

OVERRRIPENESS IN PEARS
TRANSPORTED FROM EVERETT,
U.S.A. TO ROTTERDAM BY M.V.
"SHIKISHIMA REEFER" IN DEC/JAN
1989/1990. RAPPORT 2.

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ato-dlo



ATO AGROTECHNOLOGIE

OVERRIPENESS IN PEARS TRANSPORTED FROM EVERETT, U.S.A. TO ROTTERDAM BY
M.V. "SHIKISHIMA REEFER" IN DEC/JAN 1989/1990. Rapport 2.

Reaction on the report of Ing. O. de Groot of Harmsen en De Groot (Ref. 0093.90 OG/rapport 189.
ATO/DLO).

Reaction to the letter of Paul M. Chen of Oregon State University from april 17th 1992.

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The report of Ing O. de Groot

It is necessary to react in two ways on the report of Ing de Groot. At first I will give a general view on the case and after that I will react in detail on Mr de Groot's report.

In the chain of events from picking the fruits from the trees and arrival of the SHIKISHIMA REEFER in Rotterdam we do not know what happened between picking and the beginning of the transport. We know, that transport took place on the right temperature together with apples and upon arrival in Rotterdam pears suffered from overripeness.

Is the overripeness of the pears caused by factors before loading aboard the ship or by loading the pears together with apples?

We can imagine 2 possibilities for the period between half september and half december:

1. The fruits were picked on the right moment, cooled down without delay and stored at the right temperature.

It must be expected in this situation that the pears produced already a lot of ethylene in december before loading. In the figure 1 the rise of ethylene production at 0-1°C is illustrated according to the data of Fidler and North, 1969. From this picture we learn, that after 3 months the ethylene production of pears has reached a high level in comparison with the situation directly after picking. The pears do not need an outside ethylene source to reach this high production rate.

Moreover the effect of ethylene at very low temperature is very small or absent. According to Gerhardt and Siegelman, 1953, Anjou and Bartlett pears were not stimulated to ripening at 31°F if they were stored in air from preripened apples or pears.

These facts lead to the development of compatibility tables according to Lipton, 1977. Herein are apples and pears in the same group, meaning that these fruits can be stored and transported together.

Finally: it is common practise in South Africa to store apples and pears together in the same rooms (personal information from B. Truter, Fruit and Fruit Technology Research Institute, Stellenbosch, Republic of South Africa).

2. The fruits were picked too late, while there were delays in cooling and/or proper temperature management.

In these cases it must be expected, that storage life will be shortened, as ripening is promoted by these conditions.

Conclusion: The pears of the "SHIKISHIMA REEFER" produced already much ethylene before transport. Loading these pears together with apples in a cold room on "SHIKISHIMA REEFER" has not caused overripeness in the pears as a consequence of ethylene produced by the apples. The cause of overripeness in the pears must be found in events before transport to Europe .

Concerning Mr de Groot's report I like to comment the following parts.

1. The remark on my first conclusion

quote

Similar general conclusion can be drawn for apples and many other fruits and therefore we consider this conclusion to be superfluous

unquote

This conclusion is necessary since I am convinced, that the cause of the overripeness must be found in the period before loading the fruits on board the ship. In this period overripeness may be induced by a too late harvest, cooling delay, improper cooling and CO₂ accumulation during storage.

Mr de Groot's quotation of my first conclusion is not correct. He speaks about the **packing date**, whereas it must be the **picking date**. The packing date will not influence ripening, while the picking date is of vital importance for development of overripeness.

2. I was surprised by Mr de Groot's conclusion on the shelf life.

quote

Consequently the consignment shipped per m.v. "SHIKISHIMA REEFER" still had a considerable shelf-life

unquote

This conclusion is not correct, since there appeared quality problems in the pears. For these particular samples storage life was over and there was no shelf-life left. It is necessary to define storage and shelf life to avoid confusion.

3. In the report a relation is introduced between ethylene concentration and physiological disorders.

quote

Brown heart/Internal Breakdown in pears was reduced from 68% to 36% when the ethylene level was reduced from 395 ul/litre to 1.5 ul/litre.

unquote

My comments are the following:

a. the above mentioned reduction is not comparable to the situation in the "SHIKISHIMA REEFER". The concentration rise as a consequence of storing apples together with pears is of a complete other order than from 1.5 ul/litre to 395 ul/litre. The rise will be much less, since apple and pear are classified in the same production group of 10-100 ul.kg.hr according to Kader, 1985. Moreover the fruits were stored in a cold room, in which accumulation of ethylene is hardly possible.

b. in ethylene effects there is always a threshold concentration, which causes a big effect. Changes in ethylene concentration are much less important in comparison with the big threshold effect. In the overripe pears of the "SHIKISHIMA REEFER" the threshold ethylene level must be expected to be produced by the pears themselves before transport.

c. the temperature in the example was not mentioned. In estimating ethylene effects the storage temperature is very important.

