



Effect of pruning intensity and different levels of potassium chloride on physico-chemical attributes of phalsa fruits (*Grewia subinaequalis* D.C.)

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Abstract: The present investigation was carried out during the year 2014-15. The experiment was laid out in Factorial Randomized Block Design with nine treatments and replicated in three times, considering two plants as a unit. The treatments significantly increased the quality of phalsa fruits. The maximum fruit length (1.26cm) & width (1.11cm), weight of 50 fruits (46.35g), pulp: stone ratio (1.21), total soluble solids (27.00° Brix), reducing sugar (15.05%), non reducing sugar (3.96%), total sugars (19.01%), minimum acidity (1.96%) and maximum ascorbic acid (36.50 mg/100 g pulp) were recorded with the spray of KCl @ 0.4 per cent at 50 cm pruning intensity.

Key Words: Foliar application of nutrients, Physico-chemical attributes of phalsa

Introduction

Phalsa (*Grewia subinaequalis* D.C.), a subtropical fruit, belongs to family Tiliaceae with chromosome no. (2n) = 36. Phalsa is native to India. Fruit is known as berry. It has 41 genera and 400 species, A wild species *Grewia elastica* grown on lower hills all over India. Phalsa, belongs a hardy plant, can with stand drought and can be grown under adverse climatic conditions. It requires distinct winter and summer for better yield and fruit quality. There is no improved variety of phalsa. Some local selections, Local and Sharbati are popular. Two distinct types tall and dwarf have been recognized. Dwarf type is commonly grown. It is quite productive (Singh, 2002). It is commercially grown in Uttar Pradesh, Punjab, Haryana, West Bengal, Gujarat, Maharashtra, Andhra Pradesh and Bihar. It has high nutritional and medicinal value containing iron, vitamin 'A', 'C' and phosphorous. It contains about 50-60% juice, 10-11% sugar, 2-2.5% acids, calories 329 per lb (724 per kg), moisture 81.13%, protein 1.58%, fat 1.82% and crude fiber 1.77%. Its medicinal qualities are known since Vedic times. It is mostly consumed as fresh fruit and has cooling effect on human system. The fruits are somewhat astringent. They help in cure inflammation, heart and blood disorders fever and constipation. The fruits are used for making excellent juice and squash. In addition to nutrient intensity and pruning has also been reported to manage plant canopy and enhance the flowering, fruiting, yield and quality of many fruit crops (Singh, 2008 and Ali *et al.*, 2001). It bears small berry like fruits of deep reddish brown colour with sub acidic in

taste. The main problem in phalsa cultivation is the uneven ripening and small fruit size which are to be picked individually. Considering the importance of phalsa there is greater need to initiate the nutrient management programme to increase fruit size and fruit yield. The present investigation was therefore, undertaken to evaluate the effect of foliar feeding of nutrients on vegetative growth and fruit yield.

The objectives of study to find out the effect of pruning intensity and different levels of Potassium chloride on physico-chemical attributes of phalsa fruits.

Materials and Methods

The experiment was conducted at departmental, Main Experiment Station (Horticulture), Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad during 2014-15 growth season. Twenty five year old plants of phalsa having uniform vigour were selected for present investigations. The experiment was conducted in Factorial Randomized Block Design (R.B.D.) with nine treatments which were replicated three times, considering two plant unit. T₁: 0 cm+ Water Spray, T₂: 0 cm+ KCl 0.2%, T₃: 0 cm+ KCl 0.4%, T₄: 25 cm+ Water Spray, T₅: 25 cm+ KCl 0.2%, T₆: 25 cm + KCl 0.4%, T₇: 50 cm+ Water Spray, T₈: 50 cm+ KCl 0.2%, T₉: 50 cm + KCl 0.4%.

Pruning was done in first week of February and first spray of nutrient in second fortnight of March (Pre blooming Stage) and second spray just after fruit setting. The observations regarding fruit length(cm), fruit width(cm), weight of 50 fruits(g), pulp: stone ratio, total soluble solids (° Brix), reducing sugar (%), non reducing

sugar (%), total sugars(%)Lane and Eynon (1943), acidity per cent and ascorbic acid(mg/100 g pulp) A.O.A.C. (1970) were recorded at the time of fruit picking. The data were analysed statistically and results were evaluated at five per cent significance(Panse and Sukhatme ,1985).

Results and Discussion

Data presented in table -1 reveal that most of the treatments proved to improve the physico-chemical characters of phalsa over control. The maximum fruit size varied significantly due to various nutrient spray and pruning levels. The maximum fruit length(1.26cm) & width (1.11cm), weight of 50 fruits (46.35g), pulp: stone ratio (1.21), total soluble solids(27.00° Brix), reducing sugar (15.05%), non reducing sugar (3.96%), total sugars (19.01%), minimum acidity (1.96%) and maximum ascorbic acid(36.50 mg/100 g pulp) were recorded with the spray of KCl @ 0.4 per cent at 50 cm pruning intensity. The weight of fifty fruits was significantly influenced by nutrient spray and pruning levels. However, the highest weight of fifty fruits was observed with foliar spray of KCl @ 0.4 per cent and pruning at 50cm above ground level. The present findings is in close agreement with the result of Arora and Yamdagni (1985) in fruiting of sweet lime; Singh *et al* (2001) in aonla and Kumar (2004) in litchi. Pulp: stone ratio varied significantly with pruning levels and nutrients . The highest pulp:stone ratio was noted with foliar spray of KCl @ 0.4 per cent and 50 cm pruning above from the ground level. The interaction between pruning levels and nutrients spray on pulp stone ratio was found non-significant.

