



THE INFLUENCE OF 1- METHYLCYCLOPROPENE ON PLUM (*PRUNUS DOMESTICA* L) QUALITY DURING POST-HARVEST STORAGE

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Growing in Europe”

OBJECTIVE

The research was aimed at establishing the effect of 1-methylcyclopropene (1-MCP) on physical and chemical indices and sensory quality of the five plum (*Prunus domestica* L) cultivars.

MATERIALS AND METHODS I



'Sonora'



'Minjona'



'Victoria'



'Adele'



'Stanley'



MATERIALS AND METHODS II

Research has been conducted during the period from **2014** to **2015** at the Institute of Horticulture, Latvia University of Life Sciences and Technologies in Dobele.

MATERIALS AND METHODS III



Fresh weight loss determined with the method provided by Bliet et al., 1995



Total acids content determined with the standard method - LVS EN 12147:2001



Total soluble solids estimated with the standard method - LVS EN 12143:2001



Flesh firmness determined using digital penetrometer, model TR 53205



Sensory evaluations - ISO 4121:1987

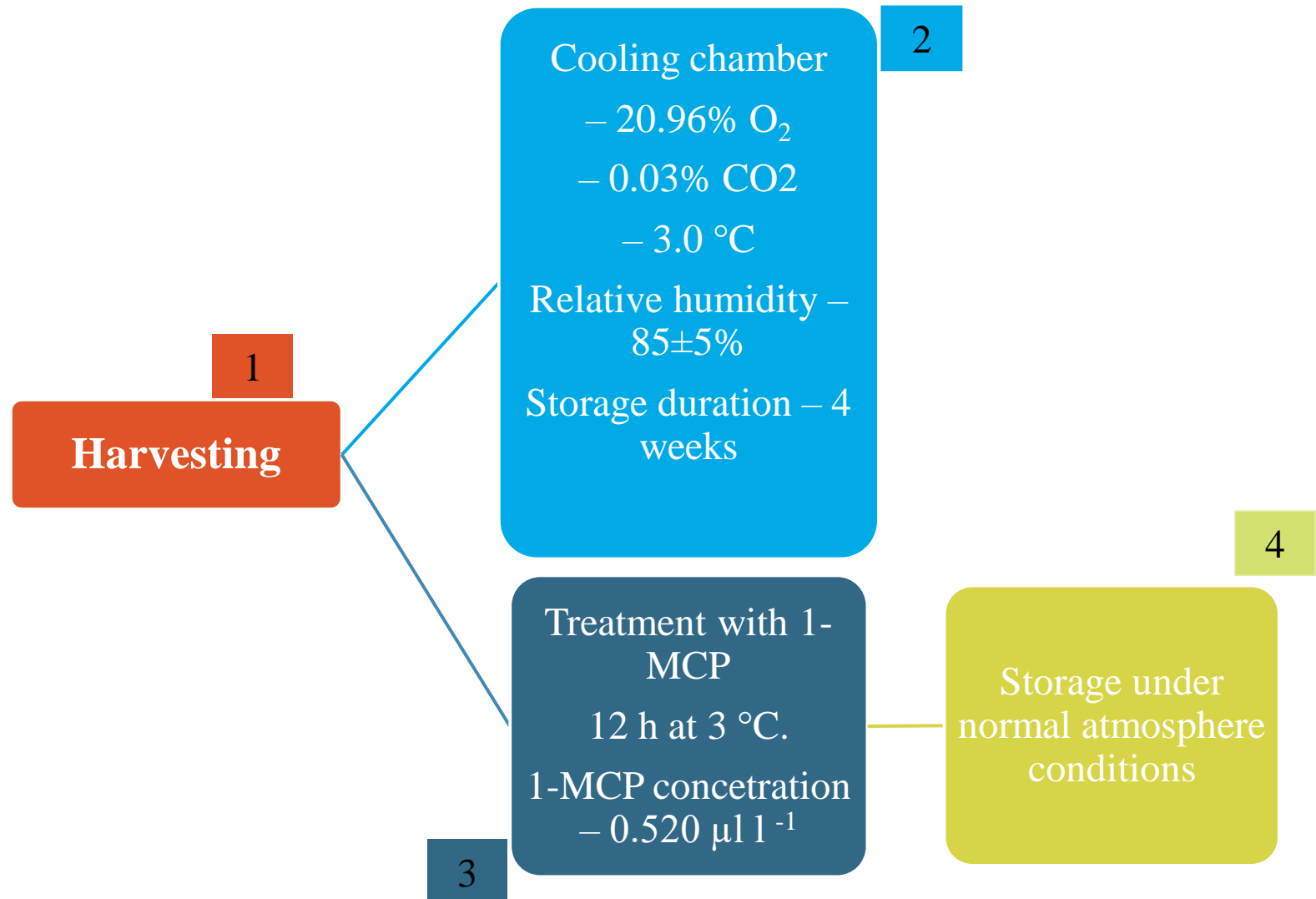


