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Response of chilli to different fertigation levels and schedules under protected conditions

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Abstract
The study utilized a Factorial Randomized Block Design (FRBD) to investigate the effect of fertigation levels and schedules on green chilli grown under protected conditions. There were twelve treatment combinations and each treatment was replicated thrice. The treatment includes two factors in this present experiment, the main factor consist of four fertigation levels i.e. 50%, 75%, 100% and 125% of RDF (112 : 37 : 37, 169 : 56 : 56, 225 : 75 : 75 and 281 : 94 : 94 NPK kg ha^{-1}). The sub-factor consist of three fertigation schedules i.e S_1-(60% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 20% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 20% NPK at maturity stage i.e 74-144 DAT with 10 splits), S_2-(40% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 30% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 30% NPK at maturity stage i.e 74-144 DAT with 10 splits) and S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits). The results indicated that, among fertigation levels, the application of 125% RDF through fertigation and among fertigation schedules, application of schedule S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits) was found to be best with respect to growth, yield and quality parameters of green chilli under protected conditions.

Keywords: Fertigation levels, fertigation schedules, green chilli, growth, yield, quality

Introduction
Chilli (*Capsicum annumm* L.) belongs to the Solanaceae family, has its unique place in the diet as a vegetable cum spice crop. It is predominantly popular for its green pungent fruits, which is used for culinary purpose. Chilli is a popular crop widely grown throughout the world. In India, chilli is grown under 410.9 thousand hectares, with production of 4363.2 thousand MT with average productivity 10.6 MT/hectare (Anon, 2021) [1]. The total area under chilli in Maharashtra is about 37.59 thousand hectares with production 408.77 thousand MT and productivity 10.88 MT/hectare (Anon, 2021) [1].

Protected cultivation is yet new and emerging propensity for growing vegetables in India. It is a most contemporary approach to produce high value vegetables and have shown tremendous potential quantitatively and qualitatively, extend the growing season of crop and fetches good market returns during off season along with higher yield and quality. (Rawat *et al.*, 2022) [10].

Drip fertigation is an important irrigation cum nutrient application method in crop production, particularly in high value crops like chilli (Reddy *et al.*, 2017) [11]. Application of water soluble fertilizers through drip irrigation system is gaining importance in present day agriculture to boost the production and productivity of various crops. Chilli crop requires a balanced fertilizer management for normal growth and development of the crop. It is a heavy feeder of nutrients and high yield can be sustained only through the application of nutrient at optimum doses in balanced proportion. The nutrient requirement also varies with the growth stages of the crop. Among the various factors responsible for higher yield, the use of appropriate quantity of fertilizer at proper time plays a vital role in enhancing the productivity. (Ciba and Syamala, 2017) [4]. Scientific information on fertigation, especially green chilli grown under protected conditions, is very scanty. Hence, the present study was undertaken to determine the effect of fertigation levels and schedules on growth, yield and quality of chilli under protected conditions.

Materials and Methods

The experiment was conducted during *Rabi* seasons of year 2020-2021 and 2021-2022. The experiment was laid out in Factorial Randomized Block Design with twelve treatment combinations and three replications. The experimental treatments consist of four fertigation levels (F) *viz.*, F_1-50% of RDF (112 : 37 : 37 NPK Kg ha^{-1}), F_2-75% of RDF (169 : 56 : 56 NPK Kg ha^{-1}), F_3-100% of RDF (225 : 75 : 75 NPK Kg ha^{-1}) and F_4-125% of RDF (281 : 94 : 94 NPK Kg ha^{-1}). There were three fertigation schedules (S) *viz.*, S_1-(60% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 20% NPK at reproductive stage i.e 43-73 DAT with 4 splits,20% NPK at maturity stage i.e 74-144 DAT with 10 splits), S_2-(40% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 30% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 30% NPK at maturity stage i.e 74-144 DAT with 10 splits) and S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits). Thirty-day-old seedlings of the chilli F_1 hybrid (Arka swetha) were transplanted with a spacing of 90 cm between rows and 45 cm between plants. Fertigation was applied in 20 equal splits at seven days interval throughout entire crop growth cycle. The fertilizer regimen consisted of a water-soluble NPK grade (19:19:19) and urea (46.6% N). Standard agronomic and plant protection practices were implemented according to established recommendations. Data for various growth and yield parameters were collected from five randomly selected plants within each treatment plot.

