EffectofPGR and chemicalsonshelf life,bunchand berryqualityparameters ofSudhakar seedlessgrapes.(*Vitis Vinifera* L.)

Abstract:

The experiment was conducted on Sudhakar Seedless vines grafted on110-R rootstockwere selected for this study. The experiment was designed in randomized block design (RBD) having fivetreatments with four replications were carried out at MRDBS Nashik during2020-2021.Pre-harvest application of treatments(Chitosan @ 10 ppm, NAA @ 100 ppm,activated Potassium salt @ 2.0 g/ liter, Salicylic acid @ 2.0 ml/literand Potassium Schoenite @ 2.0 g/liter along with untreated vines were applied at veraison stage of berry development. Application of Chitosan @ 10 ppm resulted in to the increase berry size and berry quality along with less no. of rotten berries in physiological loss in weight. Followed by the application of NAA @ 100 ppm recorded less no. of rotten in this study. However, the lowest PLW (%) were recorded with the application of NAA. The increasing dose of NAA resulted into decrease in pre- harvest berry drop.In grapevines. Application of salicylic acid significantly increase in berry weight, bunch weight, TSS/acidity ratio ascompare to untreated vines. Biochemical composition of berries was influenced by theapplicationofActivated potassium saltatdifferentconcentration. Theapplication of Potassium schonitein grapevines were found effective for increasing TSSofSudhakar seedlessgrapes.

Key words: Chitosan,NAA, Shelf life, Potassium schonite, Yield and Grapevines.

INTRODUCTION

Grape (Vitis vinifera L.) is the most important commercial crop grown in India,especially in Maharashtra. Sudhakar seedless. For this variety the veraison start after 90 days from pruning and require 25 to 30 days for harvest. The fruitwill be ready to harvest between 120 to 125 days after pruning being early maturing variety.But the ripe berries are sensitive to hot climates and Keeping qualities (shelf life). To regulatethe market supply and to reduce the losses, pre and - post-harvest applications with plantgrowth regulators, chemicals and wrappers have been useful, in extending the shelf life ofgrapesduringstorage, enablingto reducepost-harvest losses.(Shanta Krishnamurthy,1985).Plant hormones (also known as phytohormones) are naturally occurring organic substances that influence growth and development in very low concentrations and whose action may be involved in places remote from their origin. Hormones determine the formation of flowers, stems, leaves, the shedding of leaves and the development and ripening of fruit. Plants, unlike animals, lack glands that produce and secrete hormones; instead each cell is capable of producing hormones. The influences on fruit production by the growth regulators are numerous and are employed in a wide range of circumstances varying from tissue culturally propagated plants to enhancing post-harvest storage life through almost all stages of plant life in between. It is not always the effect of single growth regulator but the interaction effect of different hormones in combination for instance; the ratio of cytokinin to auxin determines the fate of callus if it is high it promotes shoot proliferation while as low cytokinin: auxin ratio enhances root formation (Jain, 2013). Application of growth regulators is also reported to increase the yield and quality of grape. Among the plant hormones applied in grapes, GA being growth promoting hormone commands a special place and is being used for different purposes such as to loosen the bunch, increase the berry size and improve the growth, yield and quality of fruits (Jindal, 1985). The present study was, therefore, undertaken to investigate the effect of

growth regulators/ enhancer on the yield and quality characteristics of grape under tropical conditions of India.

MATERIALSANDMETHODS

ExperimentalSite:

The experiment was conducted at research and developmental vineyards oat MRDBS Nashik during2020-2021. Seven year-old Sudhakar seedless grafted on Dog ridge rootstock were selectedfor the study. The vines were planted at a spacing of 2.5 m between rows and 1.2 m betweenvines within a row. The row orientation was in the direction of North – South. The vines weretrainedtodoublecordon Ysystem.Thesoilofthisregionisblackhaving pH 7.75 and EC 0.46 dS/ m.However,waterusedforirrigationhad EC 1.8 and pH 8.3. The experiment was designed as randomized Block design (RBD) having five treatments and 4 replications (2.5 m x 1.2 m). Application of following chemicals done at veraison stage of berry development. Present study was conducted to know the effect of NAA onshelflife,yield and qualityparameters of Sudhakar seedless grapes.

