THE ASIAN JOURNAL OF HORTICULTURE
Volume **9** | Issue 1 | June, 2014 | 10-17
e ISSN- 0976-724X | Open Access-*www.researchjournal.co.in* |

Research Paper

Article history :
Received : 06.09.2013
Revised : 18.03.2014
Accepted : 04.04.2014

Effect of different sources and levels of potassium on growth and yield of paprika (*Capsicum annuum* var. *longam*) cv. KtPl-19 under drip fertigation system

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ABSTRACT : Paprika is one of the important natural food colourants next to turmeric. Fertigation is known to play a vital role in enhancing the productivity and quality of many horticultural crops. Fertigation studies on paprika (*Capsicum annuum* var. *longum*) were carried out at the College orchard, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, during 2006-2009 to find out the effect of different sources and levels of potassium on growth and yield parameters of paprika. The results revealed that significantly higher growth and yield attributes *viz.*, plant height, number of branches per plant, higher fruit set percentage, number of fruits per plant, length of the fruit (cm), girth of the fruit (cm), pericarp thickness (mm),fresh fruit weight (g), fresh fruit yield per plant (g), dry fruit yield per plant (g), fresh fruit yield per plot (kg), dry fruit yield per plot (kg), fresh fruit yield per hectare (t) and dry fruit yield per hectare (t) were observed by the treatment T_7 *viz.*, drip fertigation with water soluble fertilizers at 100 per cent RDF using MAP, Multi-K, and SOP. Similarly, the same treatment was found to register significantly minimum number of days to first flowering and days to 50 per cent flowering.

KEY WORDS : Paprika, KtPl-19, Drip fertigation, Growth, Yield

HOW TO CITE THIS ARTICLE : Sathish, G., Ponnuswami, V., Geethalakshmi, I. and Sundharaiya, K. (2014). Effect of different sources and levels of potassium on growth and yield of paprika (*Capsicum annuum* var. *longam*) cv. KtPl-19 under drip fertigation system. *Asian J. Hort.*, **9**(1) : 10-17.

Natural food colourants are added to food products to impart high aesthetic appeal (Marmion, 1979), flavour, aroma (or) piquancy and colour to the foods (Srinivasan, 2000). Paprika is one of the important natural colourants next to turmeric colour extract (Anonymous, 1995). Paprika contains remarkable amount of the colouring material and is used as colourant in processed foods as they get the nod over synthetic products in the food colourant market (Prasath and Ponnuswami, 2008). Dried paprika powder and paprika oleoresin are the natural colour sources exempted from certification and can be used directly (Marmion, 1979). Synthetic colour and flavouring substances hitherto added in various food and cosmetic preparations are reported to be carcinogenic and, therefore, banned in many countries. This has resulted in huge demand for chilli and paprika oleoresin with high natural colourant and mild pungency. The world trade in paprika type oleoresin is showing a growing trend in recent years. The world trade in paprika (ground form) is estimated around 25,000 to 28,000 tonnes per annum, while oleoresin estimate reaches 400 to 500 tonnes per annum. Although 8.5 lakh tonnes of chillies are produced in India, the cultivation of paprika is meagre. India exports about 350 to 400 tonnes per annum (Anonymous, 2000). Paprika requires heavy manuring for proper growth and producing high yields (Anonymous, 1995). This warrants correct manuring practices with both organic and inorganic nutrients to get the desired growth and yield (Sharma *et al*., 1996 and Hedge, 1997). Besides, potassium improved fruit colour as well as oleoresin content in capsicum (Yodpetch, 2001). Recently use of SOP which suplies sulphur apart from K is also known to improve the growth, yield and quality of certain horticultural crops (Ramesh Kumar, 2004 in banana and Ananthi, 2002 in chillies). With this background, an investigation was taken up to determine the effect of certain aspects of fertigation involving water soluble and conventional fertilizers in paprika cv.KtPl-19 with reference to growth and yield traits.