Results and Discussion

Effect of fertigation levels on growth parameters

A reference to the pooled data presented in Table 1(a) revealed that, the growth parameters of green chilli grown under protected conditions were significantly influenced by different fertigation levels, significantly maximum plant height (130.05 cm), number of branches (40.44), plant spread (87.21 cm), leaf area (23.03 cm^2) and stem girth (4.19 cm) was found with fertigation level F_4 i.e 125% of RDF (281: 94: 94 NPK Kg ha^{-1}), which was found at par with F_3-100% of RDF (225 : 75 : 75 NPK Kg ha^{-1}). In this experiment, the water soluble fertilizers were applied directly in the vicinity of the root zone with 20 equal splits at 7 days interval, which might increase the availability and uptake of nutrients, which in turn boosted photosynthesis, chlorophyll production and nitrogen metabolism in plants enabling them to attain vigor and ultimately contributing to improved growth parameters like plant height, number of branches, plant spread and stem girth. Significant effect of fertigation with higher dose of nutrients on growth parameters were also reported by Brahma *et al.* (2010) [3] in capsicum under cover, Tekale *et al.* (2014) [14] in cucumber under polyhouse conditions, Ughade *et al.* (2016) [16] in tomato under polyhouse conditions. These results of present study was in close agreement with those obtained by Rawat *et al.* (2022) [10] where, the maximum plant height was recorded with fertigation at 120% of the recommended dose of fertilizer (RDF) in tomato plants grown under polyhouse conditions.

Tabel 1(a): Effect of fertigation levels and schedules on growth parameters of chilli crop under protected conditions

Treatment	Plant height (cm)	No. of branches	Plant spread (cm)	Leaf area (cm^2)	Stem girth (cm)
Fertigation levels (F)					
F_1	97.76	24.39	67.30	18.04	2.91
F_2	111.59	31.96	75.90	20.21	3.75
F_3	126.26	39.38	84.44	22.39	3.96
F_4	130.05	40.44	87.21	23.03	4.19
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	1.34	0.39	1.02	0.25	0.04
CD @ 5%	3.93	1.16	3.06	0.73	0.12
Fertigation schedules (S)					
S_1	108.38	31.74	72.96	19.36	3.23
S_2	118.80	34.70	80.33	21.40	3.82
S_3	122.07	35.68	82.85	21.98	4.07
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	1.16	0.34	0.88	0.21	0.03
CD @ 5%	3.40	1.00	2.65	0.63	0.11
Interaction effect (F×S)					
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	2.27	0.68	1.76	0.43	0.07
CD @ 5%	6.80	2.01	5.28	1.27	0.22

Effect of fertigation schedules on growth parameters

The data pertaining to effect of fertigation schedules on growth parameters of green chilli grown under protected conditions was presented in Table 1(a) observed that, significantly maximum plant height (122.07 cm), number of branches (35.68), plant spread (82.85 cm), leaf area (21.98 cm^2) and stem girth (4.07 cm) with fertigation schedule S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits). It was found at par with fertigation schedule S_2-(40% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 30% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 30% NPK at maturity stage i.e 73-144 DAT with 10 splits). This might be due to timely availability of nutrients as per the demand of the crop according to the different stages of growth, resulting in fulfilling the nutritional need of the crop, which leads to better photosynthesis expressed in terms of higher vegetative growth, as observed by Rawat *et al.* (2022) [10] in tomato, under protected conditions.

