

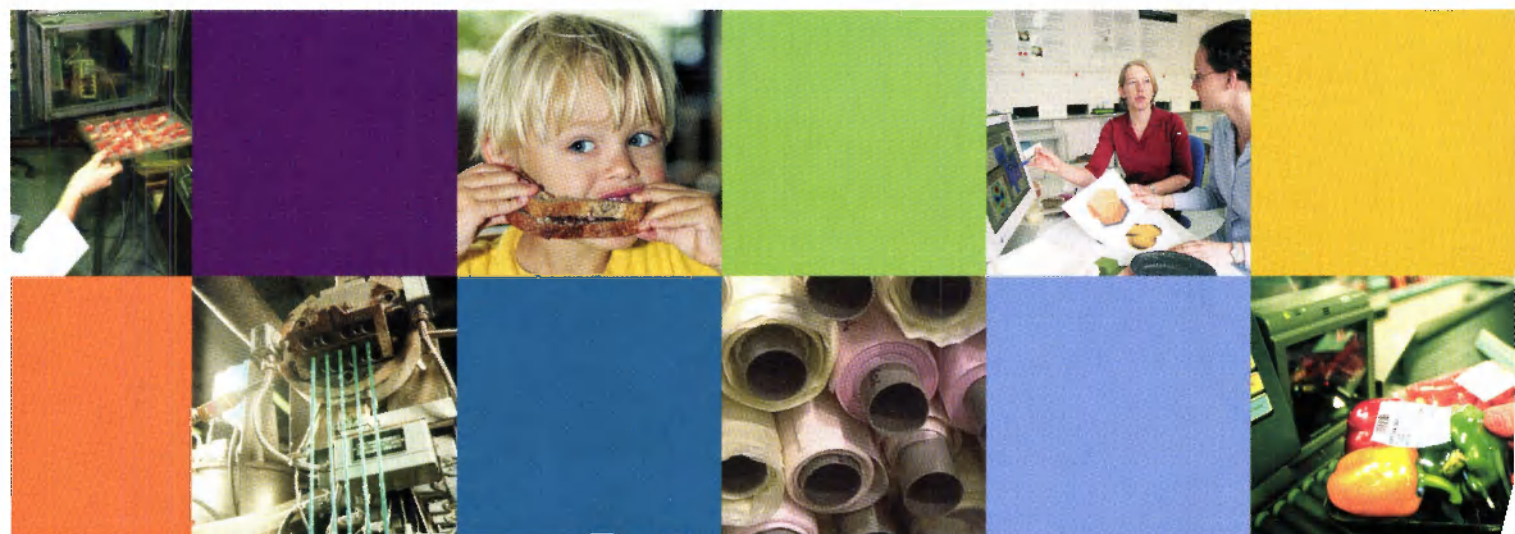


Evaluation report quality carnation flowers from container shipment

Ernst Woltering
Els Otma
Manon Mensink

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Colophon

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Author(s)	Ernst Woltering, Els Otma, Manon Mensink
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Agrotechnology and Food Sciences Group
P.O. Box 17
NL-6700 AA Wageningen
Tel: +31 (0)317 475 024
E-mail: info.afsg@wur.nl
Internet: www.afsg.wur.nl

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1 Experimental outline and results

Flowers (standard and spray carnations) were shipped in Reefer container from Colombia to Rotterdam, The Netherlands. At unloading, flowers for testing were collected and send by UPS to Wageningen University. At arrival in Wageningen (June 22, 2007), flowers were re-cut (approximately 5 cm) and put in water, 10 flower stems per 600 ml vase, in a controlled environment (conditions: 12h dark/12h light 13 $\mu\text{mol}/\text{m}^2/\text{sec}$; 60% RH; 20°C).

Flower quality was evaluated after 7 and 14 days of vase life.

Features of both flowers and stems were monitored as outlined in table 1.

Tables 2 and 3 show the results after 7 and 14 days of vase life.

At arrival in Wageningen flowers generally were of good quality, although the stems were rather thin and in some bunched easily broke.

