



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2021; 10(2): 1208-1212

Received: 16-01-2021

Accepted: 21-02-2021

Y Pavan Kumar

Department of Horticulture,
Naini Agricultural Institute,
Sam Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Samir E Topno

Department of Horticulture,
Naini Agricultural Institute,
Sam Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Anita Kerketta

Department of Horticulture,
Naini Agricultural Institute,
Sam Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Corresponding Author:**Y Pavan Kumar**

Department of Horticulture,
Naini Agricultural Institute,
Sam Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Effect of different levels of nitrogen on foliar chlorophyll content, nitrogen concentration and fruit yield of different varieties of watermelon (*Citrullus lanatus*)

Y Pavan Kumar, Samir E Topno and Anita Kerketta

Abstract

The present experiment was planned and executed in the Department of Horticulture during season of Ziad 2019. The experiment comprised of three different concentrations of Nitrogen (50, 75, and 100 %) and five different varieties of Watermelon which was replicated three times under Randomized Block Design. High nitrogen concentration in treatment (T₁₁ V₁ N₃: Black baby+100%) was significantly found best in terms of leaf chlorophyll content (0.037), SPAD meter value (37.77), foliar nitrogen concentration (1.81), growth and yield with maximum Cost Benefit Ratio (7.73) of Watermelon. For improved growth, yield and quality Watermelons 100% of Nitrogen concentration was recommended.

Keywords: Chlorophyll content, foliar nitrogen concentration, Nitrogen concentration, SPAD meter, Watermelon

Introduction

Watermelon (*Citrullus lanatus*) production has taken an important place in the agriculture of the world (Ban *et al.*, 2011; Ozmen *et al.*, 2015). World annual production of this crop in 2009 was estimated at 98 million tons with an average yield of 28.7 t/ha (FAO 2011 as cited in Fernandes *et al.*, 2014). In Jordan, watermelon is also considered one of the main irrigated vegetable crops with a total cultivated area of 3,877 ha, a total annual production of 138,244 tons, and an average fruit yield of 39 tons/ha (Department of Statistics, Agricultural Statistics Publication 2014).

Watermelon is a high nitrogen (N) demanding crop, as it enhances significantly crop growth and development, photosynthetic rate, yield, fruit quality, (Jaynes *et al.*, 2001; Okur and Yagmur 2004; Dordas and Sioulas 2008; Santos *et al.*, 2009; Heidari and Mohammad 2012; Du *et al.*, 2015; Senyigit *et al.*, 2016; Lata 2017). Nitrogen (N) is one of the most important nutrient affecting the growth, development, yield and fruit quality of Plants (Fernandes and Rossiello, 1995; Gerendas *et al.*, in 1997) It is required in the large quantities at each stage of plant growth during which N level markedly affects the amount of chlorophyll content, and therefore photosynthesis (Evans and Terashima, 1998; Evans 1989)

The chlorophyll content of a leaf is the indicator of a plant's physiological condition. Chlorophylls are pigments which are necessary in luminous energy being converted into chemical energy. The amount of radiation absorbed from the sun depends on the amount of photosynthetic in the leaf. Therefore, the amount of chlorophyll depends on photosynthetic activity and primary production (Curran *et al.*, 1990). In addition to this, the amount of chlorophyll approximately indicates the correlation between nitrogen, (Filella *et al.*, 1995). Because nitrogen is one of the main elements of chlorophyll it is very important for photosynthesis in plants. Hence, chlorophyll molecules disperse when there is a lack of nitrogen (Turan and Horuz 2012).

Nitrogen is known to promote vegetative growth. More leaves translate to better Chlorophyll development and higher stomatal conductance and enhances photosynthesis. Nitrogen fertilizer when applied at correct rates increases vegetative growth and enhances high yields and quality. The Chlorophyll Content is mainly determined in two ways Destructive and Non destructive method. We have used Non destructive method which was easy and accurate to determine the chlorophyll content, instrument used for this is SPAD 502 meter (Konica-Minolta). The SPAD meter is a hand held device that is widely used for the rapid, accurate and non destructive measurement of leaf chlorophyll concentrations. That measures leaf transmittance in the red (650 nm, the measuring wavelength) and infrared (940 nm, a reference wavelength) regions of the electromagnetic spectrum.