Data analysis was carried out using IBM® **SPSS**® Statistics programme 20.0 (SPSS Inc., Chicago, Illinois). Significant differences determined using **UNIANOVA**, by **Least Significant Difference (LSD)** criteria.



Obtained results were processed by **PanelCheck V1.4.2** programmed by Oliver Tomic and Henning Risvik software using **Principal Component Analysis** (NÆS et al. 2010).

MATERIALS AND METHODS IV



MATERIALS AND METHODS III

Cultivar	Indicies	Research year	
		2014	2015
'Adele'	Harvesting date	03.09	17.09
	Firmness, N	10.19 ^a ±0.29	13.91 ^b ±0.70
	SSC, %	14.98 ^a ±0.26	10.63 ^b ±0.26
	TA,%	0.69 ^a ±0.05	1.18 ^b ±0.05
'Sonora'	Harvesting date	03.09	17.09
	Firmness, N	16.76 ^a ±0.26	13.25 ^b ±0.26
	SSC, %	15.60 ^a ±0.31	10.98 ^b ±0.70
	TA,%	1.60 ^a ±0.05	1.47 ^b ±0.05
'Victoria'	Harvesting date	03.09	17.09
	Firmness, N	15.98 ^a ±0.26	12.92 ^b ±0.50
	SSC, %	12.92 ^a ±0.32	11.76 ^b ±0.49
	TA,%	1.85 ^a ±0.05	1.60 ^b ±0.05
'Stanley'	Harvesting date	17.09	23.09
	Firmness, N	27.75 ^a ±0.10	7.64 ^b ±0.15
	SSC, %	11.09 ^a ±0.26	15.22 ^b ±0.50
	TA,%	1.21 ^a ±0.05	1.21 ^a ±0.05
'Minjona'	Harvesting date	17.09	17.09
	Firmness, N	26.18 ^a ±0.29	12.92 ^b ±0.49
	SSC, %	12.38 ^a ±0.20	12.92 ^a ±0.15
	TA,%	1.02 ^a ±0.05	1.50 ^b ±0.05

