

# Optimal Fresh

The fruit, vegetable and fresh produce expert system



Detailed Report Printed on Wednesday, 19 December 2001

## Crop broccoli

**Maturity stage** General  
**Category** Vegetable  
**Plant Part** Flower buds  
**Usage** Cooked, Fresh/ Raw,  
Salad, Soups  
**Botanical name** *Brassica oleracea var. italica*  
**Botanical family** Brassicaceae (Cruciferae)



Picture source: Corel, 1998

### Alternate names include

(E) broccoli	(G) Brokkoli	(S) broccoli
(E) calabrese	(G) Spargelkohl	(S) brécoles
(F) calabrais	(J-K) [ ^ ] / ; XO	
(F) chou brocoli	(J-R) burokkorii	

## Refrigerated Container/Coolroom Recommendations

**Optimum product storage temperature**

0.0 to 1.0°C

**Temperature set point**

0.0°C

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

**Ventilation (air exchange) settings for containers:**

6 m (20') = 60 m<sup>3</sup>/h = 35 cfm

12 m (40') = 120 m<sup>3</sup>/h = 70 cfm

**Acceptable product temperature at loading into container**

0.0 to 5.0°C

## Key Properties

Storage time (days)†	Humidity (% RH)	Freezing point (°C)	Storage time at ambient (~20°C)	Ventilation rate
35 - 50	95 - 100	-0.6	2 - 2	High

† at optimum storage temperature

Use modern cultivars, poly-bags and good air circulation

## Other Properties

Ref	Maturity stage	Air exchange *	Freezing Point (°C)	Ethylene production **	Ethylene sensitivity	Ice compatibility	Water loss ***	% Water content	Bruising susceptibility
1	General	High	-0.6	Very Low	High	Yes	H	89.9	High

\* 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%

# Optimal Fresh

The fruit, vegetable and fresh produce expert system



## Controlled Atmosphere

Ref	Maturity stage	% O2		% CO2		Temp°C		Benefit of controlled atmosphere
		min	max	min	max	min	max	
1	General	1	3	5	15	0	1	(+21 days)
1	Fresh Cut	2	3	6	7	0	5	Good

## 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	50	55	90	430	237	443	460	900	740	900	1480	2350	3.85

\* 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 CO<sub>2</sub>/kg/h = 7.0 umol CO<sub>2</sub>/kg/h = 0.308 mg CO<sub>2</sub>/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
---	---	----	----

### Humidity compatibility group

Dry 60-80%	Moderate 80-90%	High 90-95%	Very high 95-100%
---------------	--------------------	----------------	----------------------

Not compatible with crops that: Produce ethylene (especially when they are ripe or ripening)

Odours will be absorbed by:

Absorbs odours from:

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

(Medium ethylene production levels or greater.)

apple	apricot	atemoya	avocado
banana	breadfruit	cherimoya	custard apple
durian	feijoa	fig	jackfruit
jujube fruit	kiwifruit	litchi	mamey sapote
mango	mangosteen	melon, cantaloupe	melon, honeydew
nashi	nectarine	papaya	passionfruit
peach	pear	plum	rambutan
sapodilla	tomato		

## Seasonal Availability

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

## References for broccoli

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.