), pH (6.58), EC (0.35 dSm⁻¹) and organic carbon content (0.52%).

Keywords: Organic amendments, fertigation, yield, watermelon, physico-chemical properties and *Theri* land,

Introduction

Watermelon (*Citrullus lanatus* Thunb.) is one of the important vegetable crops grown extensively in India. It is a major tropical crop in south Indian states of Karnataka, Andhra Pradesh and Tamil Nadu. India is the second largest producer of watermelon fruit among the Asian countries accounting 2.48 million tonnes from 1.01 lakh hectare with the productivity of 24.58 t ha⁻¹ (HSD, 2017) [11]. In Tamil Nadu, the production is 1.63 lakh tonnes from an area of 6930 ha with the average productivity of 23.52 t ha (DES, 2017) [7].

The *Theri* lands (red sand dunes) are one of the major wastelands in Tirunelveli and Thoothukudi districts of Tamil Nadu. These *theries* are located (77° 49' 44" to 78° 28' 22" E and from 8° 15' 13" to 9° 11' 0" N) to an extent of 20,171 ha (Jawahar *et al.*, 1999) [12]. The soils have low nutrient status, low water holding capacity, low organic carbon content and are susceptible to high wind erosion (Manikandan and Subramanian, 2010) [18]. The mean annual rainfall of the study area is between 610 and 700 mm.

A soil amendment is any material added to a soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration and structure. In *theri* soils (red sand dune) organic amendments like tank silt, FYM, composted coir pith (CCP) etc. improve the physico-chemical properties of soil. Many organic amendments contain plant nutrients and act as organic fertilizers. Monitoring soil and plant nutrient status is an essential to ensure maximum crop productivity. It is well known that organic amendments and inorganic fertilizers are essential to increase the productivity of crops and fertility of soils.

The fertigation technology is the possible way to improve the crop production and soil productivity for profitable farming in constrained *Theri* soil. Fertigation within the rhizosphere

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matches with the physiological needs of the crop viz. root development, vegetative growth, flower and fruit development. Scientific information on fertigation in theri land (red sand dune), especially in watermelon, is very scanty. Hence, the present field experiment was conducted to determine influence of organic amendments combined with inorganic fertilizers through fertigation on growth, fruit yield of watermelon and soil fertility of *Theri* land.

Materials and methods

The experiment was conducted during kharif – winter seasons of 2016-2017 and 2017-2018 at Thirumaraiyur village, Sattankulam taluk, Thoothukudi district, Tamil Nadu. The sand dune ecosystem formed in isomegathemic and ustic regime from geogenic sand deposit under a semi arid climate. Soil at the experimental site was red sandy, with organic carbon 0.12%, electrical conductivity 0.13 dS/m, neutral pH (6.66), low available N (93.7 kg ha⁻¹), low available P (8.2 kg ha⁻¹) and low available K (88.5 kg ha⁻¹). Seeds of watermelon FI hybrid Suprit were sown in rows of 2m width, with 60 cm plant-to-plant spacing, during the first week of November in both years. The experiment was laid out in Factorial Randomized Block Design (FRBD) with six treatments and three replications. Factor as three organic amendments viz., tank silt @ 100 t ha⁻¹, composted coir pith @ 12.5 t ha⁻¹ and farm yard manure @ 20 t ha⁻¹ were applied as basal doses before sowing. The treatments were T₁- 75% recommended dose of fertilizers (RDF) (150:75:75 kg of NPK ha⁻¹) through soil application; T₂- 100% recommended dose of fertilizers (RDF) (200:100:100 kg of NPK ha⁻¹) through soil application; T₃- 75% recommended dose of fertilizers (RDF) (150:75:75 kg of NPK ha⁻¹) through fertigation at 7 days interval; T₄- 75% recommended dose of fertilizers (RDF) (150:75:75 kg of NPK ha⁻¹) through fertigation at 15 days interval; T₅- 100% recommended dose of fertilizers (RDF) (200:100:100 kg of NPK ha⁻¹) through fertigation at 7 days interval; T₆- 100% recommended dose of fertilizers (RDF) (200:100:100 kg of NPK ha⁻¹) through fertigation at 15 days interval.