4. Surprising is Talib's quotation.

quote

This is why mixed storage of high ethylene producers is not advisable when high sensitive products are present.* N.B. Pears are highly ethylene sensitive.

unquote

The author will have meant storage of for example leafy vegetables with apples, but not a combination of apples and pears. According to Ryall and Pentzer, 1974 we mention the following recommendation

quote

The lesson to the fruit handler is to recognize that fleshy fruits such as apples, pears, plums, peaches etc give off large quantities of ethylene. Do not store these fruits with susceptible commodities such as flowers, greens, leafy vegetables, carrots, lettuce and nursery stock.

unquote

The letter of Paul M. Chen.

I like to make the following remarks:

- a. I already mentioned the common practice in South Africa to store apples and pears together. This is in contradiction to the situation in the Pacific Northwest.
- b. Mr Chen's statement

quote

If apples and winter pears are stored together, the high level of ethylene generated from the apple fruit may induce the senescent activities of winter pears so as to reduce their storage and shelf life.

unquote

is not relevant for the pears in the "SHIKISHIMA REEFER", since these fruits were already about 3 months stored before they were transported to Europe. During those 3 months the pears themselves had already reached a high enough level of ethylene production to stimulate ripening.

- c. I already mentioned the research of Gerhardt and Siegelman, 1953. They did not see any effect from ripening apples on the quality of pears at low temperature.

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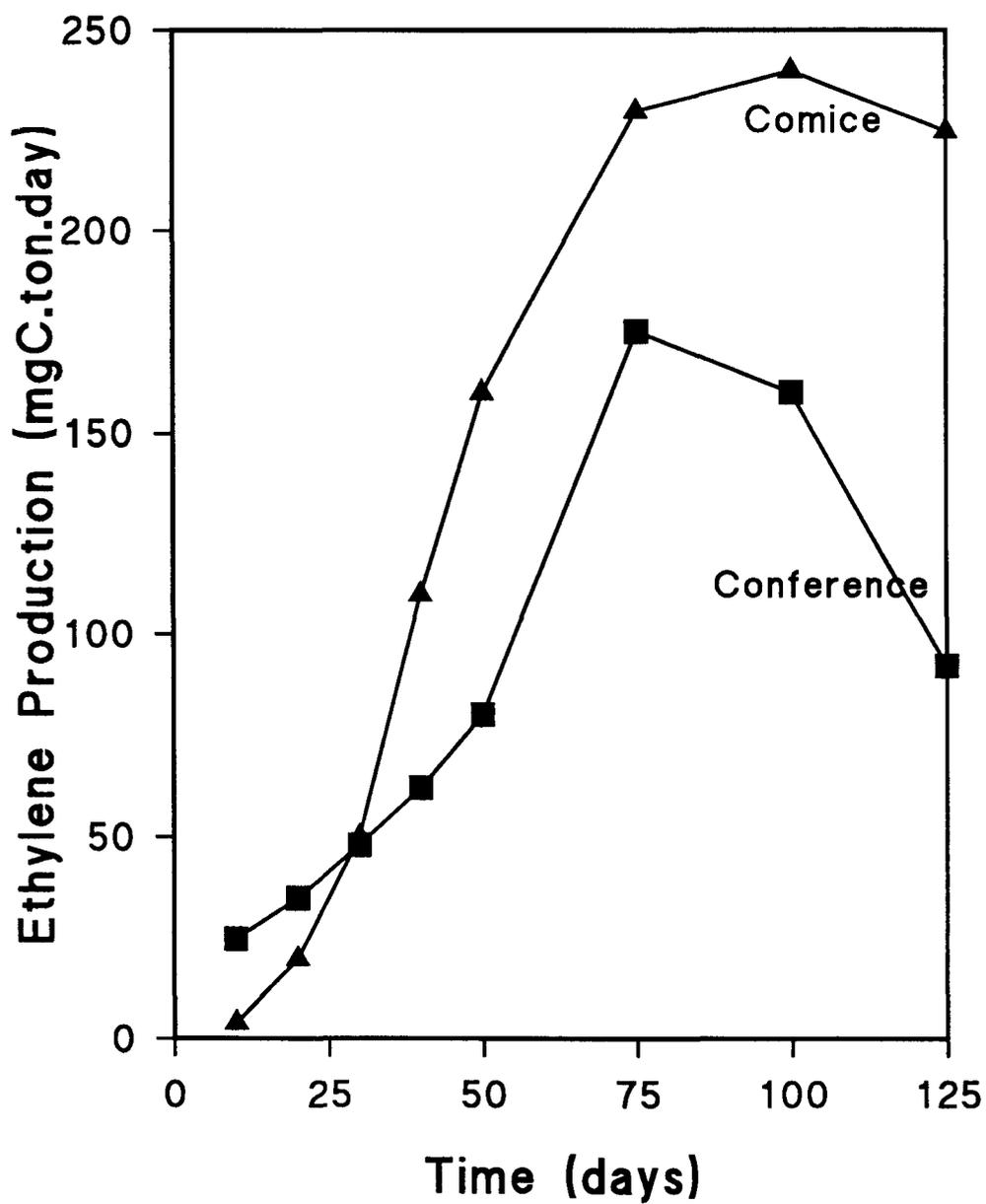


Fig. 1: Ethylene production by pears at 0 to 1°C (after Fidler and North, 1969).