Transmittance values are used by the device to derive a relative SPAD meter value (typically between 0.0 and 50.0). Measurements with the SPAD 502 meter produce relative SPAD meter values that are proportional to the amount of chlorophyll present in the leaf. Chlorophyll concentration is correlated with leaf nitrogen concentration,

The objectives of this study was to determine the leaf chlorophyll content in relation to different levels of nitrogen concentrations and to find out correlation between foliar nitrogen concentrations, fruit yield and SPAD meter values in different varieties of Watermelon.

Materials and methods

A field experiment was conducted at Departmental Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, during April to July 2019.

Experimental sites

The experiment was conducted during Ziad season of the year 2019 in Departmental research field of Department of Horticulture, SHUATS, Prayagraj. The area is situated on the south of Prayagraj on the right bank of Yamuna at Rewa Road at a distance of about 6 km from Prayagraj city. It is situated at 250.8°N latitude and 810.50°E longitudes on elevation of 98 meters from the sea level.

Climate and weather

The area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46°C - 48°C and seldom falls as low as 24°C - 29°C. The relative humidity ranges between 20 to 94 per cent. The average rainfalls in this area are around 1013.4 mm annually.

Results and discussion

The present experiment was planned and executed in the Department of Horticulture during season of 2019. The experiment comprised of 15 treatments of watermelon the experiment was replicated three times under Randomized Block Design. Result and discussion, which were presented in the preceding chapter are being summarized and concluded below. The 15 treatments varieties in observation were T₁V₁N₁: Black baby+50% Nitrogen, T₂V₂N₁: Neelambike+50% Nitrogen, T₃V₃N₁: Ice box+50% Nitrogen, T₄V₄N₁: Mahabali+50% Nitrogen, T₅V₅N₁: Ajay+50% Nitrogen, T₆V₁N₂: Blackbaby+75% Nitrogen, T₇V₂N₂: Neelambike+75% Nitrogen, T₈V₃N₂: Ice box+75% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen, T₁₀V₅N₂: Ajay+75% Nitrogen, T₁₁V₁N₃: Black baby+100% Nitrogen, T₁₂V₂N₃: Neelambike+100% Nitrogen, T₁₃V₃N₃: Ice box+100% Nitrogen, T₁₄V₄N₃: Mahabali+100% Nitrogen and T₁₅V₅N₃: Ajay100% Nitrogen.

A. Growth Parameters

Days for germination

The minimum days taken for germination (5.67 days) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen, T₃V₃N₁: Icebox+50% Nitrogen, T₁V₁N₁: Blackbaby+50% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen and T₁₂V₂N₃: Neelambike+100% Nitrogen and the maximum

days taken for germination (14.07 days) were found with T₅V₅N₁: Ajay+50% Nitrogen.

Vine length (cm)

The maximum vine length (346.54cm) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen and T₁V₁N₁: Black baby+50% Nitrogen and the minimum vine length (230.14cm) were found with T₁₅V₅N₃: Ajay+100% Nitrogen.

Primary branches

The maximum number of primary branches per plant (14.15) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen and T₁V₁N₁: Black baby+50% Nitrogen and the minimum number of primary branches per plant (7.31) were found with T₁₅V₅N₃: Ajay100% Nitrogen.

Leaves per plant

The maximum number of leaves plant⁻¹ (153.58) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Blackbaby+75% Nitrogen, T₁V₁N₁: Blackbaby+50% Nitrogen, T₇V₂N₂: Neelambike+75% Nitrogen and T₁₄V₄N₃: Mahabali+100% Nitrogen and the minimum number of leaves plant⁻¹ (122.58) were found with T₅V₅N₁: Ajay+50% Nitrogen.

Male flowers

The maximum number of male flowers plant⁻¹ (11.63) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen and T₁V₁N₁: Black baby+50% Nitrogen and the minimum Number of male flower plant⁻¹ (6.20) was found with T₁₅V₅N₃: Ajay100% Nitrogen.