Interaction effect on growth parameters

The interaction effect of fertigation levels and schedules on growth parameters was found to be significant as presented in Table 1(b), significantly maximum plant height (137.39 cm), number of branches (42.39), plant spread (93.05 cm),

leaf area (24.50 cm^2) and stem girth (4.55 cm) was recorded with application of 125% of RDF-281: 94: 94 NPK Kg ha^{-1} through fertiagtion along with fertigation schedule (S_3) application of 20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits (F_4S_3). It was found at par with F_3S_3 and F_4S_2. This might be due to fact that, fertigation process allows for precise application of nutrients directly to the root zone, ensuring that plants have access to the required elements when they need them at vegetative, reproductive and maturity stages. Sufficient and timely nutrient uptake, facilitated by appropriate fertigation levels and scheduling. These doses might directly support the plant's vegetative growth thus, results into higher vegetative growth. The above findings are in agreement with Rawat *et al.* (2022) [10] in tomato, under polyhouse conditions and Mounika *et al.* (2018) [6] in capsicum.

Tabel 1(b): Interaction effect of fertigation levels and schedules on growth parameters of chilli crop under protected conditions

Treatment	Plant height (cm)	No. of branches	Plant spread (cm)	Leaf area (cm^2)	Stem girth (cm)
F_1S_1	96.62	24.04	65.86	17.45	2.77
F_1S_2	97.83	24.33	66.71	18.19	2.89
F_1S_3	98.83	24.81	69.34	18.47	3.08
F_2S_1	104.03	29.63	72.49	19.35	3.22
F_2S_2	114.28	32.77	76.75	20.50	3.91
F_2S_3	116.46	33.47	78.46	20.79	4.12
F_3S_1	114.80	36.02	75.08	20.09	3.37
F_3S_2	128.40	40.08	87.71	22.90	4.02
F_3S_3	135.59	42.04	90.54	24.17	4.51
F_4S_1	118.08	37.29	78.43	20.55	3.54
F_4S_2	134.69	41.63	90.15	24.03	4.48
F_4S_3	137.39	42.39	93.05	24.50	4.55
'F' test	Sig	Sig	Sig	Sig	Sig
SE(m) ±	2.27	0.68	1.76	0.43	0.07
CD @ 5%	6.80	2.01	5.28	1.27	0.22

Effect of fertigation levels on yield and yield attributing parameters

The perusal of data presented in Table 2 (a) and Table 2 (b) indicated that, the yield and yield attributing parameters of green chilli were significantly influenced by the different fertigation levels significantly minimum days were required to first flower initiation (36.16), days to 50% flowering (43.88) and days to first harvest (57.27) were observed with fertigation level F_4 i.e 125% of RDF (281: 94: 94 NPK Kg ha^{-1}). Whereas, significantly maximum fruit length (18.56 cm), fruit diameter (1.50 cm), average weight of fruits (6.00 g), yield per plant (1098.52 g), yield per plot (38.50 kg), yield per 1000 m^2 (4.01 t) and yield per hectare (40.11 t) was recorded with fertigation level F_4 i.e 125% of RDF (281: 94: 94 NPK Kg ha^{-1}), which was found at par with F_3-100% of RDF (225 : 75 : 75 NPK Kg ha^{-1}) except fruit length and fruit diameter. In the present study the maximum yield of green chilli was obtained might be due to fact that, continuous supply of required quantity of nutrients in the root zone of the crop, which creates favourable conditions for growth and development of the crop by increasing metabolic activities in the plant system and resulted in maximum yield. Significant effect of fertigation with higher dose of nutrients on yield parameters also reported by Ughade *et al.* (2016) [15] in tomato, Vasanthi *et al.* (2017) [17] in tomato, Mounika *et al.* (2018) [6] in capsicum, Shilpa *et al.* (2019) [12] in capsicum and Rawat *et al.* (2022) [10] in tomato, under protected conditions.

Tabel 2(a): Effect of fertigation levels and schedules on yield and yield contributing parameters of green chilli.

