



R464 Final Report Annex

Use of ethylene and CIPC on processing varieties of potato 2013-2016

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Annex Table 1. Mean scores for variety sprout length and fry colour quality, taken from Colgan *et al.* (2013).

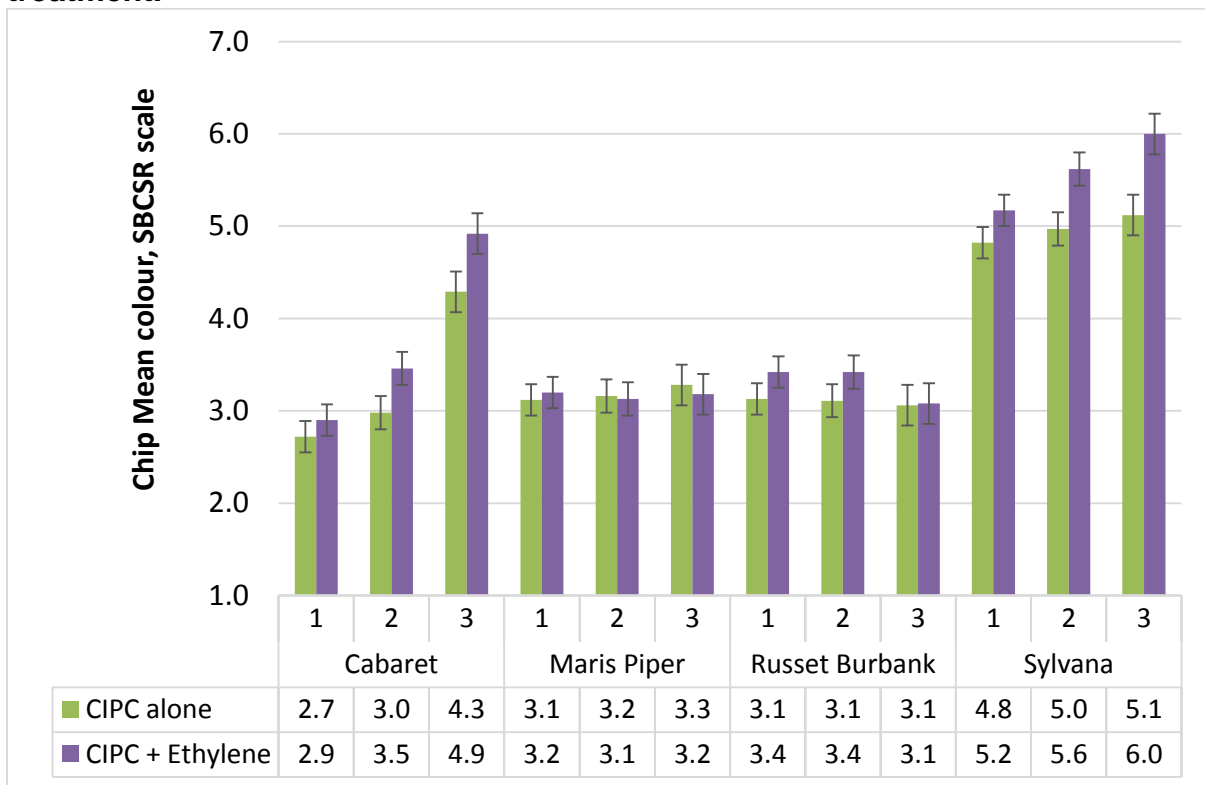
SO (Months)	Treatment	Cabaret		Maris Piper		Russet Burbank		Sylvana		Hermes		Saturna	
		sprout length (mm)	Fry colour (SBCSR units)	sprout length (mm)	Fry colour (SBCSR units)	sprout length (mm)	Fry colour (SBCSR units)	sprout length (mm)	Fry colour (SBCSR units)	sprout length (mm)	Fry colour (Hunter L score)	sprout length (mm)	Fry colour (Hunter L score)
2	Untreated	34.0	3.1	47.1	3.0	2.8	3.1	16.9	5.0	25.9	58.6	20.8	61.3
	1-MCPx1	33.1	2.5	41.1	3.3	1.3	3.2	14.6	4.7	17.2	61.7	13.6	61.6
	Ethylene	7.1	3.0	10.9	3.3	0.5	3.7	1.7	5.5	3.7	53.9	4.6	59.9
	Eth + 1-MCPx1	9.7	2.4	11.2	3.0	0.4	3.2	2.1	5.1	3.6	57.1	4.4	60.4
