

Effect of some nutrients and growth retardant on fruit quality of Wood apple (*Feronia limonia* Swingle)

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ABSTRACT

The experiment on wood apple (*Feronia limonia* Swingle) conducted at the Horticultural Research Station, Mondouri of Bidhan Chandra Krishi Viswavidyalaya to find out the effect of some nutrients and growth retardant on fruit quality of wood apple. The experiment was laid out in a RCBD with five treatments viz., T_1 - CCC at 0.2 percent, T_2 - KNO_3 at 2.0 percent, T_3 - $ZnSO_4$ at 1.0 percent, T_4 - MAP at 0.8 percent and T_5 - control which were replicated four times. The results of the investigation revealed a significant effect of some nutrients and growth retardant on fruit quality of wood apple. Fruit length (7.22 cm), girth (23.17 cm), weight (202.75 g) and pulp contents (67.14 %) were significantly increased in T_1 followed by T_2 (7.21cm, 22.63 cm, 200g and 65.79%), while minimum was observed in T_5 (6.29cm, 19.27cm, 119.25g and 62.50 %). Similarly, the highest TSS (17.35° Brix), and lowest acidity (2.60 %) were found in T_1 followed by T_2 (16.60° Brix, 2.72 %) and the lowest TSS and highest acidity was observed in T_5 (14.95° Brix, 3.10 %). The Vitamin C, Total sugar and reducing sugar were found non-significant. The highest Vitamin C content (4.13mg/100g) was found in T_2 and the lowest in T_5 (3mg/100g). Total sugar 8.28 % and reducing sugar 2.90% were noted in T_1 followed by T_2 (7.72%, 2.81 %) and the lowest in T_5 (7.36 %, 2.52%). Therefore, it was concluded that CCC at 0.2 percent and KNO_3 at 2 percent were found effective for increasing fruit quality of wood apple among the treatments.

Keywords: CCC, fruit quality, KNO_3 , mono ammonium phosphate, wood apple, $ZnSO_4$

INTRODUCTION

Wood apple (*Feronia limonia* Swingle; syns. *Limonia acidissima* L.) is a deciduous perennial plant that belongs to the family Rutaceae. In Bengali, it is called katha bel. It is reported to be originated to India. The fruits are eaten as fresh, used for making chutney and jelly. The pectin content of the pulp is 3 to 5% (Krishna *et al.*, 2019). Fruit pulp also has many medicinal properties like when unripe, it is used for halting diarrhea, dysentery, high cough, sore throat, the pulp has also anti-inflammatory, antipyretic and analgesic activity. The pulp with honey and pipili (*Piper longum*) is used for curing hiccup and difficulties in breathing (Das, 2018). Leaves and stem bark of *Limonia acidissima* have been practised for anti-tumour and antimicrobial activity (Ahamed *et al.*, 2008; Bagul *et al.*, 2019). Growth retardant like CCC and nutrients i.e. nitrogen, phosphorus, potassium and zinc play an important role to increase fruit quality of many fruit crops like kinnow mandarin (Gurjar and Rana, 2014), grape (Kumber *et al.*, 2017; Salem *et al.*, 2004) and sapota

(Agrawal and Dikshit, 2010). In this view a study was conducted to find out the effect of some nutrients and growth retardant on fruit quality of wood apple.

MATERIALS AND METHODS

The present experiment was conducted at the Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal, India during the period of 2016- 2018. The soil texture of the experimental field was sandy loam having 6.8 pH. The experimental site was situated in the sub-tropical humid climate where summer and winter both are short and mild. Maximum temperature was ranging from 35.62°C to 23.35°C and that of the minimum temperature from 23.75°C to 8.09°C during the period of the investigation. Major rainfall was received during the month of June and July. The relative atmosphere humidity prevailed during the period of the experiment varied from 91.32 % to 66.04 %. The experiment was laid out in a Randomized Complete Block Design (RCBD). Which comprised of five treatments viz., T_1 - CCC (cycocel) at 0.2 percent,

T₂ - KNO₃ (potassium nitrate) at 2.0 percent, T₃ - ZnSO₄ (zinc sulphate) at 1.0 percent, T₄ - MAP (mono ammonium phosphate) at 0.8 percent and T₅ – control and replicated four times. The total number of experimental plants was twenty (10 years old) and plant spacing was 5m. × 5m. Two times spraying was done, first on 10th November 2016 (before bud formation) and second on 10th February 2017 (before flower opening). For physical and chemical analysis of fruits, three fruits for each plant were collected randomly at mature stage. The fruits were then brought to the laboratory and measured. The observations recorded were fruit weight (g), fruit length (cm), fruit girth (cm) and fruit pulp (%). Total soluble solids content (TSS) of fruits estimated with the help of a digital hand refractometer (range 0- 53%) and calibrated at 0° Brix at 20°C, Total titratable acidity content (%) of the fruits was estimated by titrating the aqueous extract of the known quality of fruit juice against N/10 NaOH alkali solution using phenolphthalein as an indicator and expressed as a percentage (Rusk, 1969). For vitamin C (mg/100g), total sugar (%) and reducing sugar (%) analysis of fruits, the methods were followed as described by A. O. A. C. (1984).

