Studies on berry thinning and leaf removal practices in grapes

ABSTRACT

An experiment on effect of berry thinning and leaf removal practices in Thompson Seedless grapes was carried out at RHRTS Sharbo Kinnaur during the year 2023. For the study, summer pruning including leaf removal and berry clipping practices were considered as main treatments at veraison stage. Among various treatments combination of removal of basal five leaves and berry clipping by keeping six shoulders (T_5) and clipping by keeping four shoulders (T_4) have improved berry weight (4.47 g and 4.29 g), berry size (12.96 mm and 12.52 mm), bunch weight (216.65 g and 218.25g) and TSS (17.33^0B and 15.50^0B) respectively, compared to control (2.81g, 8.43 mm, 181.45g and 13.81^0B respectively.). Hence, berry clipping and leaf removal practices is essential form of crop load management to get quality grapes.

Keywards: Grapes, Berry clipping, Leaf removal, bunch weight, TSS.

INTRODUCTION

The grape, one of the ancient fruit crops of India is cultivated in an area of 171 thousand hectares with the production of 3781 thousand MT (NHB, 2023). Thompson seedless grapevines (*Vitus vinifera* L.) are planted throughout the world and are used to produce dried fruits (raisins), grapes for the fresh market (table grapes) and juice for concentrate (Mullins *et al*. 1992). Natural berry size of this cultivar is not large enough for commercial as table grapes so cultural practices are used to increase its size several fold and up to 10 g berries have been found in some vineyards (Williams & Ayars, 2005). Berry size is the main quality factor in international markets. To produce quality berries, careful balance of source sink ratio i.e .vegetative growth and bunches to retain in vine is required (Somkuwar and Ramteke, 2006). Summer pruning can be used as a useful means for maintaining vine balance between vegetative growth and productivity. For low to high vigour vineyards, summer pruning on fruit zone and leaf removal may be sufficient to improve the microclimate of the vine (Freese, 1988). At present, many agricultural practices (including thinning, defoliation, etc.) are used to improve berry quality in

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viticulture. (Aru *et al*. 2022; Intrigliolo *et al*. 2014; Xi *et al*. 2020). Berry thinning allowed the inner berries to get more sunlight and fresh air, which was beneficial to preventing a higher incidence of pests and diseases (Piernas *et al*. 2022). Thus, berry thinning tended to improve berry quality.

Leaf removal as is an important tool for improving the microclimate inside the grapevine canopy especially in the fruiting zone Caspari *et al*. (1998). It should be performed near berry set or after fruit. The clusters should be exposed to sunlight during ripening for obtaining the best colouration of berries.

Summer pruning including leaf removal and cluster thinning plays an important role in producing quality berry. In view of above discussion an experiment was conducted to study the effect of cluster clipping and leaf removal on berry characteristics of Thompson Seedless grapes.

MATERIALS AND METHODS

The study was carried out during 2023 at an experimental farm of Dr YSPUHF RHRTS Sharbo, Himachal Pradesh. The experiment was laid out in randomized block design with eight treatments of summer pruning including berry thing and leaf removal at veraison stage of Thompson seedless grapes. The treatments consisted of T_1:Removal of basal 5 leaves, T_2: Removal of basal 5 leaves +2 above leaves, T_3: Clipping by keeping 6 shoulders, T_4: Clipping by keeping 4 shoulders, T_5: Removal of basal 5 leaves + Clipping by keeping 6 shoulders, T_6: Removal of basal 5 leaves + Clipping by keeping 4 shoulders, T_7:Random leaf removal, T_8: Control. Each treatment was replicated three times. In each replication, vines spaced at 3 X 3 m distance were tagged. All the vines received uniform cultural practices during the season.

Fruit samples collected during September were weighed, washed and kept for analysis. The diameter of the berry was measured with vernier caliper and the weight of the berry and bunch was recorded on a sensitive balance. The TSS content was directly read on Zeis's hand refractometer by putting a drop of fruit juice on prism and reading as Brix^o at 20^{o}C (A.O.A.C., 1980). The obtained data were tabulated and analyzed under analysis of variance (ANOVA) procedure of statistical analysis system (SAS).

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RESULTS AND DISCUSSION

The data pertaining to berry characteristics i.e. berry weight, berry diameter, berry number, bunch weight, TSS influenced by various treatments of summer pruning is presented in Table 1. The observations indicated that the effect of different leaf removal and cluster thinning treatments varied significantly. Among the various treatments berry weight and berry diameter was recorded maximum in T5 (4.47 g and 12.96 mm) and was statistically at par with T4 and T6. Minimum berry weight and berry diameter was recorded in T8 control (2.81g and 8.43mm). In present study, leaf removal and cluster thinning treatments improved berry weight over control. These observations were also in accordance with the findings of Karoglan *et al*. (2014) who reported increased in berry weights of Merlot and Cabernet Sauvignon grapes by the berry-thinning treatment, which was consistent with the result found in Crimson Seedless grape berries (El-Razek *et al*. 2010). In a study of Jia Nan etal., 2023 heavier berry thinning tended to gain better fruit quality. Berry weight, TSS, fructose, glucose, ratio of TSS to TA, ACs, berry firmness, and the mineral contents (Ca, Fe, Na, Mg) were increased by berry thinning. Defoliation or leaf removal in the fruiting zone facilitates air movement and reduces disease incidence by ameliorating fruit exposure to sunlight, it also contributes to improving fruit quality.

The data on berry number per bunch varied from 40.55 to 69.19 as presented in Table 1. The berry clipping practices by default had less number of berries and had larger berry size which leads to increase in berry and bunch weight i.e. T4 (218.25g) and T5 (216.25 g).

The perusal of data on TSS depicted that, TSS significantly differed among the leaf removal and berry thinning practices. The maximum TSS was obtained in T5 (17.33^0B) and was statistically similar to T4, T6, T7 when compared to control (T8, 13.81^0B). Berry thinning tended to obtain higher total soluble solids and a similar result was verified in 'Cabernet Sauvignon' grapes (Han et al. 2019). Several studies demonstrated that crop removal significantly increases soluble solids and berry colour (Dokoozlian *et al*. 1995). Fruits well exposed to sunlight generally exhibit higher concentrations of sugars and lower acidity in grape juice compared to those ripened in dense canopy shade (Kliewer *et al*. 1988). The removal of basal leaves around the clusters is widely adopted to improve grape quality and to reduce the incidence of fungal infection (Gubler and Marois, 1987; Caspari *et al*. 1998).

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Table 1. Effect of berry clipping and Leaf removal practices in grapes cv. Thompson seedless.

Treatments	Berry Weight (G)	Berry Diameter (mm)	Berry Number	Bunch Weight (g)	TSS (^{0}B)
T_1	3.15	10.01	69.19	185.01	14.31
T_2	3.05	9.31	67.92	186.43	13.22
T_3	2.96	9.52	65.63	192.22	14.92
T_4	4.29	12.52	57.33	218.25	15.50
T_5	4.47	12.96	40.55	216.65	17.33
T_6	3.73	11.49	55.06	206.76	15.52
T_7	3.35	11.34	37.83	200.54	16.21
T_8	2.81	8.43	68.66	181.45	13.81
$CD_{0.05}$	0.76	1.77	4.64	11.46	2.28

Conclusion

It can be concluded from the study that there is a potential benefit from berry clipping and leaf removal practices in grapevine in the commercial production of Thompson seedless grapes for its effective influence on quality yield.

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