Treatment	Days to first flower initiation	Days to 50% flowering	Days to first harvest	Fruit length (cm)	Fruit Diameter (cm)
Fertigation levels (F)					
F_1	40.38	49.50	69.33	13.48	1.10
F_2	39.38	47.66	64.27	15.49	1.22
F_3	38.27	47.05	58.83	16.89	1.33
F_4	36.16	43.88	57.27	18.56	1.50
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	0.49	0.59	0.79	0.25	0.02
CD @ 5%	1.45	1.77	2.39	0.75	0.07
Fertigation schedules (S)					
S_1	41.16	50.29	63.83	14.65	1.22
S_2	39.08	47.16	62.29	16.40	1.27
S_3	35.75	43.62	61.16	17.26	1.37
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	0.42	0.52	0.69	0.22	0.02
CD @ 5%	1.25	1.53	2.07	0.65	0.06
Interaction effect (F×S)					
'F' test	**NS**	**NS**	**NS**	**Sig**	**NS**
SE(m) ±	0.85	1.04	1.41	0.44	0.04
CD @ 5%	-	-	-	1.31	-

Effect of fertigation schedules on yield and yield attributing parameters

The data depicted in Table 2 (a) and Table 2 (b) revealed that, the yield and yield attributing parameters of green chilli were significantly influenced by fertigation schuedules. Significantly minimum days were required to first flower initiation (35.75), days to 50% flowering (43.62) and days to first harvest (61.16) were observed with fertigation schedule S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits).This might be due to fact that, the reduced level of fertigation, the crop experienced nutrient stress in its initial stage, which inhibited vegetative growth and led to early flowering. Corroborative finding were also reported by Singh *et al.* (2022) [13] in cucumber under polyhouse conditions. Whereas, significantly maximum fruit length (17.26 cm), fruit diameter (1.37 cm), average weight of fruits (5.72 g), yield per plant (1065.38g), yield per plot (37.07 kg), yield per 1000 m^2 (3.86 t) and yield per hectare (38.63 t) was recorded with fertigation schedule S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits). It was found at par with fertigation schedule S_2-(40% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 30% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 30% NPK at maturity stage i.e 73-144 DAT with 10 splits) except fruit length and fruit diameter. This might be accredited to the upsurge in all of the yield related attributes as a result of the balanced and timely application of nutrients throughout the growth period, which perhaps improved the accessibility as well as the absorption of elements by the plants. These results are in the line of Brahma *et al.* (2010) [3] in capsicum, Tekale *et al.* (2014) [14] in cucumber, Ughade *et al.* (2016) [16] in tomato, Vasanthi *et al.* (2017) [17] in tomato, Mounika *et al.* (2018) [6] in capsicum, Shilpa *et al.* (2019) [12] in capsicum and Rawat *et al.* (2022) [10] in tomato, under protected conditions.

Tabel 2(b): Effect of fertigation levels and schedules on yield and yield contributing parameters of green chilli.

Treatment	Average weight of fruit (g)	Yield per plant (g)	Yield per plot (kg)	Yield per 1000 m^2 (t)	Yield per hectare (t)
Fertigation levels (F)					
F_1	4.20	808.78	27.29	2.84	28.43
F_2	5.50	977.06	33.52	3.49	34.91
F_3	5.83	1056.07	37.11	3.86	38.65
F_4	6.00	1098.52	38.50	4.01	40.11
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	0.08	17.86	0.62	0.063	0.63
CD @ 5%	0.25	52.38	1.81	0.189	1.89
Fertigation schedules (S)					
S_1	4.90	864.05	29.65	3.08	30.88
S_2	5.54	1025.90	35.60	3.70	37.07
S_3	5.72	1065.38	37.07	3.86	38.63
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	0.07	15.16	0.53	0.054	0.54
CD @ 5%	0.22	45.36	1.57	0.164	1.64
Interaction effect (F×S)					
'F' test	**Sig**	**Sig**	**Sig**	**Sig**	**Sig**
SE(m) ±	0.15	30.25	1.06	0.109	1.09
CD @ 5%	0.44	90.73	3.15	0.328	3.28

