Indian J. Plant Physiol., Vol. 10, No. 2, (N.S.) pp. 179-181 (April-June, 2005)

SHORT COMMUNICATION

EFFECT OF HOMOBRASSINOLIDE ON YIELD, QUALITY AND STORAGE LIFE IN THOMPSON SEEDLESS GRAPE

S.D. RAMTEKE* AND R.G. SOMKUWAR

National Research Centre for Grapes, P.O. Manjri Farm, P.B. No. 3, Solapur Road, Pune-412 307, Maharashtra

Received on 9 Aug., 2004, Revised on 17 June, 2005

A field trial was conducted to test the bioefficacy of homobrassinolide (combine) on three year old vines of Thompson seedless grafted on Dogridge rootstock. The treatments of combine alone and in combination with N-(2 chloro- 4 pyridyl)- N -phenyl urea (CPPU) and benzyladenine (BA) alongwith gibberellic acid (GA_3) were given at 2-3 mm and 5-6 mm berry size stages. Considering the favourable effects on berry quality, bunch size and storability of Thompson seedless grapes, the treatment of 2 ppm CPPU + 35 ppm GA_3 at 2-3 mm berry size stage and 1 ppm combine + 50 ppm GA_3 at 5-6 mm berry size stage was adjudged as the best for producing export quality table grapes.

***Key words*: Grape, homobrassinolide, quality, yield**

Cytokinins and homobrassinolides are known as plant growth stimulants having a unique growth promoting activity. They change several physiological processes in single cell as well as in whole plants (Mandava *et al.* 1981, Cutler *et al.* 1991). These growth stimulants are very effective over other compounds in short term bioassays, generally involving excised plant parts (Takematsu *et al.* 1983a, b). Brassinolides are also associated with increased metabolic process like photosynthesis (Sairam 1994) and protein synthesis (Kalinch *et al.* 1985). As a result, the size of grape berries may increase leading to increase in the productivity (Ramteke *et al.* 2002). The use of these bioregulators enhances the cell elongation and cell division that leads to the increase in berry size in grape. Considering these benefits, an experiment was carried out to study, the bioefficacy of homobrassinolide (combine) and other bioregulators on yield, quality and physiological loss in weight (PLW) in Thompson seedless grapes.

The study was conducted at National Research Centre for Grapes, Manjri Farm, Pune, Maharashtra, India during the year 2000-01 on the three years old vines of Thompson seedless grafted on Dogridge rootstock. The trial was sponsored by M/s. Godrej Agrovet Ltd., Mumbai The treatment details given in table 1.

Table 1. The treatment details:

Treatment	Chemical concentration	Mode of application
T1	*1 ppm combine + 25 ppm GA_3	Dip
	**1 ppm combine + 30 ppm GA_3	Dip
T2	*1 ppm combine + 25 ppm GA_3	Spray
	**1 ppm combine + 30 ppm GA_3	Spray
T3	*1 ppm combine + 40 ppm GA_3	Dip
	**1 ppm combine + 50 ppm GA_3	Dip
T4	*2 ppm CPPU + 35 ppm GA_3	Dip
	**1 ppm combine + 50 ppm GA_3	Dip
T5	*1 ppm 6 BA + 35 ppm GA_3	Dip
	**1 ppm combine + 50 ppm GA_3	Dip
T6	*2 ppm combine + 25 ppm GA_3	Dip
	**2 ppm combine + 30 ppm GA_3	Dip

* Treatments given at 2-3 mm berry size stage
** Treatments given at 5-6 mm berry size stage

* Corresponding author, E mail: dir_nrcg@vsnl.net

Five vines were selected under each treatment replicated four times in randomised block design. Bunches were treated with Combine and other bioregulators like CPPU and BA in combination with GA_3 at different berry size stages (2-3 and 5-6 mm) by either spraying or dipping the grape bunches. Application by dipping consumes labour and time, but it is effective in covering entire bunch, whereas spraying is less time and labour consuming but coverage may be a problem. Dipping was done for 30 seconds uniformly for each bunch. The experimental plot was well maintained by following recommended cultural practices. Bunches were harvested as per the maturity index for Thompson seedless table grapes for export. The number of bunches/ vine was recorded at 2-3 mm berry size stage whereas observations on yield and quality parameters were recorded after the harvest in all the treatments. The harvested grapes were then packed in 5 kg corrugated boxes and kept for pre-cooling at 0ºC temperature and 95 % relative humidity. After pre-cooling the boxes were shifted to cold storage and stored for a period of 30 days. After taking out these boxes from cold storage the observations on PLW was recorded for 7 days at room temperature. The replicated grape samples in shelf were weighed and observation was recorded as Wo. Subsequently on 1^{st} , 2^{nd} **….**7^{th} day the samples were weighed and the physiological loss in weight (PLW) was calculated on all the days (1^{st} …7^{th}) by using the formula;

$$PLW = \frac{Wo\text{-}Wn}{Wo} \times 100$$

Where, Wo= initial weight and Wn= corresponding weight on 1^{st}…7^{th} day

Significant differences were recorded for yield contributing characters (Table 2). Maximum 50-berry weight was recorded under T3 (129.5 g) followed by T4 (129.3 g). The lowest berry weight was recorded under T6. CPPU plays an important role in increasing the berry size and its crispness which also leads to the overall increase in the bunch weight. (Retamales *et al.* 1995). Significant differences were also recorded for bunch weight (Table 2). Maximum mean bunch weight of 298.7 g was recorded under T4 treatment as compared to the lowest in T5 (243.7 g). Maximum berry weight of 16.6 mm and length (20.3) was also recorded under T3 treatment. The continuity in the improvement of bunch weight through berry weight, berry diameter and length indicated the importance of treatment T3. The highest yield / vine was also recorded under T4 treatment (7.40 kg) compared to T6 (4.65 kg). The same trend was also observed under T4 treatment for brix yield. If the yield is considered, the treatment T4 seems to be better when CPPU in combination with GA_3 is applied at 2-3 and 5-6 mm berry size.

