International Journal of Agricultural Sciences
Volume **10** | Issue 2 | June, 2014 | 801-804
e ISSN–0976–5670 | Visit us | *www.researchjournal.co.in*

RESEARCH PAPER

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

G. SATHISH, V. PONNUSWAMI*[1], I. GEETHALAKSHMI[2], M.S. MARICHAMY[3] **AND** K. SUNDHARAIYA[4]
Horticultural Research Station (T. N.A.U.) COIMBATORE (T.N.) INDIA (Email : gskspice@gmail.com)

Abstract : Investigations were carried out in paprika (*Capsicum annuum* var. *longam*) cv.Ktpl19 at the Department of Spices and Plantation Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. To study the influence of drip fertigation on quality traits, the experiment was conducted for two seasons *viz.*, season I (June 2007- Jan 2008) and season II (July 2008- Feb 2009) to get the concurrent result. The experiment was laid out in a Randomized Block Design, replicated thrice with seven treatments. The data on quality traits *viz.*, ascorbic acid (mg 100^{-g} of fruit), oleoresin content (%), capsaicin content (%) were taken from randomly selected plants and were statistically analyzed. The result shows that significantly higher ascorbic acid content of 94.67 mg 100^{-g} of fruit and oleoresin content of 15.17 per cent was observed in T_7. It was followed by T_6 of ascorbic acid content of 87.20 mg 100^{-g} of fruit and oleoresin content of 14.12 per cent. Low capsaicin content of 0.018 per cent were registered when the plants were supplied with water soluble fertilizers at 100% RDF using MAP, Multi-K and SOP through drip irrigation during both the seasons. It was followed by T_1 of higher capsaicin content of 0.029 per cent.

Key Words : Paprika, *Capsicum annuum* var. longam, Drip fertigation, Ascorbic acid, Oleoresin content, Capsaicin content

View Point Article : Sathish, G., Ponnuswami, V., Geethalakshmi, I., Marichamy, M.S. and Sundharaiya, K. (2014). Effect of different sources and levels of potassium on quality of paprika (*Capsicum annuum* var. longam) cv. KtPl-19 under fertigation system. *Internat. J. agric. Sci.*, **10** (2) : 801-804.

Article History : Received : 16.12.2013**; Revised :** 12.05.2014**; Accepted :** 21.05.2014

INTRODUCTION

Capsicum in a fresh state is very rich in vitamin C (ascorbic acid), as was shown by Szent Gyorgyi, the Hungarian scientist, who was awarded the Noble prize in 1937 for isolating Vitamin C from paprika fruits (Anu and Peter, 2000). Paprika is classified into two forms, the nondried vegetable type called as 'Sweet paprika' (Bell pepper types) and the dried non-pungent types as 'Spice paprika' (Verma and Joshi, 2000). 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.

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). The application of paprika and its oleoresin as a colour additive

*** Author for correspondence**
[1]Horticultural Research Station (T.N.A.U.), KODAIKANAL (T.N.) INDIA (Email : swamyvp2002@yahoo.co.in)
[2]Regional Research Station (T.N.A.U.), Aruppukottai, VIRUDHUNAGAR (T.N.) INDIA (Email : geethahorty@yahoo.in)
[3]Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture, Karaikal, PUDUCHERRY (U.T.) INDIA (Email : marichamy.ms@gmail.com)
[4]Horticultural College and Research Institute (T.N.A.U.), PERIYAKULAM (T.N.) INDIA (Email : aiya_hort@rediffmail.com)

frequently overlaps its use as a spice. The commercial importance of paprika both as a spice and a vegetable with large scale cultivation in both tropical and subtropical regions are increasing at an alarming rate. 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). Further, micronutrients such as S, Mg and Ca are also known to considerably influence the growth, yield and quality of paprika. Balanced fertilization with sulphur enhances the quality in paprika, particularly the ascorbic acid content (Ni, 1993). The world trade in paprika type oleoresin is showing a growing trend in recent years. Besides it can reduce the fertilizer usage, minimize leaching by rain and excessive irrigation and maximize the fertilizer use efficiency. Recently use of SOP which suplies sulphur apart from K is also known to improve the 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 quality characters.

MATERIAL AND METHODS

A field experiment was conducted at the University Orchard, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in Randmized Block Design (RBD) with three replications on clayey loam soil with pH of 8.1 and EC of 0.80 ds/m and available chemical constituents of 217.0, 17.0, 382.0, 8.40, 2.15, and 5.20 kg/ ha N, P, K, Ca, Mg and S, respectively. The treatments 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)) will taken up for the experiment. The spacing adopted was 60cm between rows and 45 cm between plants. The fertilizer dose of N: P: K @ 120:100:120 kg per hectare was applied uniformly for all the experiments. Other cultural practices and plant protection measures were given according to the recommendation of TNAU, Coimbatore. Biometrical observation on quality traits *viz.*, Ascorbic acid (mg 100^{-g} of fruit), Oleoresin content (%), Capsaicin content (%) were estimated as per the standard procedure. The data were subjected to statistical analysis (Panse and Sukhatme, 1985) and the results are presented in Tables 1.