4	Untreated	44.5	3.6	56.3	3.2	22.0	3.1	24.9	5.4	46.8	60.5	39.9	59.5
	1-MCPx1	48.8	3.3	50.9	3.3	22.3	3.3	26.9	5.5	40.8	60.9	35.5	61.2
	1-MCPx2	45.3	3.2	58.2	3.3	24.0	3.2	26.4	5.0	40.6	60.6	36.3	62.1
	Ethylene	19.8	3.4	15.5	3.2	1.2	3.5	0.7	5.6	16.6	57.1	12.2	59.4
	Eth + 1-MCPx1	19.7	3.2	18.2	3.1	1.5	3.5	0.9	6.0	14.3	59.9	14.2	62.9
	Eth + 1-MCPx2	19.3	3.3	22.6	3.3	2.5	3.2	1.0	5.8	16.6	60.1	16.5	60.4
6	Untreated	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	1-MCPx1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	1-MCPx2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Ethylene	22.3	4.2	18.8	2.9	2.7	3.1	0.3	6.3	20.6	51.6	19.2	57.0
	Eth + 1-MCPx1	19.3	4.4	18.2	2.9	3.4	3.1	0.3	6.2	20.4	53.8	13.3	57.4
	Eth + 1-MCPx2	18.9	4.9	21.0	3.1	4.4	3.4	0.4	6.3	23.8	54.6	14.4	57.0
	Eth + 1-MCPx3	25.4	4.5	23.3	3.0	4.8	3.1	0.2	5.7	25.9	55.2	20.3	56.0