Interaction effect on yield and yield attributing parameters

The interaction effect of fertigation levels and schedules on yield contributing parameters like days required to first flower initiation, days to 50% flowering, days to first harvest and fruit diameter was found be non-significant. Whereas, the interaction effect of fertigation levels and schedules on yield parameters was found to be significant as presented in Table 2(c), significantly maximum fruit length (20.03 cm), average weight of fruits (6.35 g), yield per plant (1202.62 g), yield per plot (42.98 kg), yield per 1000 m^2 (4.42 t) and yield per hectare (44.24 t) was noted with application of 125% of RDF-281: 94: 94 NPK Kg ha^{-1} through fertiagtion along with fertigation schedule (S_3) application of 20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits (F_4S_3). It was found at par with F_3S_3 and F_4S_2. This might be due to fact that, the precise nutrient delivery as per the chilli crop growth demand, when coupled with higher supply of nutrient supports metabolic processes in chilli plants and enhance the development of green chilli fruits by maximizing their size, number and quality, thereby leading to optimal overall green chilli fruits yield in each picking. These results are partial accordance with those reported by Ughade *et al.* (2016) [16] in tomato, under polyhouse conditions, Vasanthi *et al.* (2017) [17] in tomato and Mounika *et al.* (2018) [6] in capsicum.

Tabel 2(c): Interaction effect of fertigation levels and schedules on yield and yield contributing parameters of green chilli.

Treatment	Fruit length (cm)	Average weight of fruit (g)	Yield per plant (g)	Yield per plot (kg)	Yield per 1000 m^2 (t)	Yield per hectare (t)
F_1S_1	12.98	4.10	784.26	25.12	2.74	27.46
F_1S_2	13.46	4.22	816.97	26.21	2.87	28.77
F_1S_3	14.00	4.29	825.11	26.56	2.90	29.07
F_2S_1	14.88	4.75	821.46	27.18	2.89	28.94
F_2S_2	15.28	5.82	1044.61	35.52	3.72	37.29
F_2S_3	16.31	5.95	1065.12	36.05	3.85	38.51
F_3S_1	14.65	5.30	912.44	32.10	3.30	33.08
F_3S_2	17.31	5.90	1087.08	39.05	4.01	40.19
F_3S_3	18.70	6.29	1168.67	40.85	4.26	42.69
F_4S_1	16.11	5.43	938.03	33.09	3.40	34.06
F_4S_2	19.54	6.21	1154.92	40.20	4.20	42.05
F_4S_3	20.03	6.35	1202.62	42.98	4.42	44.24
'F' test	Sig	Sig	Sig	Sig	Sig	Sig
SE(m) ±	0.44	0.15	30.25	1.06	0.109	1.09
CD @ 5%	1.31	0.44	90.73	3.15	0.328	3.28

Effect of fertigation levels on quality parameters

Data presented in Table 3, revealed that, the quality parameters of green chilli were significantly influenced by application of different fertigation levels, significantly maximum shelf life of green fruits (6.47 days), moisture content of fresh green fruits (84.98 %) and chlorophyll content of leaf (19.51 mg/100g) was found with fertigation level F_4 i.e 125% of RDF (281: 94: 94 NPK Kg ha^{-1}), which was found at par with F_3-100% of RDF (225 : 75 : 75 NPK Kg ha^{-1}).

In present study higher fertigation level promote maximum shelf life in chilli fruit by supplying plants with ample and balanced nutrients. Which in turn leads to stronger fruit cell walls, improves firmness, reduces water loss and respiration rate after every harvest of green chilli fruits. Ultimately extends its shelf life. Similar finding reported by Vattakunnel *et al.* (2015) [18] in chilli and Kaur *et al.* (2017) [5] in capsicum, under polyhouse conditions. Due to increased water and nutrient availability1 fruit development is significantly improved, allowing for greater cell expansion and turgor. Ultimately, this results in higher moisture content in the fruits. Similar results found by Bhattarai *et al.* (2013) [2] in tomato, under polyhouse conditions and Mounika *et al.* (2018) [7] in capsicum. Application of higher nutrient level results into maximum chlorophyll content of chilli leaf in the present study, this might be due to fact that, adequate application of NPK nutrients through drip in the vicinity of root zone as per the desired schedule in this experiments leads to more availability and uptake of nitrogen enhances the turgidity of mesophyll cells and chloroplast and thereby resulted in increased chlorophyll content in leaves. These results are in line with findings of Ughade *et al.* (2016) [15] in tomato, under polyhouse conditions and Ngupok *et al.* (2018) [9] in capsicum, under protected conditions and Nandeshwar *et al.* (2019) [8] in chilli.