Female flowers

The maximum number of female flowers plant⁻¹ (27.57) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen and T₁V₁N₁: Black baby+50% Nitrogen and the minimum Number of female flower plant⁻¹ (16.59) was found with T₁₅V₅N₃: Ajay100% Nitrogen.

Days to first picking

The minimum Number of days to first picking (62.81 days) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆V₁N₂: Black baby+75% Nitrogen and T₁V₁N₁: Black baby+50% Nitrogen and the maximum Number of days to first picking (78.83 days) was found with T₅V₅N₁: Ajay+50% Nitrogen

Chlorophyll content (SPAD unit value)

The maximum chlorophyll (SPAD unit value) (37.77) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed T₆V₁N₂: Black baby+75% Nitrogen, T₁₅V₅N₃: Ajay100% Nitrogen, T₈V₃N₂: Ice box+75% Nitrogen, T₁V₁N₁: Black baby+50% Nitrogen and T₂V₂N₁: Neelambike+50% Nitrogen and the minimum chlorophyll (SPAD unit value) (27.93) was found with T₅V₅N₃: Ajay100% Nitrogen.

Total chlorophyll

The maximum total chlorophyll (0.037) was observed in the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed T₆V₁N₂: Black baby+75% Nitrogen, T₁₅V₅N₃:

Ajay100% Nitrogen, T₈V₃N₂: Ice box+75% Nitrogen, T₁V₁N₁: Black baby+50% Nitrogen and T₂ V₂N₁: Neelambike+50% Nitrogen and the minimum total chlorophyll (0.033) were found with T₅V₅N₃: Ajay100% Nitrogen.

Leaf nitrogen content

The maximum leaf Nitrogen content (1.81) was observed in the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆ V₁N₂: Black baby+75% Nitrogen, T₁₅V₅N₃: Ajay100% Nitrogen, T₈V₃N₂: Ice box+75% Nitrogen, T₁V₁N₁: Black baby+50% Nitrogen and T₂ V₂N₁: Neelambike+50% Nitrogen and the minimum leaf Nitrogen content (0.033) was found with T₉V₄N₂: Mahabali75% Nitrogen.

B. Yield Parameters

Fruit length (cm)

The maximum fruit length (cm) (36.22) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₆ V₁N₂: Black baby+75% Nitrogen T₃ V₃N₁: Ice box+50% Nitrogen, T₁V₁N₁: Black baby+50% Nitrogen, T₁₄ V₄N₃: Mahabali+100% Nitrogen and T₁₃ V₃N₃: Ice box+100% Nitrogen and the minimum fruit length (cm) (25.31) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Fruit weight (kg)

The maximum fruit weight (2.32kg) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁ V₁N₁: Black baby+50% Nitrogen, T₆V₁N₂: Black baby+75% Nitrogen and T₂V₂N₁: Neelambike+50% Nitrogen and the minimum fruit weight (1.35kg) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Fruit diameter (cm)

The maximum fruit diameter (48.51cm) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁ V₁N₁: Black baby+50% Nitrogen, T₆ V₁N₂: Blackbaby+75% Nitrogen, T₁₂V₂N₃: Neelambike+100% Nitrogen and T₈ V₃N₂: Ice box+75% Nitrogen and the minimum fruit diameter (39.47cm) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Fruits per plant

The maximum number fruits plant⁻¹ (13.51) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁V₁N₁: Blackbaby+50% Nitrogen, T₆V₁N₂: Blackbaby+75% Nitrogen, T₂V₂N₁: Neelambike+50% Nitrogen, T₃V₃N₁: Icebox+50% Nitrogen, T₄V₄N₁: Mahabali+50% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen and T₁₂V₂N₃: Neelambike+100% Nitrogen and the minimum number of fruits plant⁻¹ (7.59) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Fruit yield per plant

The maximum fruit yield per plant (31.45 kg) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁V₁N₁: Blackbaby+50% Nitrogen, T₆V₁N₂: Blackbaby+75% Nitrogen, T₂V₂N₁: Neelambike+50% Nitrogen, T₃ V₃N₁: Ice box+50% Nitrogen, T₄ V₄N₁: Mahabali+50% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen and T₁₂V₂N₃: Neelambike+100% Nitrogen and the minimum fruit yield per plant (10.30) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Fruit yield tha⁻¹