Highlighted values considered commercially unacceptable. nd, not determined

Annex Table 2. R441 (2010-11 & 2011-12). Treatment effects on sprout length by CIPC and CIPC/ethylene by sampling occasion (all varieties pooled).

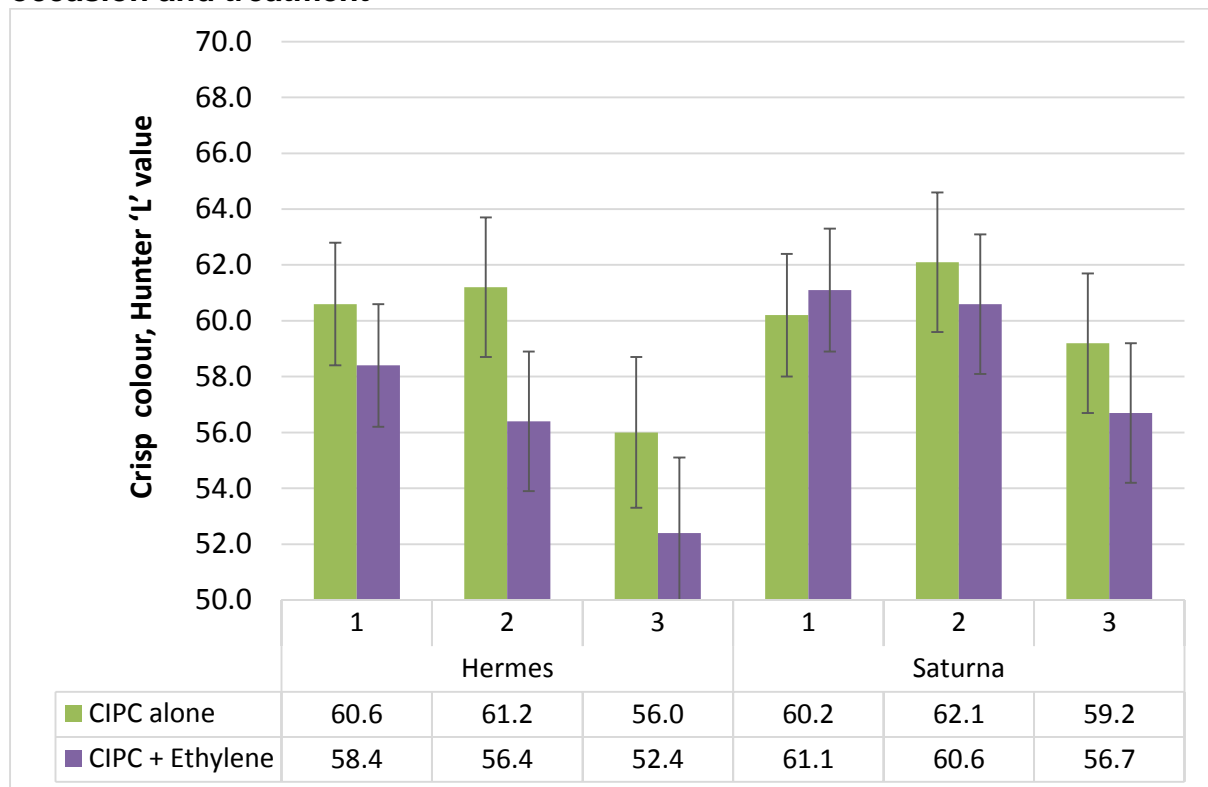
Sampling Occasion 1	Mean sprout length (mm)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
CIPC	1.657	0.106	1.444	1.869
CIPC/ethylene	0.893	0.106	0.681	1.106
Sampling Occasion 2				
	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
CIPC	4.069	0.373	3.326	4.812
CIPC/ethylene	1.113	0.373	0.370	1.856
Sampling Occasion 3				
	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
CIPC	6.579	0.598	5.393	7.766
CIPC/ethylene	1.473	0.591	0.299	2.647

Annex Figure 1. R441, Chip fry colour by variety, sampling occasion and treatment.



*SBCSR values 1-7 correspond to USDA 000, 00, 0, 1, 2, 3 and 4. SBCSR values greater than 4 (USDA 1) are considered unacceptable. +/- 95% confidence limits. For each variety, the x axis values are: 1= samples assessed after 2 months storage; 2 = samples assessed after 4 months storage; 3 = samples assessed after 6 months storage.

Annex Figure 2. R441, Crisp fry colour Hunter L values by variety, sampling occasion and treatment



*Hunter L value is a standard colour scale for crisp fry colour. Lower values indicate increasing darkness and values of less than 58/59 are considered commercially unsuitable. +/- 95% confidence limits.

Annex Table 3. R464 (2014-15), Effects of treatment on sprouting of varieties, box storage.