RESULTS

FRESH WEIGHT LOSS, %

Cultivar	Storage duration	Research year			
		2014		2015	
		Normal conditions	Treated with 1-MCP	Normal conditions	Treated with 1-MCP
‘Adele’	I	-2.90 ^a	4.10 ^b	-1.33 ^a	-1.19 ^a
	II	-5.60 ^a	-7.80 ^b	-2.51 ^a	-2.75 ^a
	III	-7.00 ^a	-9.70 ^b	-3.96 ^a	-3.93 ^a
	IV	-7.60 ^a	-10.40 ^b	-4.86 ^a	-4.93 ^a
‘Sonora’	I	-4.30 ^a	-3.50 ^a	-1.47 ^a	-1.35 ^a
	II	-8.30 ^a	-9.10 ^a	-2.50 ^a	-2.5 ^a
	III	-15.30 ^a	-11.30 ^a	-5.06 ^a	-3.67 ^a
	IV	-19.60 ^a	-12.90 ^b	-3.52 ^a	-5.13 ^a
‘Victoria’	I	-4.80 ^a	-6.30 ^a	-1.32 ^a	-1.09 ^a
	II	-9.60 ^a	-9.90 ^a	-2.29 ^a	-2.27 ^a
	III	-12.00 ^a	-12.70 ^a	-3.41 ^a	-3.58 ^a
	IV	-12.00 ^a	-13.20 ^a	-5.03 ^a	5.04 ^a
‘Stanley’	I	-1.30 ^a	-1.50 ^a	-1.56 ^a	-1.26 ^a
	II	-2.20 ^a	-2.10 ^a	-3.12 ^a	-2.76 ^a
	III	-2.80 ^a	-2.90 ^a	-4.94 ^a	-4.51 ^a
	IV	-3.10 ^a	-3.50 ^a	-9.37 ^a	-9.47 ^a
‘Minjona’	I	-4.30 ^a	-2.70 ^a	-3.22 ^a	-1.83 ^a
	II	-5.90 ^a	-3.70 ^a	-3.92 ^a	-4.68 ^a
	III	-5.40 ^a	-5.00 ^a	-5.40 ^a	-6.86 ^b
	IV	-5.40 ^a	-5.00 ^a	-8.18 ^a	-6.49 ^b

TOTAL ACIDS CONTENT

Cultivar	Storage duration	Research year			
		2014		2015	
		Normal conditions	Treated with 1-MCP	Normal conditions	Treated with 1-MCP
'Adele'	0	1.60	-	1.18	-
	I	1.31 ^a	1.08 ^b	1.02 ^a	1.02 ^a
	II	1.54 ^a	1.18 ^a	1.02 ^a	0.89 ^b
	III	1.15 ^a	1.28 ^a	1.02 ^a	1.02 ^a
	IV	1.02 ^a	1.18 ^a	0.96 ^a	1.02 ^b
'Sonora'	0	0.69	-	1.47	-
	I	1.05 ^a	0.79 ^b	1.15 ^a	1.28 ^b
	II	1.02 ^a	0.89 ^b	1.15 ^a	1.02 ^b
	III	0.99 ^a	0.92 ^b	1.15 ^a	1.28 ^b
	IV	0.89 ^a	0.82 ^b	1.02 ^a	1.15 ^b
'Victoria'	0	1.85	-	1.60	-
	I	1.64 ^a	1.48 ^a	1.53 ^a	1.66 ^b
	II	1.18 ^a	1.64 ^b	1.28 ^a	1.28 ^a
	III	1.58 ^a	1.48 ^a	1.53 ^a	1.60 ^a
	IV	1.45 ^a	1.58 ^a	1.40 ^a	1.40 ^a
'Stanley'	0	1.21	-	1.21	-
	I	1.08 ^a	1.05 ^a	0.96 ^a	1.15 ^a
	II	0.96 ^a	0.99 ^a	1.21 ^a	1.28 ^a
	III	0.99 ^a	0.86 ^a	0.96 ^a	1.02 ^b
	IV	1.08 ^a	1.15 ^a	1.15 ^a	1.02 ^b
'Minjona'	0	1.02	-	1.50	-
	I	1.02 ^a	1.08 ^a	1.34 ^a	1.60 ^b
	II	0.73 ^a	0.99 ^a	1.15 ^a	1.08 ^b
	III	0.73 ^a	0.93 ^b	1.15 ^a	1.08 ^b
	IV	0.73 ^a	0.93 ^b	1.15 ^a	1.08 ^b