The maximum Fruit yield (209.66 tha⁻¹) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁ V₁N₁: Black baby+50% Nitrogen, T₆

V₁N₂: Blackbaby+75% Nitrogen, T₂V₂N₁: Neelambike+50% Nitrogen, T₃ V₃N₁: Ice box+50% Nitrogen, T₄V₄N₁: Mahabali+50% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen and T₁₂V₂N₃: Neelambike+100% Nitrogen and the minimum Fruit yield (68.64 t ha⁻¹) was found with T₅V₅N₁: Ajay+50% Nitrogen.

C. Quality parameter

TSS

The maximum TSS (10.90 °Brix) was observed the applications of T₁₁V₁N₃: Black baby+100% Nitrogen followed by T₁V₁N₁: Blackbaby+50% Nitrogen, T₆V₁N₂: Blackbaby+75% Nitrogen, T₂V₂N₁: Neelambike+50% Nitrogen, T₃V₃N₁: Icebox+50% Nitrogen, T₄V₄N₁: Mahabali+50% Nitrogen, T₉V₄N₂: Mahabali+75% Nitrogen and T₁₂V₂N₃: Neelambike+100% Nitrogen and the minimum TSS (8.11 °Brix) was found with T₅V₅N₁: Ajay+50% Nitrogen.

Discussion

Significantly minimum days taken for germination was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher levels of N, The plot with high nitrogen content absorbed water faster and showed faster emergence. This finding correlates the findings of Yoshitaka Haran and Kazunobu Toriyama in Watermelon.

Significantly maximum vine length, was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher levels of N, which found suitable for Watermelon helpful in cell elongation of leaves for development of cell and rapid cell division and cell elongation in meristematic region of plant due to production of plant growth substance and this may be due to abundant supply of plant nutrients and water which led in the growth of Watermelon. This finding correlates the findings of Martin *et al.*, (2016) in Watermelon, Kacha *et al.*, (2017) in Watermelon.

Significantly maximum number of male flowers and female flowers per plant was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher dose of Nitrogen, which enhances the high vegetative vigor. The node at which first staminate and pistillate flower appeared is an indication of early flowering which results in getting more flowers and early crop. Reddy *et al.*, (2012) reported similar results in muskmelon, Yogesh *et al.*, (2009) in cucumber.

Significantly number of days to first picking of Watermelon was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher dose of Nitrogen, The node at which first staminate and pistillate flower appeared, is an indication of early flowering which results in getting an early crop. Reddy *et al.*, (2012) reported similar results in muskmelon, Yogesh *et al.*, (2009) in cucumber.

Significantly maximum chlorophyll, total chlorophyll and leaf chlorophyll was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher dose of nitrogen, which leads to nitrogen is a structural element of chlorophyll and protein molecules, and thereby affects formation of chloroplast and accumulation of chlorophyll content in plants. The levels of applied nitrogen fertilizer influenced the leaf nitrogen content. Nitrogen content increased with the increase in N levels. This finding correlates the findings of Amlotis *et al.*, (2004) in cucumber.

Significantly maximum Fruit length, Fruit weight and Fruit diameter was recorded in T₁₁V₁N₃: Black baby+100% Nitrogen, which might be due to higher levels of N, These results indicated that higher the growth attributes significantly influenced better translocation of photosynthates from source

to sinks resulting in higher yield in such genotypes. Similar observations were made by Vijayakumari *et al.*, (2005) in cucumber, Babu (2013), Ganiger *et al.*, (2014), Manu (2014) and Shruti *et al.*, (2015) in oriental pickling melon.

Significantly maximum Fruits per plant, Fruit yield per plant and fruit yield per tha^{-1} were recorded in $T_{11}V_1N_3$: Black baby+100% Nitrogen, which might be due to higher levels of N, These results indicated that higher the growth attributes significantly influenced better translocation of photosynthates from source to sinks resulting in higher yield in such

genotypes. Similar observations were made by Vijayakumari *et al.*, (2005) in cucumber, Babu (2013), Ganiger *et al.*, (2014), Manu (2014) and Shruti *et al.*, (2015) in oriental pickling melon.