Tableno.1:TreatmentDetails

Treatment details	Dose ml/ha or ppm
Chitosan@ 10 ppm	10.00 ppm
Naphthalene Acetic acid @ 100 ppm	100.00 ppm
Activated Potassium salt @ 2.0 g/ liter	2500 g/ha
Salicylic acid @ 2.0 ml/liter	2000 l/ha
Potassium Schoenite@ 2.0 g/liter	1000 g/ha

YieldandYieldComponents

Yield and berry quality of Sudhakar seedless grapes were recorded at harvest. At harvestingstage parameters such as average bunch weight (g) was calculated from average weight of 15bunches while yield per vine (kg) was recorded at the time of harvest. Randomly selectedberries from bunches were used for berry weight. To measure average berry length and berrydiameter, 10 berries were selected randomly from different bunches from a given replicationand measured using Digital VernierCaliper (0–300 mm RSK™) and were expressed inmillimeter.

BiochemicalAnalysis:

Total soluble solids (TSS) were measured using hand refract meter and expressed as degreeBrix. Acidity was measured by titrating the sample with 0.1 N sodium hydroxide usingphenolphthalein indicator (A.O.A.C, 1985).The total phenol and Tannins content of the berryweredeterminedusingtheFolin-Ciocalteumethod(SingletonandRossi,1965)usingCatechol, as the standard. Total flavonoid content (TFC) was determined using the aluminumchlorideassaydescribedbySamathaet al. (2012).

Physiologicallossinweight(PLW):

ThePLWwascalculatedoninitialweightbasis.Thephysiologicallossinweightofbunch was recorded on the basis of initial fresh weight of the fruit and subsequent loss inweightoccurred duringpostharvest storageandexpressed as percentagevalue.

$$PLW(\%) = \frac{\text{Initialweightoffruit} - \text{Finialweightoffruit}}{\text{Initialweightoffruit}} \times 100$$

Fallen andRotten Berries (%):

Fallenandrottenberry percentagewasrecordedfromeachboxbydividingtheweightoffallen berries and totalweight of packed bunch.

$$\text{Fallenberry(\%)} = \frac{\text{Weightoffreeberriesinsideeachbox}}{\text{Totalbunchweight}} \times 100$$

$$\text{Rottenberries(\%)} = \frac{\text{Totalweightofbunch-Bunchweightafterremovingdefectedberries}}{\text{Totalweightofbunch}} \times 100$$

StatisticalAnalysis:

Theexperimentwasconductedinrandomizedblockdesignconsistingoffivetreatments with four replications. All calculations were performed using the GLM procedureofSAS System software,(version 9.3.)

Resultanddiscussion

Yieldandqualityparameters:

Applying the chemicals at different concentrationdemonstrated a beneficial effect onbunch weight, yield and berry weight in Sudhakar seedless grapes (Table 2). Bunch treated withChitosan @10 ppm had significantly higher bunch weight (392.56g). Application of NAA at preveraison stage increasesthe yield per vine. Result obtained from this study clearly showed that the yieldsignificantlyincreasedby theapplicationofNAAat100ppm(14.60kg)followed by the treatment Salicylic acid (13.53 kg).The results confirm thefinding ofManishPrajapatiandDeviSingh,(2018)whileworking onGuava(*Psidiumguajava* L.) they reported that combination of different plant growth regulators significantlyaffectedtheparameterssuchasplantheight,fresh fruitweight(g),yield/plant (kg)foundtobe

Under the treatment (NAA 200ppm). There were no significantly differences were recordedforberrylength,berrydiameterand pedicel diameter.

The data recorded on T.S.S, Acidity was significantly influenced by potassium schonite the treatments.

ThehighestT.S.S.(21.02^{0}Brix)withleastAcidity(0.47%)wasobtainedwithapplicationpotassium schonite.While, leastT.S.S. This investigation might be due to the higher concentration of NAA @ 100 ppm. The study confirm the finding of Teaotia*et al*. (1972) found that pre-harvestspraying of NAA at different concentration viz. 100 ppm increased the TSScontent of guava fruits. Also, Mahmud *et al. (*2008) opinioned that the decrease in titratableacidity in papaya during storage probably due to decrease in citric acid and calcium causinginhibition of enzymatic activityleading to delay in the use of organic acid in the enzymaticreaction of respiration. The mean TSS and acid ratio increased withincrease in storageperiod. The maximum TSS and acid ratio was observed in potassium schonite followed by theSalicylic acid 2ml/ lit.

