



SHORT COMMUNICATION

EFFECT OF HYDROGEN CYANAMIDE ON ENHANCING BUD BURST, MATURITY AND IMPROVING FRUIT QUALITY OF PERLETTE GRAPES

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To study the effect of hydrogen cyanamide on bud burst, maturity and fruit quality, the dormant vines of Perlette grapes were treated with hydrogen cyanamide @ 1.5, 2.0 and 2.5% of active ingredients just after pruning. The vines sprayed with 1.5, 2.0 and 2.5% of hydrogen cyanamide recorded 65, 72 and 77% of total bud burst respectively after 35 days of pruning. In all the treated vines, the bud burst was completed by 40 days of pruning. In case of control treatment, the commencement of bud burst (12% only) was after 60 days of pruning and total bud burst was completed after 70 days of pruning. The applications of hydrogen cyanamide also advanced the time of flowering by 11-13 days and maturity by 6-8 days, as compared to control vines. The fruit quality in term of higher total soluble solids and lower acidity was also achieved in treated vines.

Key words: Dormex, grapes, hydrogen cyanamide, Perlette

In Northern India, 'Perlette' is the dominant cultivar of grape and it occupies 95% of acreage in Punjab. This is an early ripening, high yielding seedless cultivar. However, this variety suffers from drawback of compact bunches, due to which a large percentage of berries fail to attain the desired size and maturity. Moreover, a very short period (April-June) is available for development and ripening of berries due to the onset of premonsoon rains in the month of June. To improve the quality of Perlette grapes, the technology comprising of flower bud thinning such as GA₃ dips and girdling is recommended under Northern Indian conditions. However, still there is a need to find out other options that can supplement this technology and help in uniform early bud sprouting vis-à-vis maturity.

In different cultivars of grapes, various attempts have been made to promote early bud burst and ripening

by using hydrogen cyanamide after pruning (Pandey 1989, Lombard *et al.* 2006, Muhtaseb and Ghnaim 2008). However, under arid-irrigated conditions of northern India, in grape cultivar Perlette limited systematic work on standardisation of hydrogen cyanamide for enhancing maturity has been reported. Hence, there is a need to standardise the use of this chemical for hastening ripening in grapes, so that farmers of this region complete harvesting before the onset of rains. Therefore, the present study was conducted to find out the optimum concentration of hydrogen cyanamide and to find its effect on maturity and quality of grape cv. Perlette.

The experiment was conducted during the period of two years (2007 -2008) in the research orchard of Department of Horticulture, Punjab Agricultural University, Ludhiana and Regional Research Station, Bathinda. Nine-year-old vines of grape cultivar Perlette

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trained on Bower system and planted at a distance of 3x3 m and having similar trunk diameter were selected as treatment vines at both the locations. All the vines were provided with recommended doses of manures, fertilizers and other cultural practices. The treatments comprised of application of hydrogen cyanamide (H_2CN_2 -Dormex name of company) @ 1.5, 2.0 and 2.5% of active ingredient along with control (water spray). In all the treatments including control pruning the latter was done on 29th and 30th December during 2007 and 2008 respectively. Hydrogen cyanamide was sprayed on canes just after pruning. Each treatment was replicated four times and there were two vines per replication and the experiment was laid in randomised block design. Twenty five canes were tagged at random on each vine, for recording observations on per cent bud burst, time of bud burst, time of flowering, time of maturity, yield and quality attributes. The commencement of bud burst was considered when green tissue from the new shoot was visible (George *et al.* 1988). The time of bud burst and flowering was considered when more than 75% of buds and flowers opened, respectively. Likewise, time of maturity was considered when more than 75% of bunches attained the desired total soluble solids level. The total soluble solids (TSS) content was recorded with the help of hand refractometer. The TSS values were corrected at 20°C with the help of temperature correction chart (AOAC 1985). The acidity was determined by titrating the known volume of juice with 0.1 N NaOH, using phenolphthalein as an indicator. The two year data was pooled and analysed as per standard procedure (Gomez and Gomez 1984).

