the rate of decay. The diffusivity of ethylene was calculated to be about 42
ml/cm² per min for Tygon tubing in a 0
to 100% gradient of ethylene at 20°C.
At a flow rate of 100 ml/min each cm
of a 8 mm I.D. Tygon tube raised the
ethylene concn of the carrier gas by
about 1.47 μl/liter. If a concn of 10
μl/liter is desired at a flow rate of 150
ml/min, the Tygon tube must be
(10 μl/liter) / (1.47 μl/liter/cm) (100 ml/min) = 6.8 cm long. If a
concn of 5 μl/liter is desired in a flow of
200 ml/min, the Tygon tube must be
(5 μl/liter) (200 ml/min) / (1.47
μl/liter/cm) (100 ml/min) = 6.8 cm
long. Experiments confirmed that the
desired effluent concn will be present in
the fully charged apparatus, and that
the decrease in ethylene concn in the
effluent with time will be inversely
proportional to the size of the reservoir.
It is hoped that the simple appar­
ratus described in this paper for dispens­
ing μl/liter levels of ethylene will assist
researchers investigating the long-term
physiological effects of ethylene.

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Effect of Ethephon on Ripening of
‘Delight’ Grapes

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Additional index words. (2-chlorethyl)phosphonic acid, Vitis vinifera

A technique to induce early fruit
maturation would permit staggering the
harvest and provide an opportunity to
avoid early fall rains which are common to
grape growing regions with Mediter­
nanean climates. Dipping trials with
ethephon have resulted in advanced maturation in some cultivars of Vitis
vinifera in Australia (2). The main
effect observed was a decrease in total
citric. Weaver and Pool (4) observed that etephon induced a significant increase in
total soluble solids in ‘Carignane’ a wine cultivar but contrary results have also been reported (3). The
present study was designed to determine the
effect of etephon on ‘Delight’, a
table cultivar.

Nine year old ‘Delight’ grapevines growing in an irrigated vineyard at the
Haryana Agricultural University, His­sar, India were used. The vines were Kniffin
trained (double wire), spur pruned, and
cluster thinned to 20 per vine before
the fruiting. Six replicate clusters per vine were treated on May
16, 1976 when average % soluble solids in the juice was 10 by dipping them in
ethephon at 0, 250, 500 or 1000 ppm.
There were 3 vines per treatment. The clusters were harvested on May 26,
1976 when the fruits of one treatment reached maturity. Fifty berries from
each replicate cluster were sampled, weighed and their juice was extracted for
determining total soluble solids (TSS)
and total acidity.

Although one treatment reached
maturity (TSS/acidity ratio of 22) on
May 26 (Table 1), untreated clusters were not mature until June 6, 1976.
Ethephon application resulted in an
increase in berry wt, TSS, and TSS/acidity
ratio; 500 ppm was found to be the most
effective conncn in advancing maturity.
Ripening was advanced by 11 days at
this concn compared to controls. Some
shrivelled berries were noticed at 1000
ppm.

These findings are in agreement with
those of Weaver and Pool (4) who indi­
cated that etephon significantly
increased berry size and total soluble solids in ‘Carignane’ grapes. Hale et al.
(2) also induced higher TSS/acidity
ratio by etephon treatment of ‘Dora­
dillo’ grapes, advancing ripening by six
days. In their experiment 500 ppm
was more effective than 1200 ppm.
Contrary to these findings Clore and Fay (1) and Weaver and Montgomery (3) failed
to observe any effect of etephon on
TSS/acidity ratio in grapes. Cultivar
differences, proper concn, and time and
method of application are probably responsible for the varied responses of
grape fruits to etephon. We conclude
that etephon when properly applied
may be helpful in advancing maturity and
inducing uniform ripening of ‘Del­
light’ grapes.

Table 1. Effect of etephon on ‘Delight’ grapes.

<table>
<thead>
<tr>
<th>Etephon concn (ppm)</th>
<th>Wt/berry (g)</th>
<th>Juice soluble solids (%)</th>
<th>Juice acidity (%)</th>
<th>Soluble solids/acidity ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.19b</td>
<td>15.2b</td>
<td>0.14a</td>
<td>13.3c</td>
</tr>
<tr>
<td>250</td>
<td>1.59a</td>
<td>17.7a</td>
<td>0.95a</td>
<td>18.6b</td>
</tr>
<tr>
<td>500</td>
<td>1.67a</td>
<td>18.1a</td>
<td>0.76b</td>
<td>23.9a</td>
</tr>
<tr>
<td>1000</td>
<td>1.40a,b</td>
<td>17.9a</td>
<td>0.97a</td>
<td>18.0b</td>
</tr>
</tbody>
</table>

1Received for publication March 12, 1978.
The cost of publishing this paper was de­
fraed in part by the payment of page charges.
Under postal regulations, this paper must
therefore be hereby marked advertisement
solely to indicate this fact.

2Grams tartaric acid per 100 ml juice.
3Mean separation within columns by Duncan’s multiple range test, 5% level.


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