Conventional fertilizers used in the experiment were urea, single super phosphate, di-ammonium phosphate and muriate of potash; whereas, 19 each of N, P₂O₅, K₂O and KNO₃ used as the source of water soluble fertilizer. Fertilizer was applied at 7 and 15 days intervals through fertigation treatments. Soil treatments received the entire P₂O₅ and K₂O at sowing and N in two splits as basal during sowing and at 30 DAS. Irrigation was given through drippers to all the treatments. Growth observations were taken 60 days after sowing. All agronomic and plant protection measures were adopted as per the guide lines of crop production guide for Tamil Nadu (CPG, TNAU, 2015)^[6]. The crop was harvested at 90 to 100 days after sowing, at fruit maturity as indicated by a dull sound of the fruit, or, when the fruit tendril turned to straw colour, or when the fruit base turned creamy-yellow in colour. The nutrient content and uptake by plants were analysed through prescribed laboratory procedures. Soil samples were analysed for organic carbon following Walkley and Black (1934)^[29],

alkaline permanganate oxidizable N as described by Subbiah and Asija (1956)^[25], 0.5 M NaHCO₃- extractable P (Olsen *et al.*, 1954)^[19] and available potassium by flame photometry with extracting 1 N NH₄OAc (Schollenberger and Simon, 1945)^[23]. Observations on crop growth, yield, yield parameters and quality were recorded and statistically analyzed as per Gomez and Gomez (1984)^[9]. Economics of water melon cultivation as influenced by chemical fertilizer, drip fertigation and management practices were calculated by considering the prevailing market price of fruit and inputs used.

Results and discussion

Growth and yield attributes

Effect of amendments

The growth and yield attributing characters such as number of branches, number of fruits plant⁻¹ and fruit yield were significantly influenced by various amendments.

Among the three amendments, the application of tank silt at the rate of 100 t ha⁻¹ significantly registered more number of branches (8.72), more fruits (2.22) and higher fruit yield (55.49 t ha⁻¹) followed by composted coir pith applied at the rate of 12.5 t ha⁻¹, which registered higher number of branches (8.22), number of fruits (2.10) and fruit yield (50.43 t ha⁻¹). Tank silt contains all nutrients which is responsible for the enhanced growth and yield attributes in watermelon. Tanwar *et al.*, (2003)^[26] and Annadurai *et al.* (2005)^[2] noticed similar results that tank silt amendment enhanced the productivity of crops like sunflower, groundnut, cotton, sugarcane, soybean, gingili, tomato, cotton, onion, brinjal, turnip, cucumber, chilli etc.

Effect of nutrients

The growth and yield attributes of watermelon viz., number of branches, vine length, number of fruits and fruit weight were significantly influenced by the application of recommended dose of NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (N5) (Table 1) significantly registered maximum number of branches (10.0), longest vine (347.89 cm), highest number of fruits plant⁻¹ (2.38), more weight of fruit (5.33 kg) and higher fruit yield (63.32 t/ha), followed by the application of 75 per cent NPK through fertigation at 7 days interval (N3) with the number of fruit (9.0), long vine (339.22 cm), more number of fruits plant⁻¹ (2.28), weight of fruit (5.04 kg) and higher fruit yield (58.38 t ha⁻¹). However, among the two levels of NPK without fertigation, the minimum number of branches (6.78), shortest vein length (268.44 cm), minimum number of fruits per plant (1.75), lowest fruit weight (4.29 kg) and minimum fruit yield (38.36 t ha⁻¹) were found in treatment applied with 75 per cent NPK ha⁻¹ through soil application (T₁). The present finding was supported by Kadam *et al.*, (2009)^[15], Shyamm *et al.*, (2009)^[24]. The levels of tank silt at the rate of 20 t ha⁻¹ recorded higher number of pods, pod yield, haulm yield and shelling percentage in case of groundnut crop (Binitha, 2006)^[4] and (Sajitha *et al.*, 2016)^[22].

Table 1: Effect of organic amendment with fertigation on growth and yield of hybrid watermelon

Treatments	No. of branches plant ⁻¹	Vine length (cm)	No. of fruits plant ⁻¹	Average fruit wt. (kg)	Fruit yield (t ha ⁻¹)
	Main factor (Amendments)				
(A1) Tank silt @ 100 t ha ⁻¹	8.72	308.16	2.22	4.76	55.49
(A2) Composted coir pith @ 12.5 t ha ⁻¹	8.22	312.11	2.10	4.71	50.43
(A3) Farm yard manure (FYM) @ 20 t ha ⁻¹	7.55	300.89	2.02	4.87	49.40
Mean	8.17	307.05	2.12	4.78	51.77
SEd	0.215	11.36	0.040	0.094	0.304