The application of hydrogen cyanamide has shown positive effect on the total percent of bud burst and time of bud burst. In treated vines, the commencement of bud burst was after 30 days of pruning (Fig. 1). The vines sprayed with 1.5, 2.0 and 2.5% of hydrogen cyanamide recorded 65, 72 and 77% of total bud burst respectively after 35 days of pruning. In all the treated vines, the bud burst was completed by 40 days of pruning. In case of control treatment, the commencement of bud burst (12% only) was after 60 days of pruning and process of total bud burst was completed after 70 days of pruning.

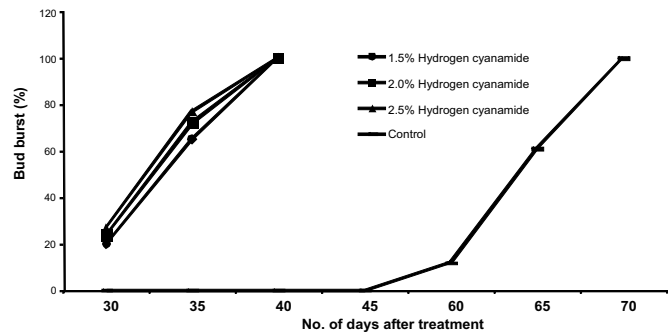


Fig 1. Effect of application of hydrogen cyanamide on total bud burst (%) of grape

Hydrogen cyanamide hastened the time of bud burst by 28-31 days as compared to untreated vines (control). Bud burst was recorded 32 days after pruning on vines treated with 2.5% of hydrogen cyanamide (Table 1) while, in the untreated vines (control: water spray), bud burst was recorded 62 days after pruning. Similarly, under Bathinda conditions, bud burst was recorded 31 days after pruning on vines treated with 2.5% of hydrogen cyanamide, whereas, it was recorded 60 days after pruning in untreated vines (Table 1). It might be due to the early completion of chilling requirement vis-à-vis reduction in inhibitors level in these treatments as compared to control. Likewise, Lombard *et al.* (2006) found that pruning and rest-breaking treatments (hydrogen cyanamide) enhanced bud burst and increased endogenous cytokinins. Shulmen *et al.* (1983) also observed that in pruned 'Perlette' vines treated with cyanamide 80% buds opened after 30 days of treatment. Likewise, George *et al.* (1988) and Zelleke and Klierer (1989) also reported that application of hydrogen cyanamide enabled the buds to sprout earlier.

The application of hydrogen cyanamide also advanced the time of flowering by 11-13 days (Table 1) and maturity by 6-8 days as compared to control vines. The fruit from vines treated with 2.5% of hydrogen cyanamide was harvested 8.5 days earlier than untreated vines (control: water spray). Similar findings with regard to time of flowering and maturity of grapes were recorded under Bathinda conditions as well, where time of flowering was also advanced by 9-13 days with

Table 1. Effect of applications of hydrogen cyanamide on time of bud burst, flowering and maturity of grape cv. Perlette (mean 2007, 2008)

| Hydrogen cyanamide (% a.i.) | Time of bud burst (DAT*) | | Time of flowering (DAT*) | | Yield (No. of clusters per vine) | |
|--------------------------------|--------------------------|----------|--------------------------|----------|----------------------------------|----------|
| | Ludhiana | Bathinda | Ludhiana | Bathinda | Ludhiana | Bathinda |
| 1.5 | 34.0 | 34.5 | 68.5 | 69.0 | 40.0 | 69.0 |
| 2.0 | 33.0 | 32.5 | 67.0 | 66.5 | 42.0 | 76.0 |
| 2.5 | 32.0 | 31.5 | 66.5 | 66.0 | 41.5 | 75.5 |
| Control(water spray) | 62.5 | 60.0 | 79.5 | 78.0 | 33.0 | 59.5 |
| CD (p=0.05) | 2.4 | 0.92 | 2.7 | 2.1 | 2.3 | 5.3 |

* Days after treatment

hydrogen cyanamide treatments. Likewise, Muhtaseb and Ghnaim (2008), Carreno *et al.* (1999) and George *et al.* (1988) demonstrated that application of hydrogen cyanamide after pruning advances the flowering and maturity as compared to untreated vines.