RESEARCH METHODS

A field experiment was carried out at the College Orchard, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during the period from 2006 to 2009 with paprika var. Ktpl-19. The experimental field was located at 11o North latitude and 77^0 East longitude at an altitude of 426.6m above MSL. The soil of the experimental field was clayey loam in texture. The field experiment was laid out in a Randmized Block Design with seven treatments *viz*, (T_1)- 100 per cent recommended normal fertilizer applied to soil with furrow irrigation*, (T_2)-Drip fertigation with water soluble fertilizer at 50 per cent RDF using polyfeed + urea+ MOP**, (T_3)-Drip fertigation with water soluble fertilizer at 75 per cent RDF using polyfeed + urea+ MOP**, (T_4)-Drip fertigation with water soluble fertilizer at 100 per cent RDF using polyfeed + urea+ MOP**, (T_5)-Drip fertigation with water soluble fertilizer at 50 per cent RDF using MAP + multi-K + SOP**, (T_6)-Drip fertigation with water soluble fertilizer at 75 per cent RDF using MAP + multi-K + SOP**, (T_7)-Drip fertigation with water soluble fertilizer at 100 per cent RDF using MAP + multi-K + SOP** (** Water soluble fertilizers = MAP (12% N and 61%P), MOP (60% K), SOP (50%K and 18% S), multi K (13 % N and 45 % K) and polyfeed (19 % N, 19 % P and 19 % K) and replicated thrice. The recommended dose of N: P: K @ 120:100:120 kg per hectare (Horticulture Crop production manual, TNAU, 2004) was followed in the experiments. Fertigation was scheduled on alternative days starting from second week after planting. Beds of experimental unit consisted of $19m^2$ and seedlings planted with a spacing of 60 × 45 cm. Biometrical observations *viz.*, plant height (cm), number of branches per plant, days taken for 50 per cent flowering, fruit set (%), number of fruits per plant, length of the fruit (cm), girth of the fruit (cm), pericarp thickness (mm),weight of individual fruit (g), yield per plant (g), yield per plot (kg) and yield per hectare (t)were observed from randomly selected ten plants from each treatment and replication. The data were subjected to statistical analysis (Panse and Sukhatme, 1985).

RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation are presented in Table 1, 2, 3, 4, 5, 6, 7 and 8.

In paprika, plant vigour is being efficiently judged by optimum plant height besides production of sufficient primary and secondary branches which have a close relationship with fruit yield. Results on growth parameters *viz.*, plant height (cm), number of primary branches per plant and secondary branches per plant revealed highly significant difference among the treatments. In the pooled mean data analysis it was observed that, the highest plant height of 27.83 cm at vegetative stage, 40.47 cm at flowering stage and 61.58 cm at harvesting stage, and number of branches per plant of 4.09 at vegetative stage, 9.03 at flowering stage and 13.74 at harvesting stage were recorded by the treatment T_7. It was closely followed by the treatment T_6 which registered plant height values of 25.47 cm, 38.27 cm and 57.68 cm at vegetative flowering and harvesting stage, respectively and number of branches per plant values of 3.63 at vegetative stage, 8.22 at flowering stage and 12.80 at harvesting stage. While, the control treatment (T_1) recorded the lowest plant height (20.83 cm, 29.67 cm and 47.50 cm) and number of branches per plant (2.12 at vegetative stage, 4.81 at flowering stage and 9.21 at harvesting stage) at all the three stages of plant growth.

The fertigation treatments at two different seasons also showed significant difference for the traits plant height and number of branches per plant. The highest plant height values (27.52 cm and 30.15 cm at vegetative stage, 39.89 cm and 42.67

Table 1 : Effect of fertigation on morphological parameters (plant height, cm) at different stages of crop growth in paprika cv. KtP1-19

Treatments	Vegetative stage			Flowering stage			Harvesting stage		
	Season-I	Season-II	Mean	Season-I	Season-II	Mean	Season-I	Season-II	Mean
T_1	20.18	21.53	20.83	28.19	31.59	29.67	46.06	49.16	47.50
T_2	20.22	23.62	21.58	30.74	33.90	31.53	51.45	54.55	51.26
T_3	22.32	25.15	23.52	34.62	37.96	35.75	52.51	55.61	53.79
T_4	23.48	26.40	24.55	36.29	38.18	36.93	55.45	58.55	56.05
T_5	21.79	24.33	22.69	33.01	36.21	33.87	51.67	54.77	53.15
T_6	24.40	27.04	25.47	37.42	40.12	38.27	56.45	59.55	57.68
T_7	27.52	30.15	27.83	39.89	42.67	40.47	61.74	64.84	61.58
S.E.+	0.092	0.098	1.785	0.142	0.132	2.424	0.174	0.174	4.019
C.D. (P=0.05)	0.200	0.213	3.678	0.313	0.289	4.993	0.380	0.380	8.279
C.D. (P=0.01)	0.280	0.299	4.999	0.436	0.405	6.789	0.533	0.533	11.253