Biometrical observation on quality traits *viz.*, Ascorbic acid (mg 100^{-g} of fruit), Oleoresin content (per cent), Capsaicin content (%) were estimated as per the standard procedure.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Ascorbic acid (mg $100\,g^{-1}$ of fruit) :

It was observed that the fertigation treatments had significant influence on ascorbic acid content of the fruits in

Table 1 : Effect of fertigation on quality parameters of crop growth in paprika cv. KtPl-19

Treatments	Ascorbic acid content (mg 100 g^{-1} of fruit)			Oleoresin content (per cent)			Capsaicin content (per cent)		
	Season		Mean	Season		Mean	Season		Mean
	I	II		I	II		I	II	
T_1	75.31	77.69	76.50	12.12 (20.37)	12.14 (20.39)	12.13 (20.38)	0.029 (0.98)	0.030 (0.99)	0.029 (0.98)
T_2	81.50	84.55	83.03	12.75 (20.92)	13.40 (21.46)	13.07 (21.19)	0.027 (0.94)	0.028 (0.95)	0.027 (0.94)
T_3	84.00	86.18	85.09	13.55 (21.60)	13.75 (21.76)	13.65 (21.68)	0.022 (0.84)	0.023 (0.86)	0.022 (0.85)
T_4	86.18	87.10	86.64	13.80 (21.80)	13.90 (21.89)	13.85 (21.84)	0.021 (0.82)	0.021 (0.82)	0.021 (0.82)
T_5	83.15	86.00	84.58	13.10 (20.95)	13.55 (21.48)	13.32 (21.21)	0.024 (0.88)	0.025 (0.90)	0.024 (0.89)
T_6	87.05	87.36	87.20	14.00 (21.97)	14.25 (21.18)	14.12 (21.97)	0.019 (0.78)	0.020 (0.81)	0.019 (0.79)
T_7	94.24	95.10	94.67	15.10 (22.86)	15.25 (22.89)	15.17 (22.88)	0.018 (0.76)	0.019 (0.78)	0.018 (0.77)
SEd	0.205	0.183	0.137	0.029	0.027	0.020	0.003	0.002	0.002
C.D. (P=0.05)	0.447	0.398	0.283	0.064	0.059	0.041	0.007	0.006	0.004
C.D. (P=0.01)	0.627	0.558	0.385	0.090	0.083	0.056	0.009	0.008	0.006

*values in parenthesis are transformed values

the pooled mean analysis and seasonal mean analysis as well. In the pooled mean analysis the highest ascorbic acid content value of 94.67 mg 100 g^{-1} of fruit was recorded by T_7. It was followed by T_6 87.20 mg 100 g^{-1} of fruit. While, the lowest value of 76.50 mg 100 g^{-1} of fruit as ascorbic acid content was noticed by T_1 (control).

Similarly the same treatment T_7 recorded the highest ascorbic acid content values of 94.24 mg 100 g^{-1} and 95.10 mg 100 g^{-1} of fruit during both season I and II, respectively. It was followed by T_6 (87.05 mg 100 g^{-1} of fruit and 87.36 mg 100 g^{-1} of fruit during season I and season II, respectively). The lowest ascorbic acid content of 75.31 mg100 g^{-1} of fruit (season I) and 77.69 mg 100 g^{-1} of fruit (season II) was recorded by T_1 (control) (Table 1).

Oleoresin content (%) :

In pooled mean analysis it was observed that the highest oleoresin content value of 15.17 per cent was noticed by T_7. It was followed by T_6 (14.12 %). While the lowest oleoresin content value of 12.13 per cent was noticed by T_1 control. Significant difference was also noticed between the treatments for this trait in the pooled mean analysis.

Results of seasonal mean analysis also showed significant difference. The highest ascorbic content value of 15.10 per cent (season I) and 15.25 per cent (season II) was recorded by T_7 and it was followed by T_6 (14.00 per cent and 14.25 per cent during both season I and II, respectively). While the lowest oleoresin content of 12.12 per cent (season I) and 12.14 per cent (season I) was recorded by T_1 (control) (Table 1).

Capsaicin content (%) :

In pooled mean analysis it was found that significantly lower capsaicin content was recorded by T_7 (0.018 %) It was followed by T_6 (0.019 %) whereas the highest capsaicin content of 0.029 per cent was recorded by T_1.