Effect of fertigation schedules on quality parameters

The data presented in Table 3 indicated that, the quality parameters of green chilli were significantly influenced by different fertigation schuedules where, significantly maximum shelf life of green fruits (6.22 days), moisture content of fresh green fruits (83.07 %) and chlorophyll content of leaf (18.458 mg/100g) was observed with fertigation schedule S_3-(20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits). It was found at par with fertigation schedule S_2-(40% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 30% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 30% NPK at maturity stage i.e 73-144 DAT with 10 splits). This might be due fact that, distinct nutrient demand at each phase directly influence chilli fruit quality and longevity. During fruit development stage precise application of potassium ensures the formation of firm cell walls, reduced post-harvest disorders, helps to regulate the green fruits of chilli respiration rate to slow down metabolic breakdown and control ethylene production. Ultimately dealying senescence and extend shelf life of fruits. This result partially similar with findings of Vattakunnel *et al.* (2015) [18] in chilli.

As the chilli plant transitions to flowering and fruit set, precise scheduling with application of 20%, 40% and 40% RDF at 2-42, 43-73 and 74-144 DAT with 6, 4 and 10 number of splits, respectively throughout life span of chilli crop (schedule-3) in the present investigation ensures that, critical nutrients like potassium (K) are available, when fruit cells are actively expanding and accumulating water, maximizing turgor. This dynamic, demand-driven approach optimizes the plant's internal water balance and nutrient utilization, directly translating to larger, plumper green chilli fruits with significantly higher moisture content. The results of the present study were partially similar with the findings of Mounika *et al.* (2018) [7] in capsicum.

Application of balance nutrients as per the chilli crop growth requirement directly into the root zone of plants. Particularly, the supply of nitrogen through fertigation schedule-3 at each critical crop growth stage and after and during each picking of green chilli fruits. Ultimately, enhances chloroplast development and efficient chlorophyll production in chilli leaves in this experimentation. This results were in accordance of Ughade *et al.* (2016) [15] in tomato, under polyhouse conditions.

Interaction effect on quality parameters

An interaction effect of fertigation levels and schedules on quality parameters like shelf life of green fruits, moisture content of fresh green fruits and chlorophyll content of leaf was found to be non-significant.

Tabel 3: Effect of fertigation levels and schedules on quality parameters of green chilli.

Treatment	Shelf life of green fruits (Days)	Moisture content of fresh green fruits (%)	Chlorophyll content of leaf (mg/100g)
Fertigation levels (F)			
F_1	4.48	75.61	15.87
F_2	5.77	79.85	17.50
F_3	6.31	83.64	19.34
F_4	6.47	84.98	19.51
'F' test	**Sig**	**Sig**	**Sig**
SE(m) ±	0.08	0.87	0.27
CD @ 5%	0.26	2.57	0.79
Fertigation schedules (S)			
S_1	5.03	78.79	17.47
S_2	6.03	81.20	18.21
S_3	6.22	83.07	18.48
'F' test	**Sig**	**Sig**	**Sig**
SE(m) ±	0.07	0.76	0.23
CD @ 5%	0.22	2.23	0.68
Interaction effect (F×S)			
'F' test	**NS**	**NS**	**NS**
SE(m) ±	0.15	1.52	0.47
CD @ 5%	-	-	-

Conclusion

On the basis of the results of the present investigation, it can be concluded that, maximum growth, yield and quality attributes of green chilli grown under protected conditions can be achieved by the application of 125% RDF through fertigation along with application of fertigation schedule S_3- (20% NPK at vegetative stage i.e 2-42 DAT with 6 splits, 40% NPK at reproductive stage i.e 43-73 DAT with 4 splits, 40% NPK at maturity stage i.e 74-144 DAT with 10 splits).