After 1 week of vase life, approximately 80% of the bunches was of acceptable quality; 20% of the bunches was of lesser quality due to either retarded flower opening (column: open%), premature wilting or severe stem/leaf damage. In some of the bunches there was a high percentage wilted flowers (column: EV wilt%) which may indicate that STS pretreatment may not have been adequate. Although botrytis was present in some of the bunches this did not lead to high % unacceptable flowers after 1 week (column: EV botrytis%).

After 2 weeks of vase life about half of the bunches were rated “unacceptable” due to a variety of reasons, in some cases there were no good quality flowers left in the bunch, in other cases the flowers were acceptable but most of the stems were broken. Approximately 25% of the bunches showed botrytis infection but in most of the cases it was not a reason to rate the bunch “unacceptable”.

2 Conclusions

On the whole flower quality, especially after 2 weeks was poor. A better pretreatment of the flowers and/or after shipment treatments (re-hydration solution) may increase flower quality. Also it may be recommended to place flowers in a preservative solution during the vase life to increase flower opening. As observed already at arrival of the flowers, the stems were generally quite thin and tended to break or bent easily (figure 1), which hints to selecting a better quality carnation for future container shipments.

Table 1. Quality evaluation

Flower quality vase life	Flower %OK	percentage acceptable flowers in bunch
	stage [1-6]	Flower opening stage of acceptable flowers (class 1-6 [fully open])
	tight%	percentage acceptable flowers in classes 1 en 2
	half%	percentage acceptable flowers in classes 3 en 4
	open%	percentage acceptable flowers in classes 5 en 6
	Flower %EV	percentage unacceptable flowers in bunch
	Botr%	Percentage flowers infected by Botrytis in bunch
	EV-botr%	percentage flowers classified unacceptable due to Botrytis infection
	discol.	Discoloration of flower petals
	EV-pt-burn%	percentage flowers unacceptable due to petal burn
	EV-wilt%	percentage flowers unacceptable due to petal senescence
Stem quality vase life	Stem%OK	percentage acceptable stems in bunch
	bent%	percentage bent stems
	EV-broken%	percentage broken stems
	remark	Remark concerning stem quality