The application of hydrogen cyanamide has also shown significant effect on yield (number of clusters/vine) of Perlette grape vines (Table 1). The higher mean yield (42.0 clusters per vine) was obtained from vines treated with 2.0% of hydrogen cyanamide, followed by 41.5 and 40.0 clusters per vine recorded in vines treated with 2.5 and 1.5% of hydrogen cyanamide, respectively under Ludhiana condition. The higher number of clusters per vine obtained in hydrogen cyanamide treated vines as compared to untreated control vines may be attributed to uniform and higher bud burst in treated vines. Similarly under Bathinda conditions, the yield in terms of number of clusters per vine was higher in vines treated with 2.0% of hydrogen cyanamide followed by in vines treated with hydrogen cyanamide @ 2.5 and 1.5% recording 75.5 and 69.0 clusters per vine, respectively (Table 1). George and Nissen (1986) also recorded a 3-fold increase in yield on young vigorous Muscat Hamburg grape-vines with cyanamide applications. In contrary to these findings, McColl (1986) observed that cyanamide applied in May and June to Sultana and Cardinal grapevines severely reduced yield. However, Shulman *et al.* (1985) found only slight yield reduction with cyanamide applications. In this study early cyanamide applications *per se* did not reduce yield.

The vines treated with 1.5% of hydrogen cyanamide recorded highest bunch weight (389.5 g) but did not significantly differ from other treatment and control vines (Table 2) under Ludhiana condition. In contrast to the above results, the bunch weight was recorded maximum (363.0 g) in untreated vines, which was at par with bunch weight of vines treated with 2.0 and 2.5% of hydrogen cyanamide under Bathinda conditions (Table 2). However, significantly higher total soluble solids (17.5%) were obtained in treatment in which foliar application of 2.5% of hydrogen cyanamide was applied immediately after pruning. At the same time, the untreated (control) vines recorded lower level of total soluble solids (13.6%) as compared to treated vines. Similarly, hydrogen cyanamide treated vines recorded lower levels of acidity (0.66 to 0.68%) as compared to untreated control vines, which recorded 0.92% of acidity (Table 2). Similar results with regard to TSS and acidity of the vines were also obtained under Bathinda conditions. In hydrogen cyanamide treated vines, fruit quality (higher TSS and lower acidity) was improved because at the same time of analysis the fruits of untreated vines were still immature (unripe) and therefore, recorded lower levels of total soluble solids and higher level of acidity. Carreno *et al.* (1999) in Thompson Seedless grape and Muhtaseb and Ghnaim (2008) in Superior Seedless also noted positive effect of hydrogen cyanamide on fruit quality. The present study suggested that hydrogen cyanamide @ 2.0 to 2.5% could be useful for advancing maturity (7-8 days) and

Table 2. Effect of applications of hydrogen cyanamide on fruit quality of grape cv. Perlette (mean 2007, 2008)

| Hydrogen cyanamide (% a.i.) | Bunch weight (g) | | TSS (%) | | Acidity | |
|--------------------------------|------------------|----------|----------|----------|----------|----------|
| | Ludhiana | Bathinda | Ludhiana | Bathinda | Ludhiana | Bathinda |
| 1.5 | 389.5 | 326.0 | 16.2 | 18.6 | 0.68 | 0.77 |
| 2.0 | 386.5 | 362.5 | 16.6 | 19.4 | 0.66 | 0.71 |
| 2.5 | 381.5 | 346.0 | 17.5 | 19.3 | 0.67 | 0.71 |
| Control(water spray) | 389.0 | 363.0 | 13.6 | 15.6 | 0.92 | 1.02 |
| CD (p=0.05) | NS | 14.0 | 1.8 | 0.9 | 0.03 | 0.09 |

improving fruit quality in grapes cultivar Perlette under northern Indian conditions.

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