RESULTS AND DISCUSSION

Fruit physical characters i.e. fruit length, girth, weight and pulp content was found significantly improved by foliar application of CCC, KNO₃, ZnSO₄ and MAP. The highest fruit length (7.22 cm), girth (23.17 cm), weight (202.75 g) and pulp content (67.14 %) were found with the application of CCC at 0.2% (Table 1) as compare to control (6.29 cm, 19.27 cm, 119.25 g, 62.50 %). The increase in physical characters of fruit due to application of CCC may be attributed to increased accumulation of assimilates and further translocation of extra metabolites through better partitioning towards reproductive growth. The result was supported by Agrawal and Dikshit (2008; 2010), they noted that a significant increase in fruit length, diameter, weight, volume of fruit, pulp thickness, pulp as well as peel weight of fruits of sapota were recorded with the increasing concentration of Cycocel. Similar result was also found by Tripathi and Shukla (2006) in strawberry cv. Chandler when they

applied Cycocel (CCC) at 1000 ppm and found highest fruit width.

TSS and acidity of wood apple fruits differed significantly (Table 2) and CCC at 0.2% was found the best in all case with the highest TSS 17.35 °Brix, and the lowest acidity 2.60 % as compare to control (TSS 14.95° brix and acidity 3.10 %). Similar result was found by Kumber *et al.* (2017) in grape cv. 2A Clone when they applied CCC 750 ppm. In their experiment they found highest total soluble solids (22.01°Brix) and the lowest acidity (0.59 %) as compared to other treatments. In another experiment, Mahalle *et al.* (2010) in acid lime found similar result and they reported that TSS, acidity percentage, improved with the application of cycocel 1000 ppm. The Vitamin C, total and reducing sugar were found non-significant (Table 2), however, highest Vitamin C recorded by application of KNO₃ (4.13 mg/ 100g) as compared to control (3 mg/ 100g). The increased ascorbic acid content with foliar application of potassium might be related with improved sugar metabolism. Gurjar and Rana (2014) also found maximum ascorbic acid (25.81 mg/100 ml juice) in kinnow mandarin fruits with the foliar application of KNO₃ 2%. Total sugar and reducing sugar was found the highest wit the application of CCC (8.28 %, 2.90 %) and the lowest (7.36 %, 2.52 %) in control (Table 2). Cycocel suppresses vegetative growth and therefore a greater chance to utilization and assimilation of total carbohydrates and also might be due to highest TSS content. It was confirmed with the results reported by Kumber *et al.* (2017) in grape cv. 2A Clone. In their experiment they found the highest total sugars (21.50 %), reducing sugar (19.60 %) with application of CCC 750 ppm.

CONCLUSION

Foliar application of CCC, KNO₃, ZnSO₄ and MAP significantly helped to increased fruit size, fruit weight, pulp contents, TSS and acidity. The heaviest and maximum sizable fruit with high pulp content was recorded from the plants treated with CCC at 0.2%. The highest TSS and acidity of fruits were found with the application of CCC at 0.2%, where, Vitamin C, total sugar and reducing sugar were found non- significant. The highest Vitamin C was noted from the application of KNO₃ at 2%, and highest total and reducing sugar was with the

Table 1: Effect of foliar application of some nutrients and growth retardant on physical parameters of wood apple fruit

Treatments	Length (cm)	Girth (cm)	Weight (g)	Pulp %
CCC @ 0.2 %	7.22	23.17	202.75	67.14
KNO ₃ @ 2.0 %	7.21	22.63	200.00	65.79
ZnSO ₄ @ 1.0 %	6.83	20.79	160.00	63.41
MAP @ 0.8%	6.88	21.26	161.25	64.68
Control	6.29	19.27	119.25	62.50
SE(m) ±	0.198	0.73	18.02	1.01
C.D. at 5%	0.61	2.25	55.53	3.12

Table 2: Effect of foliar application of some nutrients and growth retardant on chemical parameters of wood apple fruit

Treatments	TSS (°Brix)	Acidity (%)	Vitamin C (mg/100g)	Total sugar (%)	Reducing sugar (%)
CCC @ 0.2 %	17.35	2.60	3.38	8.28	2.90
KNO ₃ @ 2.0 %	16.60	2.72	4.13	7.72	2.81
ZnSO ₄ @ 1.0 %	16.20	2.89	3.19	7.71	2.74
MAP @ 0.8%	16.35	2.78	3.75	7.92	2.86
Control	14.95	3.10	3.00	7.36	2.52
SE(m) ±	0.19	0.08	0.47	0.31	0.09
C.D. at 5%	0.59	0.24	NS	NS	NS

application of CCC at 0.2%. From the results of the investigation it was concluded that two times foliar application *i.e.*, 1st time before flower bud formation and 2nd time before flower opening of CCC at 0.2% or KNO₃ at 2% is helpful for quality fruit production of wood apple.

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