cm at flowering stage and 61.74 cm and 64.84 cm at harvesting stage) and number of branches per plant values (3.75 and 4.78 at vegetative stage, 8.90 and 9.82 at flowering stage and 13.50 and 14.78 at harvesting stage) were recorded by the treatment T_7 during both seasons. It was followed by T_6 (24.40 cm and 27.04 cm at vegetative stage, 37.42 cm and 40.12 cm at flowering stage and 56.45 cm and 59.55 cm at harvesting stage as plant height values and 3.21 and 4.23 branches at vegetative stage, 8.21 and 8.45 branches at flowering stage and 13.10 and 13.70 branches at harvesting stage during season I and season II, respectively. The lowest plant height of 20.18 cm and 21.53 cm (vegetative stage), 28.19 cm and 31.59 cm (flowering stage) and 46.06 cm and 49.16 cm (harvesting stage) and number of branches per plant of 2.21 and 2.25 at vegetative stage, 4.64 and 5.32 at flowering stage and 8.80 and 9.82 were recorded by control (T_1) during season I and II, respectively.

In the present study, the plant growth characters recorded at various stages of crop growth revealed that fertigation treatments involving water soluble fertilizers such as MAP, SOP and multi-K as a source of K tended to produce more vigorus paprika plant. Adequate levels of required nutrients, especially N and K in the root zone through fertigation, might have induced plant vigour. Supply of nutrients right from the early phase of plant growth through fertigation might have led to more IAA production and consequent stimulatory action in terms of cell elongation, thus resulting in an increased plant height. Role of sulphur available in SOP enhancing the plant growth may be were explained due to its stimulatory action in enhancing the chlorophyll content in the leaves concomitant with more photosynthate production (Srinivasan, 2000). The increased number of primary and secondary branches observed might be due to better sink developed by auxillary branches to a larger amount of available nutrients as reported by Maya (1996) in sweet pepper cv. California Wonder.

Overall assessment of influence of various fertigation treatments on vegetative characters of paprika brought to lime light that N and K, fertigated through water soluble fertilizers were very effective in building up a strong vegetative foundation, healthy enough for efficient physiological activities which inturn resulted in strong, favorable and higher yields.

It was observed that the treatment T_7 recorded the least number of days for 50 per cent flowering (42.81 days). It was followed by T_6 (44.81 days). Whereas, the treatment, T_1 (50.54 days) recorded the highest number of days to 50 per cent

Table 2 : Effect of fertigation on morphological parameters (Number of branches per plant) at different stages of crop growth in paprika cv.KtPl-19

Treatments	Vegetative stage			Flowering stage			Harvesting stage		
	Season-I	Season-II	Mean	Season-I	Season-II	Mean	Season-I	Season-II	Mean
T_1	2.21	2.25	2.12	4.64	5.32	4.81	8.80	9.82	9.21
T_2	2.64	2.98	2.62	5.14	6.69	5.61	9.70	11.98	10.45
T_3	2.93	3.09	2.88	6.68	7.69	6.88	11.60	13.10	12.11
T_4	2.98	3.89	3.30	7.57	8.40	7.73	12.60	13.40	12.52
T_5	2.43	2.78	2.67	5.63	6.82	6.12	10.40	12.82	11.41
T_6	3.21	4.23	3.63	8.21	8.45	8.22	13.10	13.70	12.80
T_7	3.75	4.78	4.09	8.90	9.82	9.03	13.50	14.78	13.74
S.E. +	0.019	0.032	0.260	0.058	0.052	0.526	0.055	0.056	0.815
C.D. (P=0.05)	0.040	0.070	0.536	0.123	0.113	1.082	0.120	0.121	1.679
C.D. (P=0.01)	0.056	0.098	0.727	0.176	0.159	1.471	0.168	0.170	2.281

Table 3 : Effect of fertigation on morphological parameter (Days to 50 % flowering) in paprika cv. KtPl-19

Treatments	Days to 50 per cent flowering		
	Season-I	Season-II	Mean
T_1	50.00	51.20	50.54
T_2	47.03	48.33	48.62
T_3	46.02	47.22	46.94
T_4	45.33	46.33	46.09
T_5	47.00	48.20	47.62
T_6	43.67	44.97	44.81
T_7	41.50	42.80	42.81
S.E. +	0.096	0.095	4.58
C.D. (P=0.05)	0.209	0.208	9.43
C.D. (P=0.01)	0.294	0.291	12.82

flowering and the treatments were significantly differed for this character in the pooled mean analysis.