Total soluble solids in fruits have been enhanced significantly by spray of KCl @ 0.4 per cent. Pruning levels had also significant effect on TSS content in fruits and the maximum TSS was recorded at 50 cm pruning above the ground level. The increase in TSS content of fruit may be explained by fact that the applied nutrients (K and Cl) are helpful in photosynthesis which ultimately lead to the accumulation of carbohydrates which helps in increase of TSS content of fruits. Potassium is known to help the translocation of sugars and other metabolites towards developing fruits. Chlorine may play a role in activating certain enzymes involved in production of sugars and metabolites. The present result are confirmed with the findings of Singh *et al* (1995) in ber; and Rathore *et al* (2008) in phalsa. The reducing, non reducing and total sugars contents in fruit juice of phalsa have been increased significantly by nutrients spray and pruning levels. However, noted the highest level of reducing, non- reducing and total sugars with foliar spray of KCl @ 0.4 per cent and pruning at 50 cm above ground level. The significant increase in sugar contents might be due to accumulation of carbohydrates in fruits as a result of increased supply/ absorption of potassium chloride. Similar findings are also reported by Bhati and Yadav (2005) in ber.

Acidity per cent in fruit juice was reduced significantly by nutrient spray. The less acidity per cent was noted with the effect of potassium chloride with the spray 0.4 per cent and pruning at 50 cm above ground level. The reason for decrease in acidity due to nutrients application (K) might be due to increase translocation of

Table -1: Effect of pruning intensity and different levels of Potassium chloride on physico - chemical attributes of phalsa fruits

Pruning intensity	Fruit length (cm)	Fruit width (cm)	Wt. of fifty fruits (g)	Pulp-stone ratio	T.S.S. (° Brix)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugars (%)	Acidity (%)	Ascorbic acid (mg/ 100 g pulp)
P ₁	1.12	0.97	41.66	1.09	20.66	12.79	2.88	15.62	2.45	30.93
P ₂	1.15	0.99	43.33	1.12	21.33	13.37	3.39	16.76	2.26	32.82
P ₃	1.18	1.02	44.11	1.16	23.44	14.00	3.61	17.62	2.16	33.83
SEm	0.010	0.010	0.50	0.007	0.65	0.20	0.091	0.18	0.050	0.17
CD	0.023	0.035	1.51	0.021	1.95	0.60	0.27	0.55	0.15	0.53
Nutrients										
C ₀	1.12	0.96	41.44	1.09	17.77	12.49	2.89	15.33	2.45	30.87
C ₁	1.13	0.98	42.88	1.11	22.44	13.35	3.37	16.70	2.25	30.87
C ₂	1.20	1.04	44.77	1.16	25.22	14.34	3.63	17.97	2.18	32.37
SEm	0.010	0.010	0.50	0.007	0.65	0.30	0.091	0.18	0.050	34.33
CD	0.023	0.035	1.51	0.021	1.95	0.60	0.27	0.55	0.15	0.17
Interaction										
P ₁ C ₀	1.11	0.95	40.66	1.06	17.00	12.04	2.51	14.40	2.55	29.66
P ₁ C ₁	1.12	0.96	41.66	1.10	17.35	12.71	2.96	15.68	2.45	30.96
P ₁ C ₂	1.13	0.98	42.00	1.12	19.00	12.72	3.20	15.92	2.35	32.00
P ₂ C ₀	1.11	0.96	41.66	1.09	21.00	12.68	2.98	15.66	2.41	31.63
P ₂ C ₁	1.13	0.98	43.00	1.12	22.00	13.08	3.45	16.53	2.18	32.50
P ₂ C ₂	1.15	0.99	44.00	1.14	24.33	14.23	3.68	17.92	2.17	33.00
P ₃ C ₀	1.16	1.00	42.66	1.12	24.00	13.65	3.15	16.81	2.40	31.50
P ₃ C ₁	1.20	1.03	45.35	1.16	24.66	14.31	3.76	18.08	2.16	35.00
P ₃ C ₂	1.26	1.11	46.35	1.21	27.00	15.05	3.96	19.01	1.96	36.50
SEm	0.0035	0.003	0.16	0.002	0.21	0.067	0.030	0.060	0.016	0.058
CD	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.174

P1: 0 cm pruning above ground level; P2: 25 cm pruning above ground level ; P3: 50 cm pruning above ground level; C₀ : Water Spray; C₁ : KCl - 0.2 %; C₂ : KCl - 0.4%

carbohydrates and increase metabolism due to conversion of acids to sugar. The finding is in agreement to Singh *et al* (1995) in ber cv. Umran. It is evident from the table-1 that ascorbic acid content (mg/100g pulp) in fruit juice has been significantly increased with nutrients spray and pruning levels. However, the highest ascorbic acid was recorded with the use of KCl @0.4 per cent along with pruning at 50 cm above ground level closely followed by spray of KCl @ 0.2 per cent along with pruning at 50cm above ground level. The increase in ascorbic acid content may be attributed to quality improving properties of Potassium Chloride. Potassium is assigned the role of 'quality nutrient' and may help in synthesis of ascorbic acid in developing fruits.

Another reason might be due to increase in synthesis of catalytic activity of several enzymes and co-enzymes which are instrumental in ascorbic acid synthesis. The result is in agreement with the findings of Ghanta and Dwivedi (1993) in banana and Singh *et al* (1995) in ber.

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