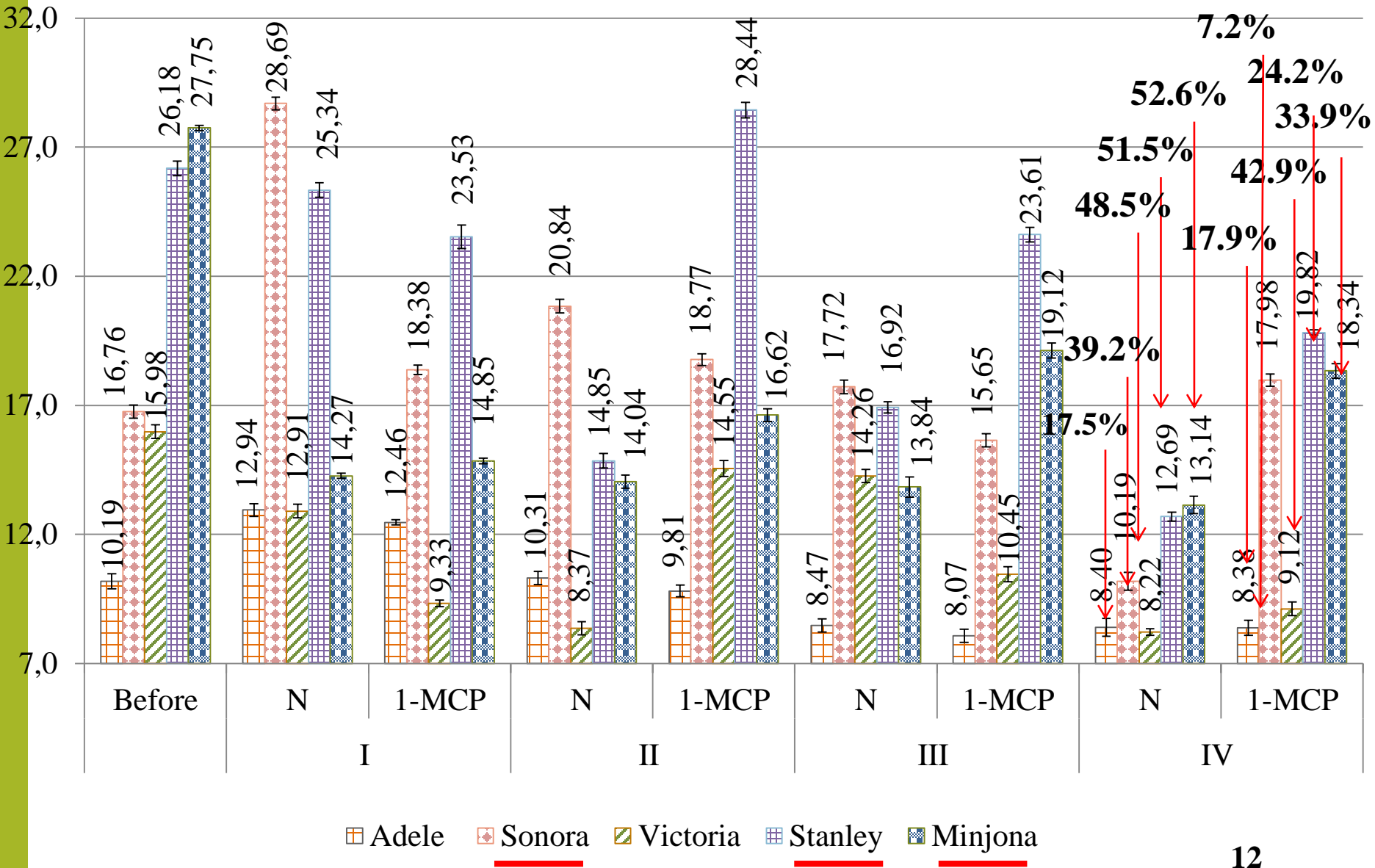
TOTAL SOLUBLE SOLIDS CONTENT

Cultivar	Storage duration	Research year			
		2014		2015	
		Normal conditions	Treated with 1-MCP	Normal conditions	Treated with 1-MCP
‘Adele’	0	14.98	-	10.63	-
	I	14.59 ^a	14.05 ^b	11.91 ^a	12.21 ^b
	II	15.45 ^a	14.51 ^b	11.95 ^a	12.19 ^b
	III	15.29 ^a	15.76 ^a	11.81 ^a	12.45 ^b
	IV	15.82 ^a	15.80 ^a	12.05 ^a	12.23 ^a
‘Sonora’	0	15.60	-	10.98	-
	I	12.00 ^a	15.39 ^b	11.55 ^a	11.18 ^a
	II	15.04 ^a	11.91 ^b	11.19 ^a	10.98 ^a
	III	14.48 ^a	13.36 ^b	11.12 ^a	10.08 ^b
	IV	16.44 ^a	13.04 ^b	10.67 ^a	11.71 ^b
‘Victoria’	0	12.92	-	11.76	-
	I	13.72 ^a	13.21 ^b	11.69 ^a	13.19 ^b
	II	12.32 ^a	15.90 ^b	12.05 ^a	13.17 ^a
	III	17.83 ^a	16.51 ^b	12.41 ^a	12.73 ^a
	IV	14.84 ^a	15.64 ^b	11.43 ^a	13.59 ^b
‘Stanley’	0	11.09	-	15.22	-
	I	12.02 ^a	11.37 ^b	15.46 ^a	14.29 ^b
	II	13.64 ^a	12.10 ^b	14.23 ^a	17.02 ^b
	III	11.55 ^a	12.32 ^b	16.89 ^a	18.22 ^b
	IV	11.69 ^a	11.42 ^a	18.40 ^a	19.20 ^b
‘Minjona’	0	12.38	-	12.92	-
	I	15.07 ^a	15.12 ^a	12.83 ^a	12.68 ^a
	II	14.66 ^a	15.87 ^b	12.97 ^a	12.97 ^a
	III	13.79 ^a	14.51 ^b	12.70 ^a	13.18 ^b
	IV	13.53 ^a	14.03 ^b	13.37 ^a	13.76 ^a

FIRMNESS, N (2014)

