

Optimal Fresh

The fruit, vegetable and fresh produce expert system



Detailed Report

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Crop carrot, with tops

Maturity stage General

Category Vegetable

Plant Part Root

Usage Cooked, Fresh/ Raw

Botanical name *Daucus carota* subsp. *sativus*

Botanical family Apiaceae (Umbelliferae)



Picture source: Corel, 1998

Alternate names include

(E) carrot, with tops

(E) with tops, carrot

Refrigerated Container/Coolroom Recommendations

Optimum product storage temperature

0.0 to 0.0°C

Temperature set point

Add a margin for uncertainty in equipment performance if necessary.
For return air control set point add 1°C to delivery set point.

0.0°C

Ventilation (air exchange) settings for containers: 6 m (20') =

10 m³/h = 5 cfm*

12 m (40') =

15 m³/h = 10 cfm*

Acceptable product temperature at loading into container

* Values taken from carrot.

-0.5 to 4.5°C

Key Properties

Storage time (days)†	Humidity (% RH)	Freezing point (°C)	Storage time at ambient (~20°C)	Ventilation rate
10 - 14	95 - 100	-1.3	8 - 8*	Very Low*

† at optimum storage temperature

* Values taken from carrot.

Recommended: ice, aeration, precooling

Other Properties

Ref	Maturity stage	Air exchange *	Freezing Point (°C)	Ethylene production **	Ethylene sensitivity	Ice compatibility	Water loss ***	% Water content	Bruising susceptibility
1	General		-1.3	Very Low	High	Yes	H (6.3)		
1#	Immature		-1.4	No	Yes	Yes			
1#	General	Very Low	-1.4	Very Low	High	Yes	M (1.3)	87.8	

Values taken from carrot

* Air exchange rates: Nil = 0%; Very low = 25%; Low = 50%; Medium = 100%; High = 200%; Very high = 400% fresh air/hour.

** Ethylene production rates at 20°C: Nil = 0 nM; Very low = <4 nM; Low = 4 - 40 nM; Medium = 40 - 400 nM; High = 400 - 4000 nM; Very high =>4000 nM ethylene/kg/hour.

*** Where % weight loss/week is given this is converted as: Low <= 1%; Medium = 1.1 - 3.4%; High = >3.5%

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Controlled Atmosphere

Ref	Maturity stage	% O ₂		% CO ₂		Temp°C		Benefit of controlled atmosphere
		min	max	min	max	min	max	
1#	General					0	0	None
1#	Fresh Cut	2	5	15	20	0	5	Good

Values taken from carrot

Reference notes

1 CA not advantageous; use perforated plastic films

Respiration* and Heat Transfer

Ref	Maturity stage	0°C		5°C		10°C		15°C		20°C		25°C		Specific heat kJ/kg/EC **
		min	max	min	max	min	max	min	max	min	max	min	max	
1	General	53	103	74	150	94	182	162	312	256	356			3.78
1#	General	29	59	38	76	59	124	76	159	135	279			
1#	Mature	25	55	35	70			70	140	120	250			

Values taken from carrot

* Respiration values given are in Watts per tonne. 1 W/t = 20.4 kCal/t/d = 82.1 Btu/tn./d = 73.3 Btu/2000 lbs/d = 0.167 mL CO₂/kg/h = 7.0 umol CO₂/kg/h = 0.308 mg CO₂/kg/h

** Specific heat (kJ/kg/°C) = 0.0335 x % water content + 0.8374; Specific heat in Btu/lb/°F = 0.08 x % water content + 0.2

Compatibility in Mixed Storage

Temperature compatibility group

0	7	13	20
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Humidity compatibility group

Dry 60-80%	Moderate 80-90%	High 90-95%	Very high 95-100%
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Not compatible with crops that: Produce ethylene (especially when they are ripe or ripening)

Odours will be absorbed by: Celery

Absorbs odours from:

Ethylene-producing fruits and vegetables from *Optimal Fresh* database

(Medium ethylene production levels or greater.)

apple
banana
durian
jujube fruit
mango
nashi
peach
sapodilla

apricot
breadfruit
feijoa
kiwifruit
mangosteen
nectarine
pear
tomato

atemoya
cherimoya
fig
litchi
melon, cantaloupe
papaya
plum

avocado
custard apple
jackfruit
mamey sapote
melon, honeydew
passionfruit
rambutan

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Seasonal Availability

Ref	Country	Region (where given)	Start Season	End Season	Start Peak	End Peak
1	Netherlands		April	December	June	August
1	Canada		July	October	-	-
1#	USA		January	December	-	-
1#	Australia		January	December	June	August
1#	Netherlands		January	December	-	-
1#	Canada		January	December	September	October

Values taken from carrot

References for carrot, with tops

Values quoted in Detailed Report are taken from a compilation of the best set of figures from all references. This best set of figures is always referred to as Reference 1.

See Reference Report for full listing of all values, original references and alternate names.