

# Influence of 1-MCP on softening behavior of different apple varieties



## in different European countries



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## INTRODUCTION

The objective of this investigation within W.P. 4.2 was to provide data for the DSS model and further quantify the effects of 1-MCP treatment on processes, characteristics and parameters determining decision making in fruit quality management. Influences of the ethylene-inhibitor 1-MCP on fruit quality were determined for the second year in different apple varieties in different countries. The investigations included ripening and quality assessments (flesh firmness, soluble solids, titratable acidity, starch pattern index, fruit size, and weight) during post-harvest storage treatments. As the factor which is mainly influenced by 1-MCP treatment only the results for firmness are shown here. Since the sensitivity of fruit for 1-MCP depends on the ripening stage of the fruit, picking stage and initial fruit quality were included in these studies again.

## MATERIAL AND METHODS

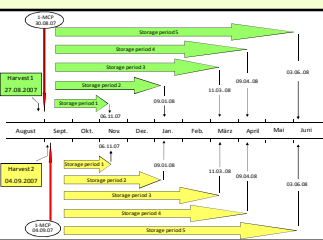


Figure 1. Time table for harvest dates and storage periods as an example for 'Elstar' apples in Germany (KOB).

Table 1. Conditions for controlled atmosphere storage and max. storage duration as applied by the participants in the different countries (2007/ 2008).

Variety	Participant	Temp. [°C]	O <sub>2</sub> [kPa]	CO <sub>2</sub> [kPa]	storage time (max.) [days]
Golden Delicious	KOB (D); Cuij (F); ACW (CH); RIPF (PL)	0.5-1.0	1.0	2.5-3.0	293
Elstar	DIAS (DK); KOB (D)	1.5/3.0	1.5/1.0	2.0	170/ 281
Rubens	ACW (CH)	0.5	1.2	1.5	285
Shampion	RIPF (PL)	1.0	2.0	2.0	211
Topaz	RIPF (PL)	1.0	2.0	2.0	218
Braeburn	Laimburg (I)	1.3	1.5	1.3	217
Red Delicious	Laimburg (I)	1.3	1.0	1.0	241



Figure 2. SmartFresh (1-MCP) application at KOB.

Experiments were realized in 6 different countries. For long-term storage fruits were picked at two different dates. The first harvest coincided with commercial harvest, the second was realized 7 or 14 days later. In each country fruits were picked in at least one orchard. Part of the fruits was treated with 1-MCP during 24h one week after harvest and then put into CA-storage. Fruit samples for analysis were taken at five different time points. CA conditions and storage duration are given in Table 1. An example of the set-up of an experiment is shown in Figure 1 for 'Elstar' in Germany (KOB).

## RESULTS

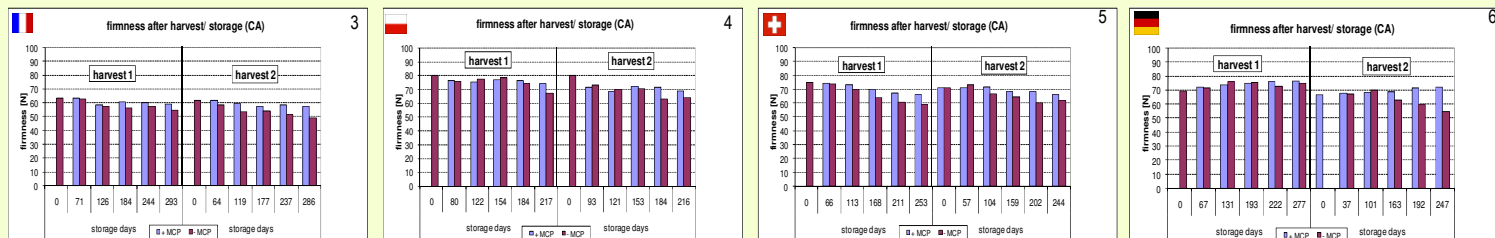


Figure 3-6. Effects of harvest date, 1-MCP treatment and CA storage on fruit firmness of 'Golden Delicious' apple in France, Poland, Switzerland and Germany

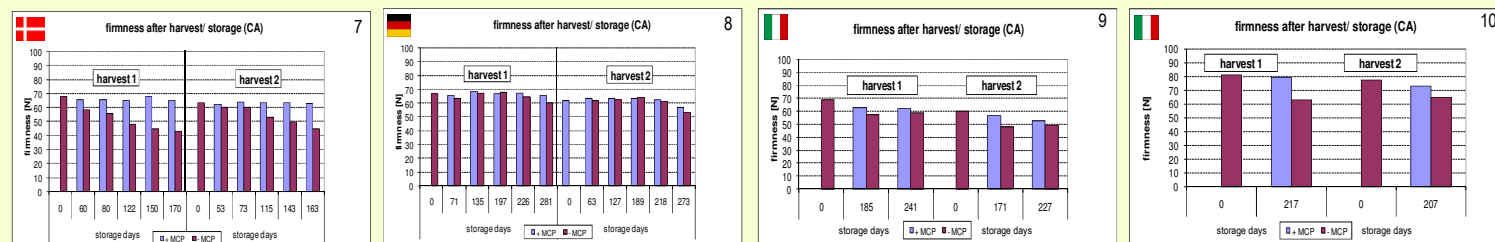


Figure 7;8. Effects of harvest date, 1-MCP treatment and CA storage on fruit firmness of 'Elstar' apple in Denmark and Germany

Figure 9;10. Effects of harvest date, 1-MCP treatment and CA storage on fruit firmness of 'Red Delicious' and 'Braeburn' apple in Italy

## CONCLUSION

- 1-MCP had a positive effect on the fruit quality of the apple varieties tested in the different countries.
- The effectiveness of 1-MCP was linked to the ripening stage at the moment of application.
- Experiments in the first and in the second year show that the quality parameter that is mainly influenced by 1-MCP treatment is fruit firmness.
- The effect of 1-MCP application compared to untreated fruit generally increases with longer storage durations
- In general: for 1-MCP treated fruits the harvest date should be later than for normal CA storage to allow a good sensory quality, but it should be early enough to guarantee an effect of 1-MCP treatment and a good storability of the fruits.

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