average
41.8%

average
23.7%

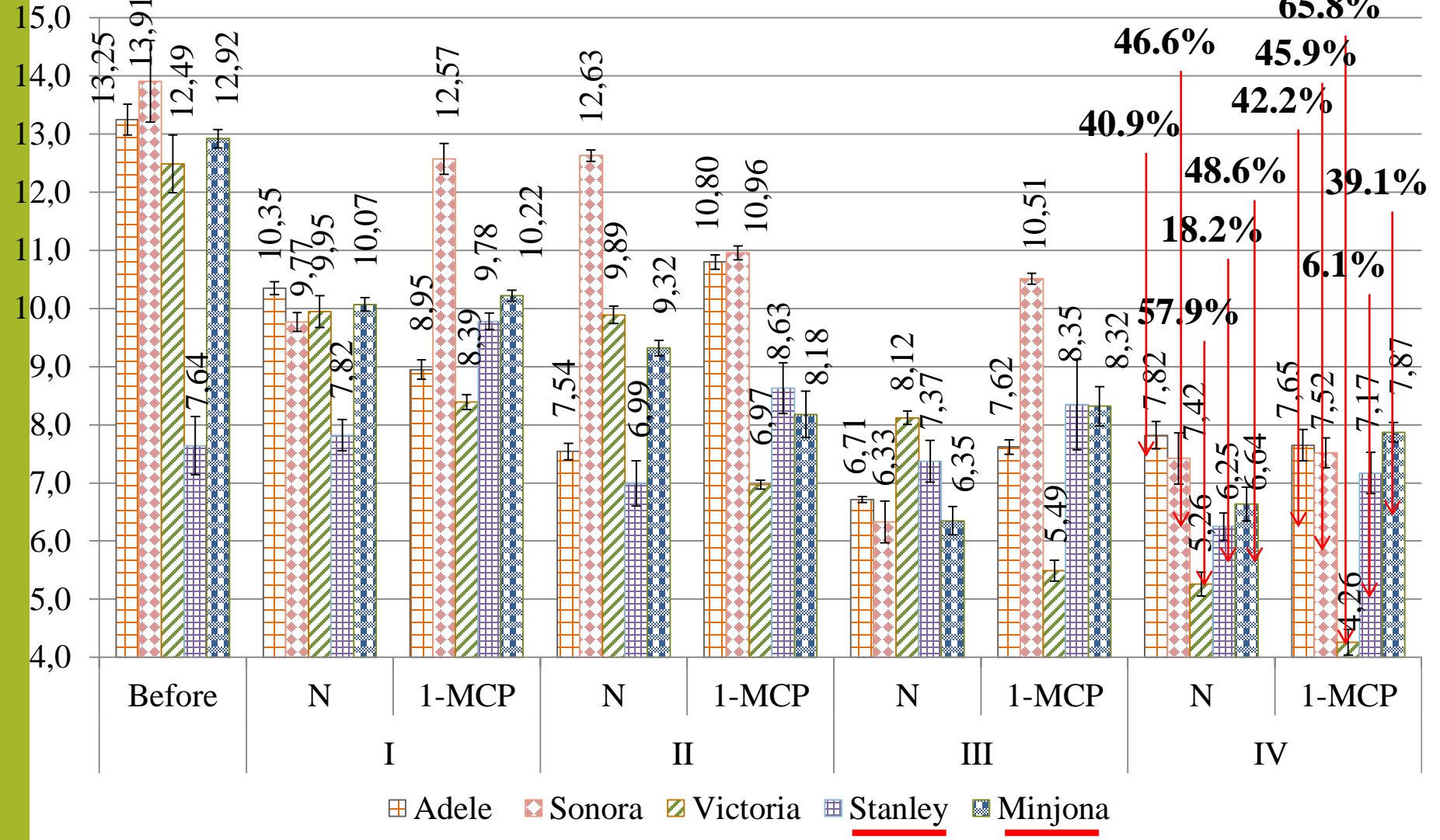


FIRMNESS, N (2015)