The least number of days for 50 per cent flowering was recorded when the plants received 100 per cent RDF using MAP, multi- K and SOP through drip fertigation (T_7) during season I (41.50 days) and season II (42.80 days). It was followed by drip fertigation with water soluble fertilizers at 75 per cent RDF using MAP, multi- K and SOP (T_6) during season I (43.67 days) and season II (44.97 days). Whereas, the highest number of days for 50 per cent flowering was exhibited by soil application of 100 per cent RDF with furrow irrigation (T_1) during both season I (50.00 days) and season II (51.20 days).

Similarly significantly higher fruit set was recorded by the treatment T_7 (62.45 %). It was followed by T_6 (53.25 %). While, the lowest fruit set was recorded by control T_1 (42.94 %) in the pooled mean data analysis. Seasonal mean values for the fruit set revealed that the same treatment T_7 recorded the highest fruit set of 61.82 per cent (season I) and 63.47 per cent (season II) and it was followed by T_6 (52.82 per cent and 53.68 per cent, respectively during season I and II). Whereas, the lowest fruit set of 42.59 and 43.30 per cent during season I and II was recorded by T_1 (control).

The results of the present investigations showed that the treatment (T_7) induced early first flowering compared to control (T_1). Similar trend of results have been documented earlier by Verma *et al*. (1984). Singh *et al*. (1982) opined that node at which first female flower appearance in bitter gourd was lowest in seed treatment with micronutrients prior to sowing. Drip fertigation with 100 per cent water soluble fertilizers *viz.*, MAP, SOP and multi-K recorded less number of days to attain 50 per cent flower appearance. These results are in accordance with Ramano and Leonardi (1994) in tomato and Bhendi. Arun kumar (2000) also observed similar early flowering in tomato when water soluble fertilizers were used for fertigation. This might be due to the available nutrients in the root zone throughout the crop growth period would have enhanced synthesis of hormones such as cytokinins. It is in accordance with the earlier findings of Keng *et al*. (1981) and Takashahi *et al*. (1993). Better uptake of potassium by fertigation treatment would have helped better transport of cytokinin and metabolites towards the sink developed namely flower buds. Similar trend of results have been documented by Prabhakar *et al*. (2001) in chilli, Meenakshi and Vadivel (2003) in bittergourd and Kavitha (2005) in tomato.

Table 4 : Effect of fertigation on yield parameters (Fruit set (%) and number of fruits per plant) in paprika cv. KtPl-19

Treatments	Fruit set (%)			Number of fruits per plant		
	Season-I	Season-II	Mean	Season-I	Season-II	Mean
T_1	42.59	43.30	42.94(40.95)	20.20	21.40	20.80
T_2	44.27	45.64	44.95(42.09)	23.29	24.49	23.89
T_3	48.55	49.89	49.22(44.55)	27.62	28.82	28.22
T_4	50.63	51.74	51.18(45.23)	29.03	30.23	29.63
T_5	46.23	47.35	46.79(43.16)	25.21	26.41	25.81
T_6	52.82	53.68	53.25(46.86)	29.85	31.05	30.45
T_7	61.82	63.47	62.45(51.76)	32.52	33.72	33.12
S.E.+	0.133	0.124	0.090	0.150	0.150	0.106
C.D. (P=0.05)	0.289	0.270	0.187	0.327	0.227	0.218
C.D. (P=0.01)	0.406	0.379	0.254	0.458	0.458	0.297

*values in parenthesis are transformed values

Table 5 : Effect of fertigation on yield parameters (Fruit length, fruit girth, (cm) and pericarp thickness (mm) in paprika cv. KtPl-19