Significantly maximum TSS was recorded in $T_{11}V_1N_3$: Black baby+100% Nitrogen, which might be due to higher levels of N, These results indicated that higher the quality significantly influenced better translocation of sugar. Similar observations were made by More *et al.*, (2015) in Watermelon, Madhuri, (2016) in Watermelon.

Table 1: Performance of different Watermelon varieties with different nitrogen rates on growth parameters.

Treatment Notation	Varieties Name	Days taken for germination	Vine length (cm)	Number of male flower plant ⁻¹	Number of female flower plant ⁻¹
T ₁	V ₁ N ₁ : Black baby+50 % Nitrogen	8.33	340.41	10.47	24.39
T ₂	V ₂ N ₁ : Neelambike+50 % Nitrogen	10.85	331.39	9.45	19.16
T ₃	V ₃ N ₁ : Ice box+50 % Nitrogen	6.33	307.83	8.76	21.19
T ₄	V ₄ N ₁ : Mahabali+50 % Nitrogen	9.74	321.16	9.10	21.78
T ₅	V ₅ N ₁ : Ajay+50 % Nitrogen	14.07	213.02	7.53	18.87
T ₆	V ₁ N ₂ : Black baby+75% Nitrogen	7.33	342.79	10.82	26.10
T ₇	V ₂ N ₂ : Neelambike+75% Nitrogen	10.33	330.11	8.96	21.32
T ₈	V ₃ N ₂ : Ice box+75% Nitrogen	9.00	320.87	9.37	21.45
T ₉	V ₄ N ₂ : Mahabali+ 75% Nitrogen	7.67	335.83	8.41	22.48
T ₁₀	V ₅ N ₂ : Ajay+75% Nitrogen	13.49	224.78	7.00	17.62
T ₁₁	V ₁ N ₃ : Black baby+100% Nitrogen	5.67	346.54	11.63	27.57
T ₁₂	V ₂ N ₃ : Neelambike+100% Nitrogen	8.67	305.90	8.14	22.18
T ₁₃	V ₃ N ₃ : Ice box+100% Nitrogen	11.67	325.51	9.08	20.60
T ₁₄	V ₄ N ₃ : Mahabali+100% Nitrogen	10.00	320.03	8.33	23.77
T ₁₅	V ₅ N ₃ : Ajay+100% Nitrogen	12.55	230.14	6.20	16.59
F-test		S	S	S	S
C.D. at 5%		2.114	9.593	0.820	2.843
S.Ed. (\pm)		1.032	4.683	0.400	1.392

Table 2: Performance of different Watermelon varieties with different nitrogen rates on Chlorophyll and Nitrogen content.

Treatment Notation	Varieties Name	Number of days to first picking	Total Chlorophyll (SPAD unit value)	Total Chlorophyll (mg cm ⁻²)	Nitrogen (%) = 0.48 x SPAD Value
T ₁	V ₁ N ₁ : Black baby+50 % Nitrogen	63.15	34.23	0.0354	1.64
T ₂	V ₂ N ₁ : Neelambike+50 % Nitrogen	74.50	34.10	0.0347	1.63
T ₃	V ₃ N ₁ : Ice box+50 % Nitrogen	73.55	31.83	0.0342	1.52
T ₄	V ₄ N ₁ : Mahabali+50 % Nitrogen	74.20	33.27	0.0344	1.59
T ₅	V ₅ N ₁ : Ajay+50 % Nitrogen	78.93	27.93	0.0333	1.34
T ₆	V ₁ N ₂ : Black baby+75% Nitrogen	65.40	35.53	0.0358	1.70
T ₇	V ₂ N ₂ : Neelambike+75% Nitrogen	75.44	31.00	0.0337	1.48
T ₈	V ₃ N ₂ : Ice box+75% Nitrogen	72.60	35.07	0.0353	1.68
T ₉	V ₄ N ₂ : Mahabali+ 75% Nitrogen	74.08	25.50	0.0324	1.22
T ₁₀	V ₅ N ₂ : Ajay+75% Nitrogen	78.12	33.77	0.0345	1.62
T ₁₁	V ₁ N ₃ : Black baby+100% Nitrogen	62.81	37.77	0.037	1.81
T ₁₂	V ₂ N ₃ : Neelambike+100% Nitrogen	70.43	31.58	0.034	1.51
T ₁₃	V ₃ N ₃ : Ice box+100% Nitrogen	74.43	28.48	0.0337	1.36
T ₁₄	V ₄ N ₃ : Mahabali+100% Nitrogen	72.91	33.83	0.0356	1.62
T ₁₅	V ₅ N ₃ : Ajay+100% Nitrogen	77.87	35.73	0.0362	1.71
F-test		S	S	S	S
C.D. at 5%		2.557	2.843	0.232	0.214
S.Ed. (\pm)		1.248	1.392	0.156	0.119