CD (P=0.05)	0.597	NS	0.112	NS	0.846
Main factor (Nutrients)					
N ₁ - 75% RDF (Soil application)	6.78	268.44	1.75	4.29	38.36
N ₂ -100% RDF (Soil application)	7.22	297.11	2.00	4.54	45.54
N ₃ -75% RDE at 7 days interval (Fertigation)	9.00	339.22	2.28	5.04	58.38
N ₄ -75% RDF at 15 days interval (Fertigation)	7.67	279.33	2.10	4.71	50.80
N ₅ -100% RDF at 7 days interval (Fertigation)	10.00	347.89	2.38	5.33	63.32
N ₆ -100% RDF at 15 days interval (Fertigation)	8.33	310.33	2.17	4.78	54.22
Mean	8.17	307.05	2.12	4.78	51.77
SEd	0.28	20.18	0.081	0.080	0.245
CD (P=0.05)	0.57	41.21	0.165	0.164	0.501
Interaction					
A1N1	7.33	275.67	1.83	4.41	41.12
A1N2	8.00	305.00	2.03	4.54	47.85
A1N3	9.33	351.00	2.40	4.86	62.76
A1N4	8.33	228.67	2.20	4.69	54.25
A1N5	10.67	362.00	2.57	5.27	68.77
A1N6	8.67	326.67	2.30	4.80	58.19
A2N1	6.67	270.33	1.77	4.22	37.85
A2N2	7.33	298.33	2.03	4.50	44.40
A2N3	9.00	338.33	2.27	5.07	56.48
A2N4	7.67	308.00	2.10	4.49	49.33
A2N5	10.33	350.00	2.33	5.29	61.73
A2N6	8.33	307.67	2.13	4.74	52.78
A3N1	6.33	259.33	1.67	4.26	36.11
A3N2	6.33	288.00	1.93	4.58	44.38
A3N3	8.67	328.33	2.20	5.20	55.93
A3N4	7.00	301.33	2.00	4.94	48.83
A3N5	9.00	331.67	2.27	5.42	59.47
A3N6	8.00	296.67	2.07	4.81	51.69
Mean	8.17	307.05	2.12	4.78	51.77
A@N					
SEd	0.494	33.86	0.134	0.158	0.493
CD (P=0.05)	NS	NS	NS	NS	1.145
N@A					
SEd	0.487	34.95	0.140	0.138	0.425
CD (P=0.05)	NS	NS	NS	NS	0.868

Combined effect of amendment and nutrients

The interaction of amendments with fertilizers played an important role in increasing the production of watermelon. Though the interaction effect was non significant for all except fruit yield more number of branches (10.67), longer vine (362 cm), maximum number of fruits plant⁻¹ (2.57), heavy weight of fruit (5.27 kg) and maximum fruit yield (68.77 t/ha) were registered by the application of tank silt @ 100 t ha⁻¹ along with 100 per cent NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (A1N5) followed by the application of composted coir pith @ 12.5 t ha⁻¹ with 100 per cent NPK through fertigation at 7 days interval (A2N5) which recorded 10.33 number of branches, 350 cm longer vine, 2.33 number of fruits plant⁻¹, 5.29 kg of fruit and higher and 61.73 t ha⁻¹ of fruit yield. Among the two levels of NPK without fertigation the less number of branches (6.33), short vein length (259.33 cm), low number of fruits plant⁻¹ (1.67), low fruit weight (4.26 kg) and minimum fruit yield (36.11 t ha⁻¹) were found in treatment applied with FYM @ 20 t ha⁻¹ with 75 per cent NPK ha⁻¹ through soil application (A3N1). The result clearly indicated that only inorganic nutrients can not alone maintain instant flow of nutrients in increasing crop yield. There is a need to use organic and chemical fertilizers in combination with drip fertigation so as to increase crop productivity. The increase in the fruit yield might be due to the application of organic amendments in combination with inorganic fertilizers. This result is supported by the earlier findings of Ramesh (2001)^[20], Krishnappa *et al.*, (2005)^[17] and Kacha *et al.*, (2009)^[13].