Table 2. Quality evaluation after 1 week of vase life

Sample information			Flower quality vase life day 7										Stem quality vase life day 7				Overall impres. day 7		
Box	description label	Sample nr.	remark	Flower %OK	stage [1-6]	light%	half%	open%	Flower %EV	Boir%	EV-botr%	discol.	EV-pt-burn%	EV-wilt%	Stem%OK	bent%	EV-broken%	remark	Overall impres. day 7
test	172-152	3	pink sp	100	3.2	35	35	30	0	8	0		0	0	98	0	3		ok
test	172-152	4	burgundy sp	100	5.5	6	6	88	0	3	0		0	0	97	0	3		ok
test	172-152	3	white sp	95	4.9	8	18	70	5	3	0		0	5	98	8	3		ok
test	172-152	2	hot pink sp	94	5.3	6	16	72	6	0	0		0	6	100	0	0		ok
test	172-152	1	rony sp	70	4.8	6	6	58	30	30	30		0	0	94	0	6		ok
test	172-053	2	nelson	50	2.6	20	30	0	50	0	0		0	50	0	0	50	stem/leaf damage	x
test	172-152	1	nelson car	90	6.0	0	0	90	10	0	0		0	10	90	0	10		ok
test	172-152	3	rendez vous car	100	6.0	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-193	4	nelson	100	5.0	0	10	90	0	20	0		0	0	0	0	0	stem/leaf damage	x
test	172-152	4	tasman	50	5.0	0	0	50	50	40	0		0	50	100	0	0		x
test	172-152	2	white car	100	6.0	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-266	6	nelson	100	5.9	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-266	4	glugia	100	6.0	0	0	100	0	0	0		0	0	90	0	10		ok
test	172-053	6	pink nelson	100	5.8	0	10	90	0	0	0		0	0	100	40	0		ok
test	172-053	5	tasman	100	5.5	0	10	90	0	0	0		0	0	100	30	0		ok
test	172-266	5	nelson	100	5.8	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-193	5	nelson	100	4.4	0	70	30	0	0	0		0	0	90	10	10	stem/leaf damage	ok
test	172-126	5	white	100	5.8	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-053	1	nelson	100	5.4	0	20	80	0	0	0		0	0	100	0	0		ok
test	172-126	6	hot pink	100	5.8	0	0	100	0	0	0		0	0	100	0	0		ok
test	172-126	4	nelson	70	6.0	0	0	70	30	0	0		0	30	100	10	0		ok
regular	172-152	8 R	novelty	38	3.7	13	9	16	62	0	0		0	62	100	0	0		x
regular	172-152	6 R	light pink	100	4.0	17	34	49	0	0	0		0	0	100	0	0		ok
regular	172-152	7 R	white	100	5.1	9	6	85	0	0	0		0	0	100	0	0		ok
regular	172-193	3 R	areaulo	90	5.9	0	0	90	10	0	0		0	10	100	0	0		ok
regular	172-126	1 R	nelson	90	6.0	0	0	90	10	0	0		0	10	100	10	0		ok
regular	172-152	5 R	rony	100	4.8	3	17	81	0	0	0		0	0	97	0	3		ok
regular	172-126	3 R	green	100	6.0	0	0	100	0	0	0		0	0	100	0	0		ok
regular	172-126	2 R	white	100	5.9	0	0	100	0	0	0		0	0	100	0	0		ok
regular	172-126	3 R	(no name)	70	5.0	0	0	70	30	10	10		0	20	100	80	0		ok
regular	172-053	4 R	nelson	80	5.1	0	0	80	20	0	0		0	20	100	0	0		ok
regular	172-266	2 R	nelson	90	5.4	0	0	90	10	10	0		0	10	100	10	0		ok
regular	172-053	8 R	pink nelson	100	5.6	0	0	100	0	0	0		0	0	20	0	80		x
regular	172-193	1 R	nelson	90	4.6	0	40	50	10	10	10		0	0	100	0	0		ok
regular	172-053	7 R	pink nelson	100	5.9	0	0	100	0	0	0		0	0	80	40	20		ok
regular	172-266	1 R	nelson	100	5.2	0	0	100	0	0	0		0	0	90	90	10		ok
regular	172-266	7 R	tolfo	60	6.0	0	0	60	40	0	0		0	40	90	20	10		x
regular	172-193	2 R	nelson	90	5.9	0	0	90	10	0	0		0	10	100	50	0		ok
regular	172-053	3 R	nelson	90	5.0	0	0	90	10	0	0		0	10	100	0	0		ok
regular	172-152	8 R	tasman car	76	6.0	0	0	90	10	0	0		0	10	100	50	0		ok
regular	172-152	5 R	nelson car	77	6.0	0	0	50	50	30	0		0	50	100	0	0		x
regular	172-152	7 R	rendez vous car	100	6.0	0	0	100	0	0	0		0	0	100	0	0		ok
regular	172-152	9 R	nelson car	40	5.5	0	0	40	60	0	0		0	60	100	0	0		x
regular	172-152	6 R	white car	91	5.3	0	27	64	9	0	0		0	9	100	9	0		ok