Table 3: Performance of different Watermelon varieties with different nitrogen rates on yield parameters.

Treatment notation	Varieties Name	Fruit length (cm)	Fruit weight (kg)	Fruit Diameter (cm)	Number of fruit per plant	Fruit yield per plant (kg)
T ₁	V ₁ N ₁ : Black baby+50 % Nitrogen	34.48	2.03	46.91	11.16	22.70
T ₂	V ₂ N ₁ : Neelambike+50 % Nitrogen	27.53	1.82	42.28	10.59	19.31
T ₃	V ₃ N ₁ : Ice box+50 % Nitrogen	30.22	1.72	44.31	10.10	17.34
T ₄	V ₄ N ₁ : Mahabali+50 % Nitrogen	31.38	1.64	43.76	10.94	17.85
T ₅	V ₅ N ₁ : Ajay+50 % Nitrogen	25.31	1.35	39.47	7.59	10.30
T ₆	V ₁ N ₂ : Black baby+75% Nitrogen	35.96	2.05	47.51	11.80	24.16
T ₇	V ₂ N ₂ : Neelambike+75% Nitrogen	25.51	1.52	42.57	9.85	14.98
T ₈	V ₃ N ₂ : Ice box+75% Nitrogen	25.83	1.74	45.02	9.62	16.73
T ₉	V ₄ N ₂ : Mahabali+ 75% Nitrogen	27.23	1.51	44.16	10.40	15.74

T10	V ₅ N ₂ : Ajay+75% Nitrogen	26.62	1.38	40.28	8.76	12.12
T11	V ₁ N ₃ :Black baby+100% Nitrogen	36.22	2.32	48.51	13.51	31.45
T12	V ₂ N ₃ :Neelambike+100%Nitrogen	28.11	1.49	45.68	10.51	15.41
T13	V ₃ N ₃ : Ice box+100% Nitrogen	31.81	1.51	44.58	9.44	14.21
T14	V ₄ N ₃ : Mahabali+100% Nitrogen	33.63	1.52	42.11	9.56	14.58
T15	V ₅ N ₃ : Ajay+100% Nitrogen	27.21	1.42	41.70	8.81	12.51
F-test		S	S	S	S	S
C.D. at 5%		2.739	0.263	1.916	1.385	3.801
S.Ed. (\pm)		1.341	0.129	0.935	0.676	1.856

Table 4: Performance of different Watermelon varieties with different nitrogen rates on growth parameters.