Table 2. Effect of homobrassinolide on yield and quality parameters in Thompsen seedless grape.

Treatment	50-berry wt. (g)	Berry dia. (mm)	Berry length (mm)	Pediced thickness (mm)	No. of bunches/ vine	Mean bunch wt. (g)	No. of berries/ bunch	Berry colour (Scale 0-4)	Berry crispness (Scale 0-10)	Acidity (%)	TSS (°B)	Yield/ vine (kg)	Brix yield/ vine kg)
T1	108.0	15.7	18.3	2.11	29.0	287.5	133.5	2.00	7.50	0.64	20.8	5.03	1.045
T2	119.2	15.3	19.1	1.96	34.7	252.5	107.8	1.75	7.25	0.73	18.6	5.63	1.051
T3	129.5	16.6	20.3	1.94	40.0	253.8	98.5	1.75	7.25	0.63	18.6	5.33	0.994
T4	129.3	16.6	19.0	2.03	53.0	298.7	114.7	2.00	7.25	0.74	17.2	7.40	1.273
T5	118.6	15.0	18.3	1.72	36.0	243.7	103.0	2.50	7.75	0.71	16.9	5.25	0.887
T6	107.1	14.8	18.9	1.86	33.5	247.5	108.3	2.25	7.50	0.63	20.2	4.65	0.937
Mean	118.6	15.6	18.9	1.93	37.7	263.9	110.9	2.04	7.41	0.68	18.7	5.54	1.031
CD (P=0.05)	9.44	0.80	0.88	NS	NS	19.30	7.81	NS	NS	0.08	1.48	1.18	0.229

Table 3. Effect of homobrassinolide on physiological loss in weight (%) in Thompson seedless grape.

Treatment	Days in shelf						
	1	2	3	4	5	6	7
T1	3.41	5.58	7.10	8.68	10.16	12.59	16.57
T2	5.19	9.57	12.38	13.98	17.72	20.78	25.75
T3	3.91	5.89	6.63	8.92	11.47	13.49	18.01
T4	6.82	8.49	10.28	13.88	14.65	15.51	18.09
T5	5.15	8.59	11.04	15.36	15.18	17.51	23.56
T6	6.42	12.22	15.63	22.24	23.74	23.51	27.41
Mean	5.15	8.39	10.51	13.84	15.48	17.23	21.56
CD (P=0.05)	NS	2.78	3.28	3.57	3.94	4.13	5.57

Among the quality characters studied, the differences for berry colour and berry crispness were found to be non-significant (Table 2). This showed that application of Combine did not have any correlation with these characters. Significant differences were recorded for total soluble solids (TSS) and titratable acidity among the treatments studied. Maximum acidity was noticed under T3 treatment, which indicates the slow conversion of organic acids to tartaric acid because of application of combine in combination with CPPU treatment along with GA_3 at 2-3 and 5-6 mm berry stages, respectively.

Significant differences were observed for PLW in all the treatments from 2nd day onwards in shelf (Table 3). The least physiological loss in weight was recorded during all days in shelf with treatments of combine 1 ppm at both the stages (2-3 mm and 5-6 mm berry stage) along with variable application of GA_3. This indicates that treatment of 1 ppm combine along with GA_3 as dip results in maintaining the firmness of berries, resulted in less reduction in loss of water (Ramteke *et al.* 2002).

REFERENCES

Cutler, H.G., Yokota, T. and Adam, G. (Eds) (1991). Brassinosteroids: Chemistry, Bio activity and Applications. In: *American Chemical Society Symposium Series*, No. **474**. American Chemical Society, Washington D.C.

Kalinch, F.N., Mandava, N.V. and Todhunter, J.A. (1985). Relationship of nucleic acid metabolism to brassinolide induced responses in bean. *J. Plant Physiol*. **120**: 207-214.

Mandava, N.B., Sasee, J.M. and Yopp, T.H. (1981). Brassinolide, a growth-promoting steroidal lactone. Activity in selected giberellin and cytokinin bioassays. *Physiol. Plant.* **53**: 431-461.

Ramteke, S.D., Somkuwar, R.G., Shikhamany, S.D. and Satisha, J. (2002). Effect of growth regulators in increasing pedicel thickness and shelf life in Tas-A-Ganesh grapes (*Vitis vinifera*) grafted on 1613 C rootstock. *Indian J. Agril. Sci.* **72**: 3-5.

Retamales, J., Bangerth, F., Copper, T. Callegas, R. and Nito, N. (1995). Effects of CPPU and GA_3 on fruit quality of Sultania table grapes. *Acta Horticulture*. **394**: 149-57.

Sairam, R.K. (1994). Effect of homobrassinolide application on plant metabolism and grain yield under irrigated and moisture stress conditions of two wheat varieties. *Plant Growth Regul.* **14**: 173-181.

Takematsu, T., Takeuchi, Y. and Koguchi, M. (1983 a). New plant growth regulators. Brassinolide analogues, their biological effects and application to agriculture and biomass production. *Chem. Regul. Plants (in Japanese*). **18:** 2-15.

Takematsu, T., Takeuchi, Y. and Koguchi, M. (1983 b). Bioassay methods and physiology of brassinolides. *Chem. Regul. Plants (in Japanese).* **18**: 38-54.