It was observed that the different treatments of the present study showed significant difference for the fruit capsaicin content during season I and II, respectively. The lowest capsaicin content was noticed by T_7 (0.018 and 0.019 %) during season I and II. It was followed by T_6 (0.019 and 0.020 %) during both season I and II, respectively. While, the highest capsaicin content of 0.029 and 0.030 per cent was observed by T_1 during season I and II, respectively (Table 1).

In any crop production system, the primary objective is to obtain maximum fruit yield per unit area without affecting the prime fruit quality. The fruit quality in paprika is mainly judged by oleoresin, capsaicin and ascorbic acid contents. In the present investigation, oleoresin and ascorbic acid contents in fruits were always found to be higher with drip fertigation including 100 per cent RDF having SOP, MAP and Multi-K. The increased oleoresin content might be due to increased accumulation of minerals, amino acids and dry matter production (Ananthi *et al.*, 2004 and Majumdar *et al*., 2000).

Potassium improved fruit colour as well as oleoresin content as reported by Yodpetch (2001). These effects of K were due to its involvement in carbohydrate synthesis, break down and translocation of starch, synthesis of protein and neutralization of physiologically important organic acids (Tisdale *et al*., 1997). Besides, K is also involved in phloem loading and unloading of sucrose and amino acids and storage in the form of starch in developing fruits by activating the enzyme starch synthase (Magen, 1995). Increase in ascorbic acid content observed may be due to balanced fertilization with sulphur as reported by Ni (1993). Potassium and sulphur could have helped hand in hand to slow down the enzyme system that encouraged the oxidation of ascorbic acid, thus helping the plants to accumulate more ascorbic acid content in the fruits (Ananthi, 2002).

REFERENCES

Ananthi, S. (2002). Comparative efficacy of murite of potash and sulphate of potash on yield attributes and economics of chilli (*Capsicum annuum* L.). Ph.D. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore, T.N. (INDIA).

Ananthi, S., Veeraragavathatham, D. and Srinivasan, K. (2004). Influence of sources and levels of potassium on quality attributes of chilli (*Capsicum annuum* L.). *South Indian Hort.*, **52**(1-6):152-157.

Anonymous (1995). Tips for Paprika Cultivation. Spice India, May 16-18.

Anu, A. and Peter, K.V. (2000). The chemistry of paprika. *Capsicum & Egg Plant News l.*, **19** : 19-22.

Hedge, D.M. (1997). Nutrient requirement of solanaceous vegetable crops. Extension Bulletin ASPAC, Food and fertilizer Technology Center. No. 441-9.

Magen, H. (1995). Fertigation: An overview of some practical aspects. *Fert. News*, **40**(12): 97-100.

Majumdar, S.P., Meena, R.L. and Baghel, G.D.S. (2000). Effect of levels of compaction and potassium on yield and quality of tomato and chilli crop grown on highly permeable soils. *J. Indian Soc. Soil Sci.*, **48**(2): 215-220.

Marmion, D.M. (1979). *Handbook of U.S. colorants for foods, drugs and cosmetics.* John Woley and Sons, Inc. NEW YORK, U.S.A.

Ni, W.Z. (1993). Annual report. Zhejiang Agricultural university. Hangzhou, China.

Panse, V.G. and Sukhatme, P.V. (1985). *Statistical methods for agricultural workers.* ICAR, New Delhi. pp.134-192.

Prasath, D. and Ponnuswami, V. (2008). Breeding for extractable colour and pungency in *Capsicum*- A review. *Veg. Sci.*, **35**(1) : 1-9.

Ramesh Kumar, A. (2004). Studies on the efficacy of sulphate of potash (SOP) on growth, yield and quality of banana. Ph.D. (Hort.).Thesis, Tamil Nadu Agricultural University, Coimbatore, T.N. (INDIA).

Sharma, B.R., Chadha, AP.S. and Bajpai, H.K. (1996). Response of chilli (*Capsicum annuum* L.) to nitrogen and phosphorus levels under irrigated condition. *Adv. Plant Sci.,* **9** : 213-214.

Tisdale, S.L., Nelson, W.L., Beaton, J.D. and Harlin, J.L. (1997). *Soil fertility and fertilizers.* Prentice Hall of India Pvt. Ltd., New Delhi. pp. 109-346.

Verma, T.S. and Joshi, S. (2000). Status of paprika development in India. *Indian J. Arecanut, Spices & Medicinal Plants,* **2**(2) : 40-44.

Yodpetch, C. (2001). Study on the optimum fertilizer rates on yield and quality of 3 long cayenne peppers. *Natural Sci.,* **32**(5): 37-45.