Table 3. Quality evaluation after 2 weeks of vase life

Sample information			Flower quality vase life day 14											Stem quality vase life day 14				Overall impres. day 14	
Box	description label	remark	Sample nr.	Flower %OK	stage [1-6]	tight%	half%	open%	Flower %EV	Boat%	EV-boat%	discol.	EV-pt-burn%	EV-wilt%	Stem%OK	ben%	EV-broken%	remark	
test	172-152	3 pink sp	spray	1	40	3.2	13	17	10	60	23	0	0	60	96	0	4		x
test	172-152	4 burgundy sp	spray	2	100	5.3	15	0	85	0	0	0	0	0	80	0	20		ok
test	172-152	3 white sp	spray	3	90	5.4	0	21	69	10	7	0	10	0	97	8	3		ok
test	172-152	2 hot pink sp	spray	4	100	5.6	0	13	88	0	0	0	0	0	75	0	20		ok
test	172-152	1 rony sp	spray	5	20	4.5	0	10	10	80	60	60	0	20	92	0	8		x
test	172-053	2 nelson		11	0	-	0	0	100	0	0	0	0	100	0	0	50	stem/leaf damage	x
test	172-152	1 nelson car		12	100	6.0	0	0	100	0	0	0	0	0	60	0	40		ok
test	172-152	3 rendez vous car		13	70	6.0	0	0	70	30	0	0	30	0	100	0	0		ok
test	172-193	4 nelson		14	100	6.0	0	0	100	0	20	0	0	0	0	0	10	stem/leaf damage	x
test	172-152	4 tasman		15	20	5.0	0	0	20	80	100	0	0	80	100	0	0		x
test	172-152	2 white car		16	100	6.0	0	0	100	0	0	0	0	0	100	0	0		ok
test	172-266	6 nelson		17	90	6.0	0	0	90	10	0	0	0	10	100	20	0		ok
test	172-266	4 giogia		18	100	6.0	0	0	100	0	0	0	0	0	80	0	20		ok
test	172-053	6 pink nelson		19	90	6.0	0	0	90	10	0	0	0	10	50	40	50		x
test	172-053	5 tasman		20	90	5.7	0	0	90	10	0	0	0	10	50	30	50		x
test	172-266	5 nelson		21	100	6.0	0	0	100	0	0	0	0	0	100	0	0		ok
test	172-193	5 nelson		22	60	5.5	0	0	60	40	0	0	0	40	80	10	20	stem/leaf damage	x
test	172-126	5 white		23	20	6.0	0	0	20	80	0	0	60	20	100	0	0		x
test	172-053	1 nelson		24	50	5.0	0	20	30	50	0	0	30	20	100	0	0		x
test	172-126	6 hot pink		25	20	6.0	0	0	20	80	0	0	0	80	100	0	0		x
test	172-126	4 nelson		26	30	6.0	0	0	30	70	0	0	20	50	100	10	0		x
regular	172-152	8 novelty	spray	51	10	4.0	0	10	0	90	0	0	0	90	70	0	30		x
regular	172-152	6 R light pink	spray	52	100	5.3	0	20	80	0	0	0	0	0	100	0	0	stem/leaf damage	ok
regular	172-152	7 R white	spray	53	90	5.7	0	10	80	10	10	0	0	10	100	0	0		ok
regular	172-193	3 R areuato		61	90	6.0	0	0	90	10	0	0	0	10	100	0	0		ok
regular	172-126	1 R nelson		62	50	6.0	0	0	50	50	0	0	40	10	90	10	10		x
regular	172-152	5 R rony	spray	63	50	5.4	0	10	40	50	50	x	0	0	90	0	10		x
regular	172-126	3 R green		64	100	6.0	0	0	100	0	0	0	0	0	100	0	0		ok
regular	172-126	2 R white		65	0	-	0	0	0	100	0	0	0	100	100	0	0		x
regular	172-126	3 R (no name)		66	50	5.2	0	10	40	50	30	30	0	20	100	60	0	leaf damage	x
regular	172-053	4 R nelson		67	60	5.7	0	0	60	40	0	0	10	30	90	0	10		x
regular	172-266	2 R nelson		68	100	5.9	0	0	100	0	10	0	0	0	50	0	50		x
regular	172-053	8 R pink nelson		69	60	6.0	0	0	60	40	0	0	20	20	20	0	80		x
regular	172-193	1 R nelson		70	90	5.4	0	10	80	10	10	x	0	0	100	0	0		ok
regular	172-053	7 R pink nelson		71	90	5.9	0	0	90	10	0	0	10	0	80	40	20		ok
regular	172-266	1 R nelson		72	80	5.9	0	0	80	20	0	0	0	20	90	90	10		ok
regular	172-266	7 R toledo		73	40	6.0	0	0	40	60	0	0	0	60	0	0	100		x
regular	172-193	2 R nelson		74	90	6.0	0	0	90	10	0	0	0	10	100	50	0		ok
regular	172-053	3 R nelson		75	90	6.0	0	0	90	10	0	x	0	10	100	0	0		ok
regular	172-152	8 R tasman car		76	50	6.0	0	0	50	50	0	0	40	10	90	50	10		x
regular	172-152	5 R nelson car		77	50	6.0	0	0	50	50	30	0	0	50	100	0	0		x
regular	172-152	7 R rendez vous car		78	90	6.0	0	0	90	10	10	0	10	0	100	0	0		ok
regular	172-152	9 R nelson car		79	40	6.0	0	0	40	60	0	0	0	60	90	0	10		x
regular	172-152	6 R white car		80	50	5.6	0	0	50	50	0	0	0	50	80	10	20		x