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Effect of systemic pesticide on physico-chemical characteristics of cultivar *Red delicious*

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ABSTRACT

The present study is carried out to assess the effect of systemic pesticide triadimefon (WP) on physico-chemical features of cultivar Red delicious. The different parameters studied were pedicle, fruit length, width, length : width, total soluble solids (TSS), yield efficiency and average fruit yield. The treatment is applied at fruit development stage with different treatment concentrations ranging from 0. 00 to 0. 09% designed as control (0.00), T3C1, (0.03%), T3C2, (0.05%), T3C3, (0.07%) and T3C4, (0.09%). There is marked reduction in above mentioned parameters at T3C4, (0.09%) compared to control plants.

Key words: Pesticides, Red delicious.

INTRODUCTION

Among the various temperate fruits grown in hills and mountains apple (*Malus pumila* Mill) belongs to family Rosaceae and subfamily Maloideae is the premier fruit, has been under cultivation since times immortal. Fruits have a pivotal role in the diet for maintenance of health and prevention of diseases. A wide range of pesticides (13 – 14%) are used for the production of fruits and vegetables in India due to heavy pest infestation throughout the cropping season of horticultural crops whereas cropped area is only 3% (Agnihotri, 1999). Pesticides have potentially adverse effects on fruits and human health (Perez Bendito, 1999). Because of the wide spread use, their toxic residues have been reported in fruits (Kumari *et al*., 1996, 2002, 2003), (Frank *et al*., 1987). Systemic pesticides are largest and most important group of pesticides, developed in 1960s for controlling fungal diseases in plants (Siegel, 1981). They tend to be much more effective than many other chemicals and they generally require relatively low levels of application (Davis *et al*., 1988, Gilley and Fletcher, 1977).

MATERIAL AND METHODS

The present study is taken up on 10 year old Red Delicious apple trees grown at research farm of Pomology, SKUAST – K Shalimar (Sgr) situated at 34.01^{o} North latitude and 74.89^{o} East latitude, at an elevation of 1685 m above the mean sea level. The maximum and minimum temperature ranges between 5.6C^{o} to 29.3C^{o} and 2.5C^{o} to 16.5C^{o} . The experiments are laid out in Randomized block design (RBD) with four replications for each treatment. The foliar application of systemic fungicide triadimefon (WP) is applied at fruit development stage with different treatment concentrations ranging from 0.00 to 0.09% designed as Control, (0.00), T3C1, (0.03%), T3C2, (0.05%), T3C3, (0.07%) and T3C4, (0.09%).

Ten fruits from each treatment per replication were taken to determine the fruit length and diameter, measured with the help of verneer calliper scale. The pedicle length is measured with the same scale and length: diameter ratio of fruits is calculated by dividing length with diameter. Fruit total soluble solids (TSS) were measured by the

method Rangana, (1986). Five fruits from each treatment per replication were taken. A hand refractometer (range 0-33 °Brix, Erm make, Japan, No. A 90067, Bellingham & Stanley Ltd, England) range is used and values were corrected at 20°C. After each reading, the prism of the refractometer is cleaned with tissue paper and methanol, and dried before re-use. The refractometer is standarised against distilled water. Fruit firmness is calculated as per the method A.O.A.C, (1980). Five fruits from each treatment per replication were taken. Each fruit is punctured at three different places on their surface after removing about one square inch peel. Firmness is measured by pentometer and recorded in Kg/cm^2 all the values obtained were averaged.

The average fruit yield and yield efficiency were calculated by the method of Westwood and Roberts, (1970). Two representative branches, randomly selected from each treatment per replication including control plants were taken. The yield is expressed as Kg tree^{-1} and yield efficiency is calculated by the formula

$$\text{Yield efficiency} = \frac{\text{Fruit yield (Kg tree}^{-1})}{\text{TTCSA (cm}^2)}$$

Where,
TTCSA = Tree trunk cross sectional area (cm^2)
The data is analyzed statistically, (ANOVA) is done as per the method of Singh and Choudhary, (1977).

RESULTS AND DISSCUTION

The effect of systemic pesticides on fruit qualitative and quantative parameters is attributed to two factors. In addition to their primary fungicidal effects they often have physiological advantageous and depressive side effects. The decrease in pedicle, fruit length, width, length: width, yield efficiency and average fruit yield were found at T3C4, (0.09%) compared to control, the results are in conformity with the findings of Jones *et al*., (1991), Steffens *et al*., (1992) Saxena *et al*., (2000).). The fruit firmness is found to increase at T3C1, (0.03%) in comparison to control, similar results are reported by Calvo, (2000), Bound, (2001), Luo *et al*., (1988), Magnitsky *et al*., (2006). The total soluble solids (TSS) increases at T3C1, (0.03%) compared to control, similar results are reported by Tiku and Dar, (1980), Tripathi *et al*., (1993). The increase in the average fruit yield and yield efficiency at T3C1, (0.03%) compared to control, might be due to growth enhancing effect of tridimefon in comparison to control, the results are in agreement with the reports of Stevens and Palmer, (1980), Singh and Dhillion, (1986). It might also be due to assimilate partioning of the plant, as the demand is unidirectional to developing fruit, because of enhanced vegetative growth like increase in leaf area, chlorophyll and soluble sugar content as observed in the present study, similar results are reported by Vijayalakshmi and Sirivasan, (2000).

Table 1: Showing the effect of different treatment concentrations of triadimefon (WP) sprayed

Treatment Concentrations	Pedicle length (cm)	Fruit length (cm)	Fruit diameter (cm)	Length : diameter (cm)	Flesh firmness (kg/ cm^2)	Total soluble solids (%)	Average yield (Kg tree^{-1})	Yield efficiency (%)
Control	1.87	5.52	7.19	0.76	7.02	10.11	92.21	0.70
T3C1 (0.03%)	1.93	6.59	8.29	0.79	7.09	11.32	107.11	0.72
T3C2 (0.05%)	1.84	5.47	7.10	0.77	6.97	11.26	90.94	0.68
T3C3 (0.07%)	1.82	5.44	6.95	0.78	6.92	10.95	89.26	0.66
T3C4 (0.09%)	1.78	5.42	6.92	0.78	6.88	10.75	88.17	0.63
CD (P=0.05)	0.004	0.07	0.005		0.01	0.008	0.21	0.006
CD (P=0.01)	0.006	0.10	0.007		0.02	0.01	0.29	0.008

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