Variety	Storage Period	Mean sprout Length (mm) and treatment			ANOVA			
	(months)	Ethylene	CIPC + Ethylene	CIPC	Suppr-essant	E v C	E v CE	C v CE
Arsenal	2	6.2	1.0	2.8	**	*	**	NS
	4	13.3	3.0	6.1	*	NS	*	NS
	6	13.3	2.3	6.9	NS			
Chicago	2	6.3	1.3	2.3	***	***	***	NS
	4	19.5	4.3	9.7	*	NS	*	NS
	6	26.6	7.2	14.7	***	**	***	NS
Fontane	2	11.7	3.7	5.5	**	*	**	NS
	4	17.0	5.5	8.1	***	**	***	NS
	6	20.6	8.0	17.0	NS			
Lady Claire	2	5.6	2.0	8.0	**	NS	NS	**
	4	16.4	9.3	43.1	***	***	NS	***
	6	20.9	17.4	43.8	***	***	NS	***
Maris Piper	2	20.5	5.5	6.2	**	**	**	NS
	4	21.2	5.5	15.8	**	NS	**	*
	6	21.1	3.7	38.2	***	***	***	***
Markies	2	4.4	3.4	4.4	NS	-	-	-
	4	4.5	2.4	15.5	**	**	NS	**
	6	5.4	3.1	35.3	***	***	NS	***
Ramos	2	1.4	0.5	0.8	NS			
	4	5.5	1.6	5.4	NS			
	6	11.0	5.1	13.4	NS			
Royal	2	3.2	1.7	9.4	**	*	NS	*
	4	14.3	12.2	45.7	***	**	NS	**
	6	22.4	19.1	65.2	**	*	NS	**
R. Burbank	2	0.2	0.1	0.8	**	*	NS	**
	4	2.5	0.9	3.8	*	NS	NS	*
	6	3.0	2.7	22.3	***	***	NS	***
VR808	2	4.2	1.7	3.0	*	NS	*	NS
	4	9.9	2.5	5.2	**	NS	**	NS
	6	11.5	4.0	8.6	NS			

E, Ethylene., C, CIPC., CE, combined ethylene and CIPC treatment.

ANOVA: NS, Non-significant result (P>0.05), significant results * (P<0.05), ** (P<0.01) and *** (P < 0.001)

Annex Table 4. R464 (2014-15), French fry colour score, box storage.

Variety	treatment	Storage period, SBCSR score					
		2 months	sd*	4 months	sd*	6 months	sd*
Fontane	Untreated	2.1	0.4	2.5	0.6	3.0	0.7
	Ethylene	2.6	0.7	2.8	0.6	3.1	0.8
	CIPC	1.9	0.5	2.0	0.5	3.2	0.9
	CIPC + Ethylene	2.7	0.7	3.1	0.7	3.9	0.9
Maris Piper	Untreated	3.4	0.6	3.4	0.6	3.9	0.7
	Ethylene	3.6	0.8	3.4	0.8	3.4	0.9
	CIPC	3.6	0.8	3.3	0.7	3.6	0.8
	CIPC + Ethylene	3.7	0.9	3.4	0.8	3.9	1.0
Markies	Untreated	2.0	0.3	1.6	0.6	1.7	0.6
	Ethylene	2.1	0.3	2.0	0.5	2.2	0.8
	CIPC	1.9	0.4	1.7	0.5	1.8	0.4
	CIPC + Ethylene	2.1	0.4	2.0	0.5	2.2	0.7
Ramos	Untreated	2.2	0.5	2.0	0.6	2.8	0.6
	Ethylene	2.9	0.7	2.9	0.7	3.4	0.8
	CIPC	2.1	0.5	1.8	0.6	2.7	1.0
	CIPC + Ethylene	2.7	0.8	3.0	0.8	3.8	1.1
Royal	Untreated	3.3	0.6	3.3	0.6	3.6	0.8
	Ethylene	4.0	0.9	3.6	0.8	3.9	0.9
	CIPC	3.3	0.9	3.2	0.7	3.6	0.8
	CIPC + Ethylene	3.8	0.9	3.5	0.7	3.7	0.8
Russet Burbank	Untreated	3.3	0.5	3.2	0.5	3.8	0.7
	Ethylene	3.7	0.6	3.2	0.4	3.5	0.6
	CIPC	3.4	0.5	3.2	0.4	3.6	0.7
	CIPC + Ethylene	3.7	0.7	3.3	0.5	3.5	0.6

*sd, standard deviation

Annex Table 5. R464 (2014-15), ANOVA F-test results and post-hoc findings for Chip score, by sampling occasion per variety, box storage.