References

1. Anonymous. Indian horticulture database. New Delhi: National Horticulture Board; 2021. Available from: www.nhb.gov.in
2. Bhattarai P, Kaushik RA, Ameta KD, Kaushik MK, Jain HK, Sharma FL. Response of plant geometry and fertigation on quality attributes and leaf nutrient status of cherry tomato (*Lycopersicon esculentum* var. *cerasiforme*) under zero energy polyhouse conditions. Nepalese J Agric Sci. 2013;11:5-15.
3. Brahma S, Saikia L, Burua P, Hazarika T, Sarma B. Effect of fertigation with different levels of N and K fertilizers on growth, yield, quality and economics of early season capsicum (*Capsicum annuum* L. var. *grossum*) under cover. Veg Sci. 2010;37:160-163.
4. Ciba C, Syamala M. Drip fertigation's effect on nutrient contents of chilli (*Capsicum annuum*). Int J Curr Microbiol App Sci. 2017;6(11):3314-3320.
5. Kaur R, Singh SK, Raturi HC. Effect of different levels of fertigation and foliar application of nutrients on capsicum (*Capsicum annuum* L. var. *grossum*) grown in soilless media under polyhouse conditions. J Pharmacogn Phytochem. 2017;6(6):1770-1773.
6. Mounika D, Uma Devi M, Praveen Rao V, Avil Kumar K, Prabhakar BN. Effect of different N and K fertigation levels on growth parameters and yield of paprika (*Capsicum annuum* L.) under drip fertigation. Int J Pure Appl Biosci. 2018;6(5):329-338.
7. Mounika D, Uma Devi M, Praveen Rao V, Avil Kumar K, Prabhakar BN. Effect of different N and K fertigation levels on quality parameters and yield of paprika (*Capsicum annuum* L.) under drip fertigation. Int J Chem Stud. 2018;6(5):2956-2961.
8. Nandeshwar VN. Effect of planting geometry and fertigation levels on growth, yield and quality of chilli [PhD thesis]. Akola (India): Dr Panjabrao Deshmukh Krishi Vidyapeeth; 2019.
9. Ngupok O, Warade SD, Das S, Raghavan M. Effect of NPK on quality parameters of capsicum (*Capsicum annuum* L. var. *grossum*) under protected conditions. Int J Chem Stud. 2018;6(4):451-453.
10. Rawat SS. Standardization of NPK fertigation in tomato (*Solanum lycopersicum* L.) under naturally ventilated polyhouse [PhD thesis]. Pantnagar (India): G.B. Pant University of Agriculture and Technology; 2022.
11. Reddy GC, Hebbar SS, Nair AK, Raghupathy HB, Mallikarjuna Gowda AP, Umesha K. Growth and yield performance of hybrid hot pepper, chilli (*Capsicum annuum* L.) as influenced by fertigation and polyethylene mulching. J Hortl Sci. 2017;11(2):151-155.
12. Shilpa K, Uma Devi M, Kumar AK, Sridevi S. Effect of N and K fertigation levels on yield attributes, yield and water productivity of coloured capsicum (*Capsicum annuum* L. var. *grossum*) hybrids under shade net. J Res PJTSAU. 2019;47(4):33-37.
13. Singh A, Singh D, Bhatt L, Singh PK, Gautam P. Effect of fertigation and scheduling on growth attributes of cucumber under polyhouse. Pharma Innov J. 2022;SP-11(3):1718-1723.
14. Tekale CD, Thumbre AD, Tekale GS, Danawale NJ, Tambe ST. Effect of different fertigation levels and schedules on growth and yield of cucumber under polyhouse conditions. Int J Curr Res. 2014;6(7):7353-7355.
15. Ughade SR, Tumbare AD, Surve US. Total chlorophyll content and leaf water potential of tomato as influenced by fertigation under controlled environment condition. Int J Trop Agric. 2016;34(4):867-872.
16. Ughade SR, Tumbare AD, Surve US. Response of tomato to different fertigation levels and schedules under polyhouse. Int J Agric Sci. 2016;12(1):76-80.

17. Vasanthi BG, Srinivasappa KN, Manjunath B, Padmavathi M. Effect of fertigation levels and schedules on growth, yield and economic returns of tomato (*Solanum lycopersicum* L.). Int Res J Agric Econ Stat. 2017;8(2):320-324.
18. Vattakunnel PR, Rani TS, Geethakumari VL. Varietal influence on quality aspect of chilli under different growing conditions and fertigation. Green Farming. 2015;6(5):997-999.