Treatment notation	Varieties Name	Fruit yield (tha ⁻¹)	TSS (⁰ Brix)	Organoleptic test				B:C ratio
				Colour and appearance	Texture	Flavour and taste	Overall acceptability	
T ₁	V ₁ N ₁ : Black baby+50 % Nitrogen	151.31	10.31	7.82	8.46	8.23	8.17	5.61
T ₂	V ₂ N ₁ :Neelambike+50 % Nitrogen	128.72	9.41	7.42	7.20	6.42	7.01	4.83
T ₃	V ₃ N ₁ : Ice box+50 % Nitrogen	115.58	9.35	7.34	6.96	8.00	7.43	4.36
T ₄	V ₄ N ₁ : Mahabali+50 % Nitrogen	119.00	9.24	5.51	8.08	6.68	6.75	4.43
T ₅	V ₅ N ₁ : Ajay+50 % Nitrogen	68.64	8.11	5.33	5.35	5.08	5.25	2.57
T ₆	V ₁ N ₂ : Black baby+75% Nitrogen	161.03	10.76	8.33	8.95	8.49	8.59	5.95
T ₇	V ₂ N ₂ : Neelambike+75% Nitrogen	99.85	9.66	6.55	7.32	6.24	6.70	3.73
T ₈	V ₃ N ₂ : Ice box+75% Nitrogen	111.54	9.60	6.24	7.55	6.88	6.89	4.20
T ₉	V ₄ N ₂ : Mahabali+ 75% Nitrogen	104.90	9.49	6.31	7.57	6.35	6.74	3.90
T10	V ₅ N ₂ : Ajay+75% Nitrogen	80.80	8.39	5.75	5.86	5.32	5.64	3.01
T11	V ₁ N ₃ :Black baby+100% Nitrogen	209.66	10.90	8.67	9.00	8.88	8.88	7.73
T12	V ₂ N ₃ :Neelambike+100%Nitrogen	102.70	9.54	6.36	7.16	6.39	6.63	3.83
T13	V ₃ N ₃ : Ice box+100% Nitrogen	94.75	9.41	6.24	7.35	6.47	6.69	3.55
T14	V ₄ N ₃ : Mahabali+100% Nitrogen	97.19	9.49	6.50	7.28	6.30	6.69	3.60
T15	V ₅ N ₃ : Ajay+100% Nitrogen	83.36	8.89	5.83	6.13	5.47	5.81	3.10
F-test		S	S	S	S	S	S	
C.D. at 5%		25.340	0.360	1.010	0.950	0.771	0.521	
S.Ed. (\pm)		12.370	0.176	0.493	0.464	0.376	0.254	

Conclusion

This study found that highest chlorophyll content was with 100% N application in T₁₁V₁N₃:Black baby. There was a significant correlation between foliar nitrogen concentrations, fruit yield and SPAD meter values, increasing in nitrogen rates increases the chlorophyll content and fruit yield. Maximum growth and yield was observed in treatment T₁₁V₁N₃ with maximum cost benefit ratio of (7.73) of watermelon.

References

- Adeyeye AS, Akanbi WB, Sobola OO, Lamidi WA, Olalekan KK. Growth and fruit yield of water melon (*Citrullus Supported by lanatus*) as influenced by compost and npk fertilizer. *FUW Trends in Science & Technology Journal*.2016, 80-83.
- Aliyu L, Karikari SK, Ahmed MK. Yield and yield components of eggplant (*Solanumgilo* L.) as affected by date of transplanting, intra-row spacing and nitrogen fertilization. *Journal of Agricultural Sciences and Technology* 1992;2:7-12.
- Amandeep Kaur, Manoj Sharma, Jatinder Manan, Bindu. Comparative Performance of Muskmelon (*Cucumismelo*) Hybrids at Farmers' Field in District Kapurthala. *J Krishi Vigyan* 2017;6(1):24-31.
- Audi W, Aguyoh JN, Gao-Qiong L. Yield and Quality of Watermelon as affected by Organic and Inorganic Nitrogen Sources. *Asian Journal of Agriculture and Food Sciences* 2013.
- Choudhury B. Vegetable production, National Book Trust pub. New Delhi, 2000, 150-151.
- Emmanuel Mremaa, Amon Maerereb P. Growth and yield performance of watermelon during dry and wet seasons under tropical conditions. *International Journal of Vegetable Science* 2018.
- Habimana Sylvestre, Kamugisha Thierry, Nkurunziza Rene. Production of Watermelon As Influenced By Different Spacing And Mulching Under Rubilizi Conditions in Rwanda. *Global Journal of Advance Research* 2015.
- Jadhav PB, Saravaidya SN, Tekale GS, Patel DJ, Patil NB, Harad NB, *et al.* Performance of different varieties in respect of plant growth, yield and quality of watermelon (*Citrullus lanatus* Thunbmansf) 2013.
- John LW, Jamer DB, Samuel LT, Warner LW. Soil Fertility and Fertilizers: An Introduction to Nutrient Management, Pearson Education, India, 2004, 106-53.