Physico-chemical properties

Effect of amendments

Among the three amendments, the application of tank silt at the rate of 100 t ha⁻¹ significantly registered the improved physical properties *viz.*, particle density, bulk density (2.49 and 1.35 Mg m⁻³) and pore space (45.46%) followed by composted coir pith applied at the rate of 12.5 t ha⁻¹, which registered the particle density, bulk density (2.53 and 1.37 Mg m⁻³) and pore space (44.33%). Similar trend was observed for the chemical properties *viz.*, pH (6.46), EC (0.28 dSm⁻¹) and organic carbon (0.38%) in the treatment applied with tank silt at the rate of 100 t ha⁻¹. Tank silt contains high clay and silt which is responsible for the improvement of physico-chemical properties of the soil of *theri* land. Annadurai *et al.* (2005)^[2] noticed similar results that tank silt amendment enhanced the physico-chemical properties through the amendments of organic manure in the *theri* soil.

Effect of nutrients

The physico-chemical properties *viz.*, particle density, bulk density, per cent pore space, pH, EC and organic carbon were significantly influenced by the application of recommended dose of NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (N5) (Table 2) significantly registered improved physical properties *viz.*, particle density, bulk density (2.48 and 1.33 Mg m⁻³) and pore space (46.60%) followed by the application of 75 per cent NPK through fertigation at 7 days interval (N3) with the particle density, bulk density (2.51 and 1.35 Mg m⁻³) and pore space (45.68%). The chemical

characteristics *viz.*, pH (6.49), EC (0.31 dSm⁻¹) and organic carbon (0.39%) were also significantly influenced by the application of recommended dose of NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (N5). However, among the two levels of NPK without fertigation, the minimum improvement of physico-chemical properties *viz.*, particle density and bulk density (2.55 and 1.38 Mg m⁻³), per

cent pore space (42.13%), pH (6.35) EC (0.24 dSm⁻¹) and organic carbon (0.24) were observed in treatment applied with 75 per cent NPK ha⁻¹ through soil application (T₁). The present finding was supported by Andrade Junior *et al.*, (2009) [1] and Vasantha kumar *et al.*, (2012) [28]. The levels of tank silt at the rate of 20 t ha⁻¹ recorded influenced the physico-chemical properties. (Battilani *et al.*, 2006) [3].

Table 2: Effect of organic amendment with fertigation on physico-chemical properties of soil

Treatments	Physical properties			Chemical properties		
	Particle density (Mg m ⁻³)	Bulk density (Mg m ⁻³)	Pore space (%)	pH	EC (dSm ⁻¹)	Organic carbon (%)
Main factor (Amendments)						
(A1) Tank silt @ 100 t ha ⁻¹	2.49	1.35	45.46	6.46	0.32	0.38
(A2) Composted coir pith @ 12.5 t ha ⁻¹	2.54	1.37	44.33	6.37	0.26	0.27
(A3) Farm yard manure (FYM) @ 20 t ha ⁻¹	2.53	1.38	43.67	6.38	0.28	0.25
Mean	2.52	1.37	44.49	6.41	0.29	0.30
SEd	0.0014	0.0032	0.144	0.001	0.004	0.001
CD (P=0.05)	0.0040	0.0091	0.401	0.002	0.012	0.004
Main factor (Nutrients)						
N ₁ - 75% RDF (Soil application)	2.55	1.38	42.13	6.35	0.24	0.24
N ₂ -100% RDF (Soil application)	2.53	1.37	43.30	6.38	0.28	0.26
N ₃ -75% RDE at 7 days interval (Fertigation)	2.51	1.35	45.68	6.48	0.31	0.34
N ₄ -75% RDF at 15 days interval (Fertigation)	2.51	1.37	44.81	6.37	0.29	0.29
N ₅ -100% RDF at 7 days interval (Fertigation)	2.48	1.33	46.60	6.49	0.31	0.39
N ₆ -100% RDF at 15 days interval (Fertigation)	2.54	1.37	44.41	6.35	0.29	0.27
Mean	2.52	1.37	44.49	6.41	0.29	0.30
SEd	0.0015	0.0053	0.22	0.002	0.006	0.002
CD (P=0.05)	0.0031	0.011	0.45	0.003	0.013	0.004
Interaction						
A1N1	2.55	1.38	42.20	6.38	0.26	0.29
A1N2	2.50	1.36	44.30	6.43	0.32	0.32
A1N3	2.45	1.32	47.06	6.55	0.35	0.43
A1N4	2.47	1.35	44.97	6.45	0.34	0.36
A1N5	2.45	1.31	48.33	6.58	0.35	0.52
A1N6	2.53	1.37	45.90	6.36	0.33	0.34
A2N1	2.56	1.36	43.00	6.35	0.22	0.22
A2N2	2.57	1.37	43.23	6.38	0.23	0.24
A2N3	2.57	1.35	46.00	6.43	0.28	0.32
A2N4	2.51	1.39	44.43	6.25	0.25	0.24
A2N5	2.50	1.34	46.10	6.48	0.29	0.35
A2N6	2.54	1.36	43.27	6.33	0.28	0.23
A3N1	2.55	1.38	41.20	6.32	0.26	0.21
A3N2	2.53	1.38	42.37	6.32	0.31	0.23
A3N3	2.52	1.37	43.97	6.46	0.31	0.28
A3N4	2.55	1.39	45.03	6.40	0.28	0.26
A3N5	2.50	1.35	45.37	6.42	0.29	0.30
A3N6	2.55	1.38	44.07	6.35	0.26	0.24
Mean	2.52	1.37	44.49	6.41	0.29	0.30
A@N						
SEd	0.0028	0.009	0.38	0.003	0.011	0.003
CD (P=0.05)	0.0062	0.019	0.81	0.006	0.024	0.008
N@A						
SEd	0.0026	0.009	0.38	0.003	0.011	0.003
CD (P=0.05)	0.0054	0.019	0.78	0.006	0.023	0.007