average
42.4%

average
39.8%

65.8%



46.6%

45.9%

42.2%

40.9%

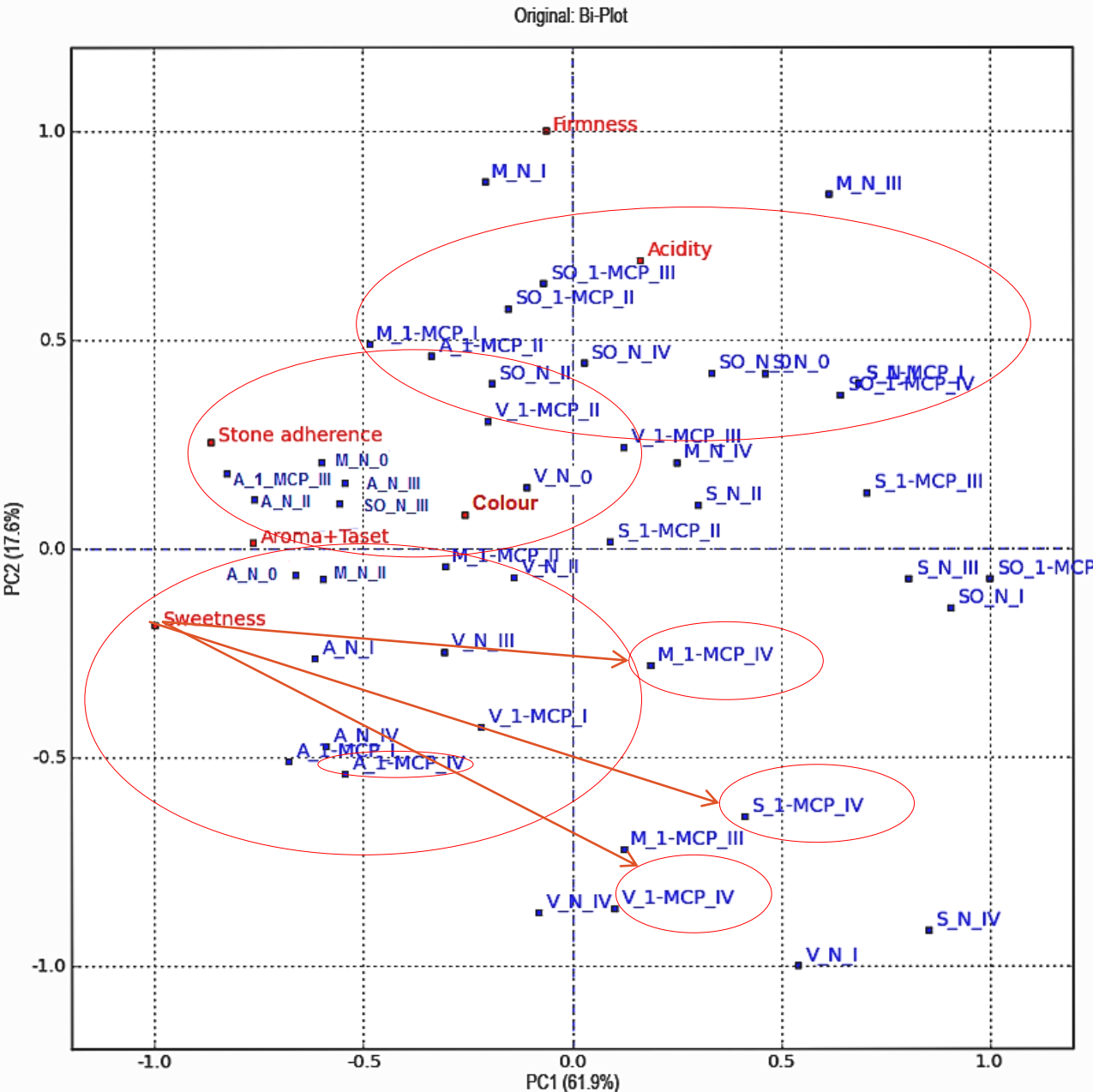
18.2%

57.9%

6.1%

39.1%

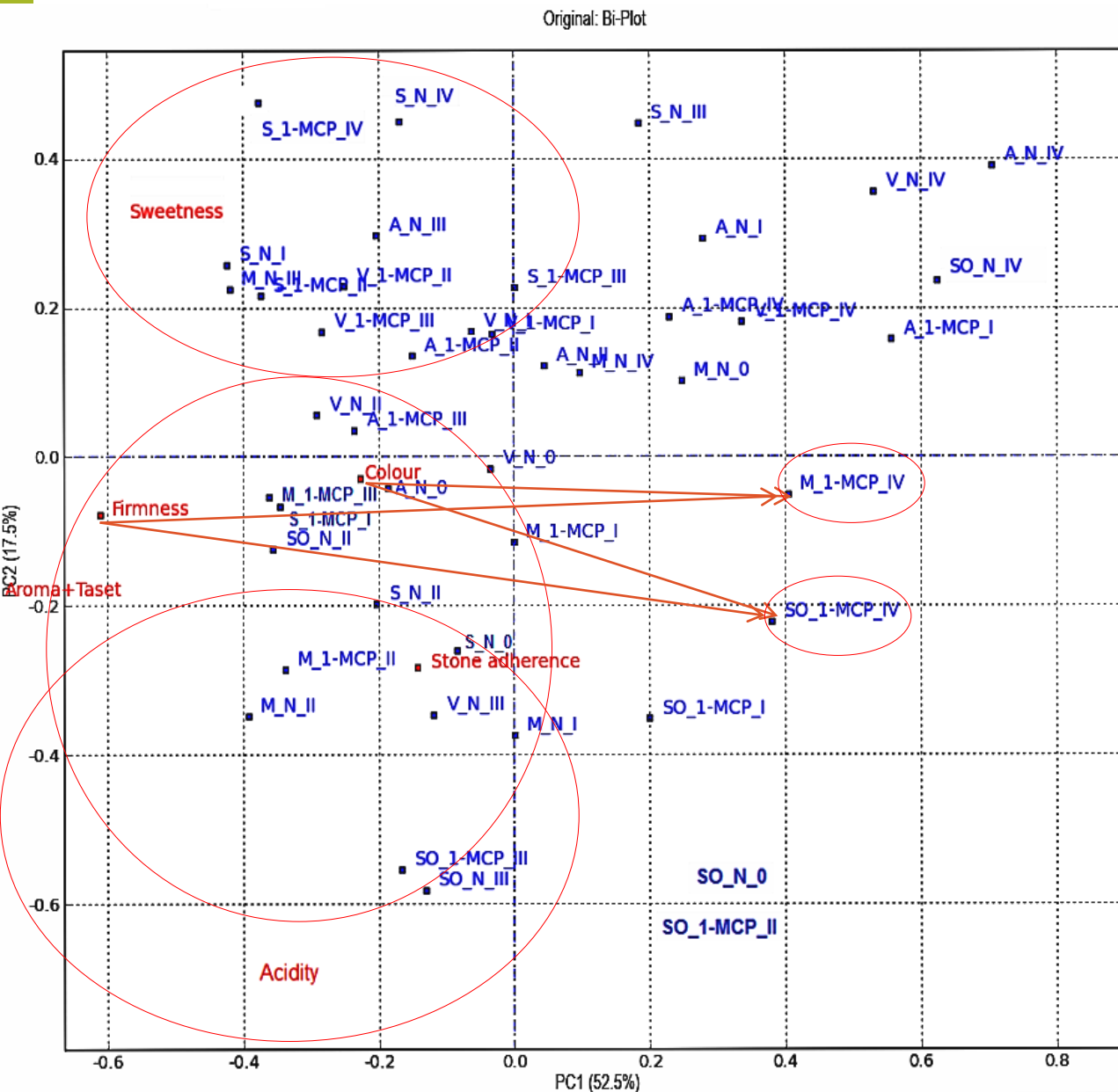
SENSORY EVALUATION 2014



Biplot present scores and loadings of the first two principal components for plum sensory data within four weeks of storage 2014

Letters represented in the figures indicate on types of storage: N – normal conditions, 1-MCP – normal conditions + 1-MCP treatment; Cultivars: A – Adele, SO – Sonora, S – Stanley, M – Minjona, V – Victoria; A; Storage duration: 0 – Before storage, I – after 1 week; II – after two weeks; III – after three weeks; IV – after four weeks.

SENSORY EVALUATION 2015



Biplot present scores and loadings of the first two principal components for plum sensory data within four weeks of storage 2015

