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Strategies for optimization of fruit quality in temperate fruits with special reference to pome fruits

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ABSTRACT : Fruit quality is the major determinant of grower returns without bringing additional land under cultivation and consequently has been studied widely. There are many components of fruit quality such as size, colour, firmness, soluble solids and acidity. In addition there are many factors which may influence fruit quality, some of which are outside of control such as weather, site suitability and varietal genetic potential. But now a days we can improve the fruit quality through modern management practices such as use of dwarf rootstocks, site specific nutrient management, drip irrigation etc. The use of clonal rootstocks regulate the tree size, induce early bearing and high cropping, and helps in adaptation of root system to existing soil and climatic conditions. Fruit Calcium is important in apple fruit quality by delaying cell wall breakdown, maintain firmness, retarding ethylene production and alleviates internal break down. Boron is important in pollen germination and pollen tube growth resulting in successful fruit setting. Bioregulators can have impact on apple fruit quality regardless of the cultivar. Foliar application of gibbberllins have been reported to reduce russeting on Golden Delicious apple and Bartlett pear. The saving of soil water content and improvement of adaptability of plants to periodical insufficient water and use of deficit irrigation technology become more important because of the occurrence of frequently dry periods. Deficit irrigation minimizes water use, decreases vegetative growth and pruning cost may improve fruit quality. The application of different types of mulches conserve the soil moisture during the peak period of plant growth and development and improve quality.

Key Words : Strategies, fruit quality, temperate fruits, pome fruits.

Table-1: Effect of different rootstocks on the quality of apple.

Rootstock	Flesh firmness	Starch index	Total soluble Solids	Titrable acidity
kg/cm^2	(Scale 1-10)	(%)	(mg malate 100/g)	
M.9	8.1b	9.3bc	12.6b	635b
M.26	7.9a	8.9a	12.0a	601ab
P.22	8.6c	9.6d	13.3c	586a
P.59	8.6c	9.4c	13.2c	630b
P.60	7.1b	9.2b	12.6b	603ab

Table-2 : Effect of different nutrients on the quality of Jonagold apple.

Treatments	Internal browning (%)				
	2002	2003	2004	2006	2008
Two spray of $Cacl_2$	5.2b	4.5b	0.9b	2.2b	2.5b
Four spray of $Cacl_2$	6.1b	4.8b	0.8b	1.8b	3.1b
Six spray of $Cacl_2$	1.2a	0.8a	0a	0a	0a
Control	6.5b	5.2b	1.2b	2.1b	3.2b

Table-3 : .Effect of plant growth regulators on the quality of Leconte pear (Stino *et al*., 2011).

Treatments	Fruit set (%)	Fruit drop (%)	Fruit retention (%)	Seed number
GA3 10 ppm	4.78	37.01	62.91	2.23
GA3 20 ppm	6.56	30.05	69.94	2.00
GA3 30 ppm	5.85	36.40	63.67	2.39
Sucrose 5%	5.09	48.59	51.37	4.30
Sucrose 10%	5.97	40.95	59.06	4.77
Sucrose 15%	7.29	35.99	64.04	4.77
Boric acid 100	6.10	42.27	57.46	4.67
Boric acid 200	5.16	43.92	57.52	4.70
Boric acid 300	4.61	44.47	55.58	5.17
Control	3.13	61.6	38.32	5.17
CD 0.05				
Stage	0.02	0.63	NS	0.10
Treatment	0.05	1.42	4.58	0.22
Interaction	0.07	2.01	6.48	0.31

Table-4 : Effect of crop load on the fruit quality (Dennis, 2008).

Treatment Cultivar	Crop load	Increase in TCSA (cm^2)	Yield/tree (lbs)	Avg. fruitwt.(g)	Fruit firmness fruitwt.(g)	Soluble solids (%)
Redfree	3	5.5x	40.6	159.6	110.2	11.2
	6	5.1	50.5	142.5	114.3	10.9
	9	4.6	60.2	125.3	118.4	10.6
	12	4.2	70.1	108.2	122.5	10.2
	NS	*	*	*	*	
Liberty	3	7.6	36.2	160.8	91.3	13.8
	6	5.9	43.9	152.1	90.3	13.4
	9	4.3	51.8	143.4	89.4	12.9
	12	2.7	59.7	134.7	88.4	12.5
	*	*	*	*	NS	
GoldRush	3	8.3	50.5	182.2	133.2	14.4
	6	7.2	66.4	165.3	132.4	13.6
	9	5.9	81.8	148.4	131.6	12.8
	12	4.8	97.2	131.5	130.8	12.1
	*	*	*	NS	*	

Table-5 : Effect of GA3, wettable sulphur + boric acid on length, breadth and L/D ratio of pear fruits cv. 'Bartlett' (Peer *et al*., 2010).

Treatment	Fruit length (cm)			Fruit diameter (cm)			Fruit L:D ratio		
	2006	2007	Mean	2006	2007	Mean	2006	2007	Mean
Control (water sprayed)	6.17	5.95	6.06	5.76	5.66	5.71	1.07	1.05	1.06
GA3 @ 12 ppm	6.24	6.13	6.18	5.72	5.70	5.71	1.09	1.07	1.08
GA3 @ 24 ppm	6.27	6.16	6.21	5.7	5.72	5.71	1.10	1.08	1.09
GA3 @ 36 ppm	6.26	6.15	6.20	5.70	5.71	5.70	1.10	1.08	1.09
*Wettable sulphur 0.5% + boric acid 0.05%	6.16	6.28	6.22	5.65	5.65	5.65	1.09	1.11	1.10
*Wettable sulphur 0.7% + boric acid 0.10%	6.18	5.97	6.07	5.73	5.69	5.71	1.08	1.05	1.06
*Wettable sulphur 0.9% + boric acid 0.15%	6.19	5.97	6.08	5.63	5.64	5.63	1.10	1.06	1.08
CD0.05	ns	ns	ns	ns	ns	ns	ns	ns	ns