Combined effect of amendment and nutrients

The interaction of amendments with fertilizers played an important role in improving the physico-chemical properties of the *Theri* soil (red sand dune). Though the interaction effect was significant for all physico-chemical properties of the *theri* land. The least values of particle density and bulk density (2.45 and 1.31 Mg m⁻³), highest value of per cent pore space (48.33%), increased pH (6.58), EC (0.35 dSm⁻¹) and organic carbon content (0.52%) were registered by the application of tank silt @ 100 t ha⁻¹ along with 100 per cent

NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (A1N5) followed by the application of composted coir pith @ 12.5 t ha⁻¹ with 100 per cent NPK through fertigation at 7 days interval (A2N5) which recorded particle density and bulk density (2.50 and 1.34 Mg m⁻³), per cent pore space (46.10%), pH (6.48), EC (0.29 dSm⁻¹) and organic carbon content (0.35%). Among the two levels of NPK without fertigation the minimum improvement of physico-chemical properties *viz.*, particle density and bulk density (2.55 and 1.38 Mg m⁻³), per cent pore space (41.20%), pH

(6.32) EC (0.26 dSm^{-1}) and organic carbon (0.21) were found in treatment applied with FYM @ 20 t ha^{-1} with 75 per cent NPK ha^{-1} through soil application (A3N1). The result clearly indicated that only inorganic nutrients can not alone maintain physico-chemical properties. There is a need to use organic and chemical fertilizers in combination with drip fertigation so as to improve the physico-chemical properties of red sand dune. The improvement of soil characteristics might be due to the application of organic amendments in combination with

inorganic fertilizers. This result is supported by the earlier findings of Ganeshappa *et al.*, (2000) [8], Kadam and Kathikeyan (2006) [14], Castellanos *et al.*, (2012) [5]

Economics

Details on economics and benefit:cost ratio in watermelon F1 hybrid Suprit in relation to various organic amendments with inorganic fertilizers with and without fertigation treatments tested are presented in Table 3.

Table 3: Effect of organic amendment with inorganic fertilizers on economics of hybrid watermelon