Letters represented in the figures indicate on types of storage: N – normal conditions, 1-MCP – normal conditions + 1-MCP treatment; Cultivars: A – Adele, SO – Sonora, S – Stanley, M – Minjona, V – Victoria; A; Storage duration: 0 – Before storage, I – after 1 week; II – after two weeks; III – after three weeks; IV – after four weeks.

CONCLUSIONS

1. Results shows that 1-MCP treatment gave a positive effect on fresh weight losses for cultivar 'Sonora' (2014) and 'Minjona' (2015).
2. Within the research in 2014 total acids content decreased by an average of 17.1% (control samples) and by 7.7% (1-MCP treated). However, in the research year 2015 total acids content in control fruits decreased by 18.1%, while in treated with 1-MCP decreased by 11.1%.
3. Soluble solids content (2014) in control and with 1-MCP treated samples after four weeks of storage increased by 6.3% and 4.8%, respectively. While during the research in 2015 control and with 1-MCP treated fruit, SSC increased by 4.3% and 8.4%, respectively.
4. After four weeks of storage, flesh firmness was considerably decreased. The declines in firmness in the research year 2014 was 12.7% in control and 10.0% in 1-MCP treated samples, while in 2015 - 30.3% in control and 26.2% in 1-MCP treated samples.
5. Panellists found (2014) that, regardless of storage technology cultivars 'Adele' and 'Victoria' were most of all pronounced in colour, aroma+taste, sweetness, firmness, and good stone adherence. However, fruits those treated with 1-MCP were less pronounced in sweetness. By contrast, results from the research year 2015 reveal that fruits of the cultivar 'Stanley' treated with 1-MCP have better-retained quality in terms of colour, aroma+taste, firmness. Besides, fruits treated with 1-MCP ('Sonora', 'Minjona', 'Victoria') were the most acidic.

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‘Creation of a new research group for propagation
of stone fruits, quality improvement of generative
processes and possibilities of fruit use’

THANK YOU VERY MUCH FOR YOU
ATTENTION