Variety	Storage period (months)	Suppressant	E v C	E v CE	C v CE
Fontane	2	*	*	NS	*
	4	***	**	NS	***
	6	NS			
Maris Piper	2	NS			
	4	NS			
	6	**	NS	**	NS
Markies	2, 4 & 6	NS			
Ramos	2	**	**	NS	*
	4	*	*	NS	*
	6	*	NS	NS	*
Royal	2	**	**	NS	NS
	4	*	NS	NS	NS
	6	NS			
Russet Burbank	2, 4 & 6	NS			

Suppressants: E, Ethylene. C, CIPC. CE, combined ethylene and CIPC treatment. ANOVA: NS, Non-significant result ($P > 0.05$), significant results * ($P < 0.05$), ** ($P < 0.01$) and *** ($P < 0.001$). Post-hoc comparisons between suppressants at the sampling occasion are reported only where the F-test is significant ($P < 0.05$).

Annex Table 6. R464 (2014-15) Crisp fry colour.

		Storage period, Hunter L value					
Variety	treatment	2 months	sd	4 months	sd	6 months	sd
Arsenal	Untreated	58.5	3.1	56.3	2.2	58.2 ⁽³⁾	3.2
	Ethylene	53.0 ⁽²⁾	0.2	52.3 ⁽³⁾	1.9	58.3 ⁽¹⁾	N/A
	CIPC	56.2	2.4	57.6	3.0	56.3	2.6
	CIPC + Ethylene	53.2 ⁽¹⁾	N/A	52.7 ⁽³⁾	1.6	61.0 ⁽¹⁾	N/A
Chicago	Untreated	63.9	2.4	64.9	3.0	64.0	1.2
	Ethylene	61.2	1.9	63.1	2.7	62.1	2.0
	CIPC	62.6	1.2	63.1	1.1	63.0	1.4
	CIPC + Ethylene	59.7	3.6	61.5	2.0	61.7	1.6
Lady Claire	Untreated	66.3	3.2	66.6	1.8	64.2	1.5
	Ethylene	62.9	1.8	62.1	1.6	63.1	1.3
	CIPC	64.3	1.3	65.3	2.3	60.1	4.4
	CIPC + Ethylene	63.8	2.9	62.9	2.6	60.9	2.3
VR808	Untreated	65.5	1.9	68.4	2.1	65.1	2.2
	Ethylene	61.3	6.3	63.2	2.8	64.4	1.3
	CIPC	64.5	1.4	64.0	1.3	65.6	2.5
	CIPC + Ethylene	63.4	2.3	64.4	1.1	62.1	3.0

sd, standard deviation. Where fewer than four replicates were available the number remaining is shown in brackets

Annex Table 7. R464 (2014-15), Mean % weight of crisps with defects, box storage.

Variety	treatment	Storage period % weight of crisps with defects					
		2 months	sd	4 months	sd	6 months	sd
Arsenal	Untreated	10.0	10.1	21.6	13.9	70.7	14.3
	Ethylene	59.4	31.7	48.5	28.7	84.0	16.8
	CIPC	10.6	5.7	5.6	2.9	52.2	8.1
	CIPC + Ethylene	70.3	21.6	49.8	16.7	70.8	37.8
Chicago	Untreated	0.3	0.6	0.0	0.0	3.6	3.1
	Ethylene	3.4	1.7	0.5	0.9	2.5	2.2
	CIPC	0.6	0.9	0.7	1.4	0.4	0.7
	CIPC + Ethylene	3.2	3.8	1.7	2.0	6.4	4.0
Lady Claire	Untreated	1.2	1.4	2.6	2.3	1.0	2.0
	Ethylene	11.8	5.7	3.8	6.3	5.6	2.0
	CIPC	5.0	5.8	2.2	2.5	26.3	36.4
	CIPC + Ethylene	12.3	5.1	4.6	3.4	6.9	12.8
VR808	Untreated	0.3	0.7	0.0	0.0	0.0	0.0
	Ethylene	0.9	1.7	1.1	2.1	0.9	1.9
	CIPC	0.0	0.0	0.0	0.0	0.6	1.1
	CIPC + Ethylene	3.2	2.7	1.8	1.5	6.2	5.9

sd, standard deviation