Treatments	Cost of cultivation (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	Benefit: cost ratio
Main factor (Amendments)				
(A1) Tank silt @ 100 t ha^{-1}	1,01,729	3,00,417	1,98,795	1.88
(A2) Composted coir pith @ 12.5 t ha^{-1}	1,21,618	2,74,307	1,52,688	2.20
(A3) Farm yard manure (FYM) @ 20 t ha^{-1}	1,11,618	2,66,973	1,55,355	2.33
Mean	1,11,655	2,80,565	1,68,946	2.14
SEd	90.72	10.88	8.16	0.004
CD (P=0.05)	251.88	30.23	22.67	0.010
Main factor (Nutrients)				
N ₁ - 75% RDF (Soil application)	82,820	1,51,300	68,493	1.52
N ₂ -100% RDF (Soil application)	93,972	1,81,053	87,303	1.62
N ₃ -75% RDE at 7 days interval (Fertigation)	1,22,820	3,48,680	2,25,860	2.52
N ₄ -75% RDF at 15 days interval (Fertigation)	1,17,820	3,02,760	1,84,940	2.26
N ₅ -100% RDF at 7 days interval (Fertigation)	1,28,750	3,76,860	2,48,090	2.61
N ₆ -100% RDF at 15 days interval (Fertigation)	1,23,750	3,22,740	1,98,990	2.29
Mean	1,11,655	2,80,565	1,68,946	2.14
SEd	128.30	11.41	11.55	0.003
CD (P=0.05)	262.04	23.32	23.58	0.006
Interaction				
A1N1	72,820	1,62,640	89,820	1.23
A1N2	83,750	1,88,560	1,04,810	1.25
A1N3	1,12,820	3,73,380	2,60,560	2.31
A1N4	1,07,820	3,22,440	2,14,620	1.99
A1N5	1,18,750	4,09,320	2,90,570	2.45
A1N6	1,13,750	3,46,080	2,32,330	2.04
A2N1	92,820	1,48,200	55,380	1.60
A2N2	1,03,750	1,79,200	75,450	1.73
A2N3	1,32,820	3,41,580	2,08,760	2.57
A2N4	1,27,820	2,95,140	1,67,320	2.31
A2N5	1,38,750	3,69,540	2,30,790	2.66
A2N6	1,33,750	3,12,180	1,78,430	2.33
A3N1	82,820	1,43,040	60,220	1.73
A3N2	93,750	1,75,400	81,650	1.87
A3N3	1,22,820	3,31,080	2,08,260	2.69
A3N4	1,17,820	2,90,700	1,72,880	2.47
A3N5	1,28,750	3,51,660	2,22,910	2.73
A3N6	1,23,750	3,09,960	1,86,210	2.50
Mean	1,11,655	2,80,565	2,80,565	2.14
A@N				
SEd	222.22	21.08	20.00	0.006
CD (P=0.05)	NS	47.18	43.29	0.014
N@A				
SEd	222.00	19.78	20.00	0.005
CD (P=0.05)	NS	40.39	40.84	0.010

Effect of amendments

The application of tank silt at the rate of 100 t ha^{-1} (A1) significantly influenced economics of watermelon with the return (₹1,98,795) and benefit:cost ratio (1.88) followed by application of FYM @ 20 t ha^{-1} (A3) which recorded the higher net return (₹1,55,355) and benefit:cost ratio (2.33). This might be due to the cheap cost of manures reduced the cost of cultivation and increased the net return.

Effect of nutrients

The highest net return (₹2,48,090) with the benefit:cost ratio (2.61) were obtained by the application of 100 per cent NPK through fertigation at 7 days interval (N5). The next highest net return (₹2,25,860) with the benefit:cost ratio (2.52) were recorded for the treatment which received 75 per cent NPK as 150:75:75 kg ha^{-1} through fertigation at 7 days interval (N3). The lowest net return (₹68,493) with the benefit: cost ratio

(1.52) were recorded in the treatment received 75 per cent NPK as 150:75:75 kg ha⁻¹ through soil application (N1).

Combined effect of amendments and nutrients

The application of tank silt @ 100 t ha⁻¹ with 100 per cent NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (A1N5) fetched significantly the highest net returns (₹2,90,570 and benefit : cost ratio (2.45) over the rest of the treatments. The better treatment was application of tank silt @ 100 t/ha with 75 per cent NPK as 150:75:75 kg ha⁻¹ through fertigation at 15 days interval (A1N3), which fetched a net return of ₹ 2,60, 560 and benefit: cost ratio of 2.31. The application of CCP@ 12.5 t ha⁻¹ with 100 per cent NPK as 200:100:100 kg ha⁻¹ through fertigation at 7days interval (A2N5) recorded the net return of ₹ 2,30, 790 and benefit : cost ratio of 2.66 which was higher than the application of FYM @ 20 t ha⁻¹ with 100 per cent NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (A3N5) by fetching the net return of ₹ 2,22, 910 and benefit : cost ratio of 2.73. This might be due to increased higher productivity and lower cost of cultivation. The variation in the cost of cultivation under different treatments were recorded due to variable costs of fertilizers. Fruit yield was the major factor, which caused differences in net return. These results are in close conformity with the findings of Umamaheswarappa *et al.*, (2005) [27] Kumar *et al.*, (2007) [16] and Sajitha (2013) [13].

From the above data It can be concluded that application of tank silt @ 100 t ha⁻¹ with 100 per cent NPK as 200:100:100 kg ha⁻¹ through fertigation at 7 days interval (A1N5) could be recommended for increasing the fruit yield of hybrid watermelon, better net return and sustaining soil fertility in *Theri* land (Red sand dune) of Thoothukudi district of Tamil Nadu.

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