Treatments	Fruit length (cm)			Fruit girth (cm)			Pericarp thickness (mm)		
	Season-I	Season-II	Mean	Season-I	Season-II	Mean	Season-I	Season-II	Mean
T_1	11.82	12.92	12.37	2.90	2.98	2.94	1.58	1.97	1.77
T_2	13.38	13.48	13.43	3.17	3.25	3.21	2.24	2.42	2.33
T_3	12.69	13.78	13.23	3.67	3.75	3.71	2.56	2.60	2.58
T_4	12.90	14.00	13.45	4.28	4.36	4.32	2.61	2.64	2.63
T_5	12.66	13.76	13.21	3.47	3.55	3.51	2.35	2.40	2.37
T_6	13.07	14.17	13.62	4.51	4.59	4.55	2.71	2.80	2.76
T_7	14.66	15.76	15.21	4.95	5.03	4.99	3.00	3.25	3.13
S.E.+	0.032	0.031	0.022	0.027	0.027	0.019	0.016	0.014	0.010
C.D. (P=0.05)	0.069	0.068	0.046	0.058	0.058	0.037	0.035	0.032	0.021
C.D. (P=0.01)	0.960	0.095	0.062	0.081	0.082	0.053	0.049	0.043	0.030

Fruit characters and yield component:

All the fertigation treatments showed significant difference for number of fruits per plant, fruit length, fruit girth and pericarp thickness. The treatment T_7 registered the highest number of fruits per plant (33.12), fruit length (15.21 cm), fruit girth (4.55 cm) and pericarp thickness (3.13 mm) in the pooled mean. It was followed by T_6 (30.45). While, the lowest number of fruits per plant (20.80), fruit length (12.37 cm), fruit girth (2.94 cm) and pericarp thickness (1.77 mm) were recorded by the control (T_1) treatment.

Significantly higher number of fruits per plant (32.52 and 33.72), fruit length (14.66 cm and 15.76 cm), fruit girth (4.95 cm and 5.03 cm) and pericarp thickness (3.00 mm and 3.25 mm) were noticed by the plants when treated with drip fertigation with water soluble fertilizers at 100 per cent RDF using MAP, multi- K and SOP (T_7) during both the season I and II, respectively. It was closely followed by the treatment T_6, which registered 29.85 (season I) and 31.05 (season II) fruits per plant, 13.07 cm (season I) and 14.17 cm (season II) length fruit, 4.51 cm (season I) and 4.59 cm (season II) fruit girth and 2.71 mm (season I) and 2.80 mm (season II) pericarp thickness. Whereas, the lowest number of fruits per plant (20.20 and 21.40), fruit length (11.82 cm and 12.92 cm), fruit girth (2.90 cm and 2.98 cm) and pericarp thickness (1.58 mm and 1.97 mm) were recorded by the treatment T_1 during season I and II.

Fresh fruit weight (g):

It was observed that, significantly the highest fresh fruit weight (16.83 g), fresh yield per plant (555.64 g), dry fruit yield per plant (79.38 g), fresh fruit yield per plot (38.90 kg), dry fruit yield per plot (5.56 kg), fresh fruit yield per hectare (20.58 t ha^{-1}) and dry fruit yield per hectare (2.94 t ha^{-1}) were recorded by T_7 in the pooled mean. The treatments *viz.*, T_6 (15.10 g of fresh fruit weight, 458.08 g of fresh yield per plant, 65.44 g dry fruit yield per plant, 32.07 kg of fresh fruit yield per plot, 4.58 kg of dry fruit yield per plot, 16.96 t ha^{-1} of fresh fruit yield per hectare and 2.42 t $ha^{-1}$of dry fruit yield per hectare and T_4 (15.03 g of fresh fruit weight, 448.67 g of fresh yield per plant, 63.45 g dry fruit yield per plant, 31.08 kg fresh fruit yield per plot, 4.44 kg dry fruit yield per plot, 16.49 t $ha^{-1}$of fresh fruit yield per hectare and 2.35 t ha^{-1} of dry fruit yield per hectare ranked as next best. The lowest fruit weight (12.94 g), fresh

Table 6 : Effect of fertigation on yield parameters (fresh fruit weight, g) paprika cv. KtPl-19

Treatments	Fresh fruit weight (g)		
	Season-I	Season-II	Mean
T_1	12.92	12.95	12.94
T_2	13.42	13.45	13.44
T_3	14.52	14.56	14.54
T_4	15.01	15.05	15.03
T_5	14.20	14.25	14.23
T_6	15.08	15.12	15.10
T_7	16.81	16.85	16.83
S.E+	0.045	0.046	0.032
C.D. (P=0.05)	0.098	0.099	0.066
C.D. (P=0.01)	0.0137	0.139	0.089