Biochemicalparameters:

The data recorded on biochemical changes of Sudhakar seedless vines were presented inTable 4.The result obtained from the study revealed that the application of PGR at differentconcentration does not affect the phenolic properties of berry. This result might be just due tothe time of application of NAA and its chemical properties. NAA is applied to increase theshelf life of grapes at pre veraison stage. The result in hand confirm the finding of Artes-Hernandez et al., (2006)reported that white Superior Seedless table grapes stored for 7 daysat 0 ^{0}C, followed by 4 days at 8 ^{0}C under modified atmosphere packaging, did not changetheir total phenolic content. Further slight decreases were seen during their subsequent shelf-life.

Physiologicallossinweight(PLW):

The data on physiological loss in weight (PLW) of grape bunches as influenced by thepre-harvest treatment with growth regulators are presented in Table 3. Among the treatmentshighest PLW was observed in control at (10.58 per cent). PLW was less in NAA @ 100 ppmat (7.23 percent). Data revealed that reduced PLW %, fallen berries %, rotten berries % wereobserved with application ofChitosan. Findings confirm with the report of Ranjeet and Gupta (1987) that pre harvestspray of NAA @ 100 reduced the physiological loss in weight in perlette grapes. The resultsobtained in this investigation might be due to the application of NAA at pre harvest reduceswater loss in berries after post-harvest storage. These studies confirm the findings of Dass etal. (1972) and Beerh et al. (1976) reported that the use of growth regulators as pre-harvestsprays improves the quality of grapes and also the shelf life. In Cheema Sahebi, a pre-harvestsprayof NAA@50 and@100 ppm significantlyreduced thepost-harvest berryshattering.

Conclusion:

From the present study, it is concluded that the application of Chitosan @ 10 ppmincreases berry weight, bunch weight and yield per vine. Application of NAA at @ 100 ppm concentration at pre veraison stage significantly reduced the berry drop and increasestheshelflifeof Sudhakar seedless grapeswhich isserious problem inthis variety.

Table2.EffectofPGR and other chemicalsonbunchand berryqualityparameters ofSudhakar seedlessgrapes.

Treatment	Bunch Weight (g)	Berry Weight (g)	Berry diameter (mm)	Berry length (mm)	Pedicel diameter (mm)	Skin Thickness (mm)	TSS (°Brix)	Acidity (%)	Yield/ vine kg /Vine
T1	392.56	3.50	17.10	18.09	1.11	18.67	19.56	0.56	13.01

T2	320.14	4.12	18.05	19.43	1.28	29.00	18.21	0.66	14.60
T3	300.95	3.09	16.12	17.16	1.04	17.00	19.60	0.60	12.86
T4	377.68	3.96	17.73	18.86	1.21	20.67	18.60	0.66	13.53
T5	352.05	3.67	16.82	17.75	1.16	19.33	21.02	0.47	13.49
SEm (±)	5.04	0.03	0.23	0.35	0.03	2.16	0.24	0.03	0.23
C.D @ 0.5 %	16.70	0.09	0.78	1.16	0.09	7.14	0.81	0.09	0.76

Table 3.EffectofPGR and other chemicalsonShelflife ofSudhakar seedless Grapesat7thDayafterstorage

Treatment	PLW	FallenBerry	RottenBerry
	(%)	(%)	(%)
T_1	9.42	2.25	2.15
T_2	7.21	2.89	3.15
T_3	8.10	2.10	3.84
T_4	7.56	1.52	8.50
T_5Control	10.58	4.75	10.13
SEm(±)	0.59	0.84	1.41
C.D@0.5%	1.50	1.84	3.08

Table4:EffectofPGR and other chemicalsonbiochemicalparametersofSudhakar seedlessgrapes

Treatment	Phenol	Tannin	Flavonoids
	(mg/g)fresh.wt.	(mg/g)fresh.wt.	(mg/g)fresh.wt.
T_1	1.72	2.08	54.77
T_2	3.66	3.78	80.54
T_3	1.61	1.87	49.57
T_4	1.21	1.54	50.91
T_5Control	2.93	3.04	62.05
SEm(±)	0.17	0.26	1.66
C.D@0.5%	0.56	0.88	5.52

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