Table 7 : Effect of fertigation on yield parameters (fresh and dry yield per plant (g $plant^{-1}$), fresh and dry yield per plot (kg $plot^{-1}$)) paprika cv. KtPl-19

Treatments	Fresh fruit yield per plant (g $plant^{-1}$)			Dry fruit yield per plant (g $plant^{-1}$)			Fresh fruit yield per plot (kg $plot^{-1}$)			Dry fruit yield per plot (kg $plot^{-1}$)		
	Season-I	Season-II	Mean	Season -I	Season -II	Mean	Season -I	Season -II	Mean	Season -I	Season -II	Mean
T_1	259.88	276.03	267.96	37.12	39.43	38.28	18.19	19.32	18.76	2.59	2.76	2.68
T_2	311.45	327.55	319.50	44.49	46.79	45.64	21.80	22.93	22.37	3.11	3.27	3.20
T_3	400.04	417.36	408.70	57.15	59.62	58.39	28.00	29.21	28.60	4.00	4.17	4.09
T_4	434.64	453.70	448.67	62.09	64.81	63.45	30.42	31.75	31.08	4.35	4.53	4.44
T_5	356.88	373.92	365.40	50.98	53.41	52.20	24.98	26.17	25.58	3.57	3.74	3.66
T_6	449.03	467.13	458.08	64.15	66.73	65.44	31.43	32.70	32.07	4.49	4.67	4.58
T_7	545.56	565.73	555.64	77.94	80.82	79.38	38.19	39.60	38.90	5.45	5.66	5.56
S.E.+	0.236	0.239	3.409	0.482	0.489	0.344	0.236	0.239	0.168	0.034	0.035	0.024
C.D. (P=0.05)	0.514	0.521	7.428	1.050	1.066	0.708	0.514	0.521	0.346	0.073	0.075	0.049
C.D. (P=0.01)	0.721	0.731	10.414	1.473	1.495	0.962	0.721	0.731	0.471	0.102	0.105	0.067

yield per plant (267.96 g), dry fruit yield per plant (38.28 g), fresh fruit yield per plot (18.76 kg), dry fruit yield per plot (2.68 kg), fresh fruit yield per hectare (9.93 t ha^{-1}) and dry fruit yield per hectare (1.42 t ha^{-1}) was recorded by T_1 (control).

Results of seasonal mean values revealed that the treatment T_7 registered the highest mean fresh fruit weight of 16.81 g and 16.85 g, fresh yield per plant of 545.56 g and 565.73 g, dry fruit yield per plant of 77.94 g and 80.82 g, fresh fruit yield per plot of 38.19 kg and 39.60 kg, dry fruit yield per plot of 5.45 kg and 5.66 kg, fresh fruit yield of 20.21 t ha^{-1} and 20.95 t ha^{-1} and dry fruit yield of 2.89 t ha^{-1} and 2.99 t ha^{-1} during season I and II, respectively. It was followed by T_6 (15.08 g and 15.12 g of fresh fruit weight, 449.03 g and 467.13 g of fresh yield per plant, 64.15 g and 66.73 g of dry fruit yield per plant, 31.43 kg and 32.70 kg of fresh fruit yield per plot, 4.49 kg and 4.67 kg of dry fruit yield per plot, 16.63 t ha^{-1} and 17.30 t ha^{-1} of fresh fruit yield and 2.37 t ha^{-1} and 2.47 t ha^{-1} of dry fruit yield during season I and II and T_4 (15.01 g and 15.05 g, 434.64 g and 453.70 g of fresh yield per plant, 62.09 g and 64.81 g of dry fruit yield per plant, 30.42 kg and 31.75 kg of fresh fruit yield per plot, 4.35 kg and 4.53 kg of dry fruit yield per plot, 16.17 t ha^{-1} and 16.80 t ha^{-1} and fresh fruit yield and 2.30 t ha^{-1} and 2.40 t ha^{-1} of dry fruit yield, respectively at season I and II). Whereas, the control (T_1) registered the lowest mean fruit weight of 12.92 g and 12.95 g, fresh yield per plant of 259.88 g and 276.03 g, dry fruit yield per plant of 37.12 g and 39.43 g, fresh fruit yield per plot of 18.19 kg and 19.32 kg, dry fruit yield per plot of 2.59 kg and 2.76 kg, fresh fruit yield of 9.63 t ha^{-1} and 10.22 t ha^{-1} and dry fruit yield of 1.37 t ha^{-1} and 1.46 t ha^{-1} during season I and II, respectively.

Significant and higher yield of paprika registered in the treatment T_7 could also be attributed to the simultaneous significant increase in the yield component *viz.*, pericarp thickness. Similar findings were also reported earlier by Patil (1995) in tomato, Ushakumari *et al.* (1996) in Bhendi and Singh *et al.* (1977) in chilli. The increase in fruit weight and number of fruits per plant might due to accelerated mobility of photosynthates from source to the sink as influenced by potassium and sulphur present in SOP (Di Candilo and Silvestri, 1994 and Tandon, 1995). Higher fruit weight might be attributed to increased plant vigour and physiological parameters resulting in higher dry matter production. The yield per plant, yield per plot and yield per ha were significantly improved by the application of nutrients through fertigation as they boosted the overall vegetative growth and biological efficiency of the plant. Constant and continuous supply of required water and nutrients in good soluble form, to the wetted area of root zone might have favoured the better availability of required nutrients where the active roots were concentrated. This might have inturn favoured better utilization of nutrients resulting in good plant vigour, favourable physiological activities culminating in higher yield. Fertigation with 100 per cent RDF with SOP, MAP and multi-K resulted in higher fruit yield which might be due to the presence of sulphur in SOP. In SOP, sulphur is available in the form of SO_4 which is water soluble and hence needs no further transformation in the soil for the plants to get it absorbed. Potassium also functioned as a mobilizer of photosynthates as well as other nutrients in plants could have helped in the promotion of early growth and vigour thereby increased the fruit yield (Ananthi, 2002). Sulphur also helps in energy transformation and activation of enzymes in carbohydrates metabolism and subsequently greater partitioning of photosynthates in yield attributes. Sulphur application increased the yield of plants since it is a constituent of certain amino acids and proteins (Ahmed and Thanki, 1991). Similar increase in yield under drip fertigation with water soluble fertilizers were also reported by Shivashankar (1999) in capsicum, Veeranna *et al.* (2000) and Singandhupe and Brahmanand (2000) in chillies.

Conclusion:

From the study, it was observed that the crop paprika responded well to the fertigation treatments. Among the different fertigation treatments, the water soluble fertilizer as nutrient source showed superior performance than the conventional fertilizer application. The results revealed that

Table 8 : Effect of fertigation on yield parameters (Fresh and dry fruit yield (t ha^{-1})) paprika cv. KtPl-19

Treatments	Fresh fruit yield (t ha^{-1})			Dry fruit yield (t ha^{-1})		
	Season-I	Season-II	Mean	Season-I	Season-II	Mean
T_1	9.63	10.22	9.93	1.37	1.46	1.42
T_2	11.54	12.13	11.83	1.65	1.73	1.69
T_3	14.82	15.46	15.14	2.12	2.21	2.17
T_4	16.17	16.80	16.49	2.30	2.40	2.35
T_5	13.22	13.85	13.53	1.89	1.98	1.94
T_6	16.63	17.30	16.96	2.37	2.47	2.42
T_7	20.21	20.95	20.58	2.89	2.99	2.94
S.E.+	0.125	0.127	0.089	0.018	0.018	0.013
C.D. (P=0.05)	0.272	0.276	0.183	0.039	0.041	0.027
C.D. (P=0.01)	0.383	0.387	0.249	0.055	0.057	0.036

significantly higher growth attributes *viz.*, plant height, number of branches per plant were recorded. When the plants treated with 100 per cent recommended dose of fertilizer as water soluble fertilizers (MAP, multi-K and SOP) through drip fertigation. Similarly, the same treatment was found to register significantly minimum number of days to 50 per cent flowering and higher fruit set percentage.

For yield component characters *viz.*, number of fruits per plant, fruit length (cm), fresh fruit weight (g), fresh fruit yield per plant (g), dry fruit yield per plant (g), fresh fruit yield per plot (kg), dry fruit yield per plot (kg), fresh fruit yield per hectare (t), dry fruit yield per hectare (t) the treatment drip fertigation with water soluble fertilizers at 100 per cent RDF using MAP, multi-K, and SOP registered the highest values.

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