

Table 1 Classification of Fruits According to Respiratory Behaviour during Ripening

Climacteric Fruits		Non-climacteric Fruits	
Mango	Papaya	Date	
Apple	Passion fruit	Cucumber	Prickly pear
Banana	Peach	Eggplant/Brinjal	Raspberry
Guava	Pear	Grape	Strawberry
Apricot	Persimmon	Grapefruit	Summer squash
Avocado	Plum	Lemon	Tamarillo
Blue Berry	Quince	Lime	Tangerine
Breadfruit	Rambutan	Loquat	Mandarin
Cherimoya	Sapodilla	Okra	Watermelon
Durian	Tomato	Olive	Longan
Fig	Sweetsop	Orange	Jujube
Jackfruit	Sapote	Pea	Cranberry
Mangosteen	Plantain	Pepper	Cacao
Muskmelon	Kiwifruit	Pineapple	Carambola
Nectarine	Biriba	Pomegranate	Cashew apple

Source: Kader, AA 1992. Postharvest Technology of Horticultural Crops. University of California Press, Oakland, California. USA.

Table 2 Classification of Horticultural Commodities According to Respiration Rates

Class	Range at 5 °C (41 °F) (mg CO₂/Kg-hr)	Commodities
Very Low	Less than 5	Dates, Dried fruits and Nuts
Low	5-10	Apple, Beet, celery, Citrus fruits, Cranberry, Garlic, Grapes, Honeydew melon, Kiwifruit, Papaya, Persimmon, Pineapple, Pomegranate, Potato (mature), Pumpkin, Sweet potato, Watermelon, Winter squash
Moderate	10-20	Apricot, Banana, Blueberry, Cabbage, Cantaloupe, Carrot, Cherry, Cucumber, Fig, Gooseberry, Lettuce, Mango, Nectarine, Olive, Peach, Pear, Plum, Potato (Immature), Radish, Summer squash, Tomato
High	20-40	Avocado, Blackberry, Cauliflower, Leak, Lima bean, Raspberry, Strawberry
Very high	40-60	Artichok, Broccoli, Brussel sprouts, Cherimoya, Cutflowers, Endive, Green Onions, Kale, Okra, Passion fruit, Snap bean, Watercress
Extremely High	More than 60	Asparagus, Mushroom, Parsley, Peas, Spinach, Sweet corn,

Source: Kader, AA 1992. Postharvest Technology of Horticultural Crops. University of California Press, Oakland, California. USA.

Table 3 Classification of Horticultural Commodities According to Their Ethylene (C₂H₄) Production Rates

Class	Range at 20⁰C (68⁰F) (μ Co₂/Kg-hr)	Commodities
Very Low	Less than 0.1	Artichoke, Asparagus, Cauliflower, Cherry, Citrus fruits, Grapes, Jujube, Strawberry, Pomegranate, Leafy vegetables, Root vegetables, Potato and most of the Cutflowers
Low	0.1-1.0	Blackberry, Blueberry, Casaba melon, Cranberry, Cucumber, Egg plant, Okra, Olive, Pepper (sweet and chilies), Persimmon, Pineapple, Pumpkin, Raspberry, Tamarillo, Watermelon
Moderate	1.0-10	Banana, Fig, Guava, Honeydew melon, Lychee, Mango, Plantain, Tomato
High	10-100	Apple, Apricot, Avocado, Cantaloupe, Feijoa, Kiwifruit (ripe), Nectarine, Papaya, Peach, Pear, Plum
Very high	More than 100	Cherimoya, Mamme apple, Passion fruit, Sapote

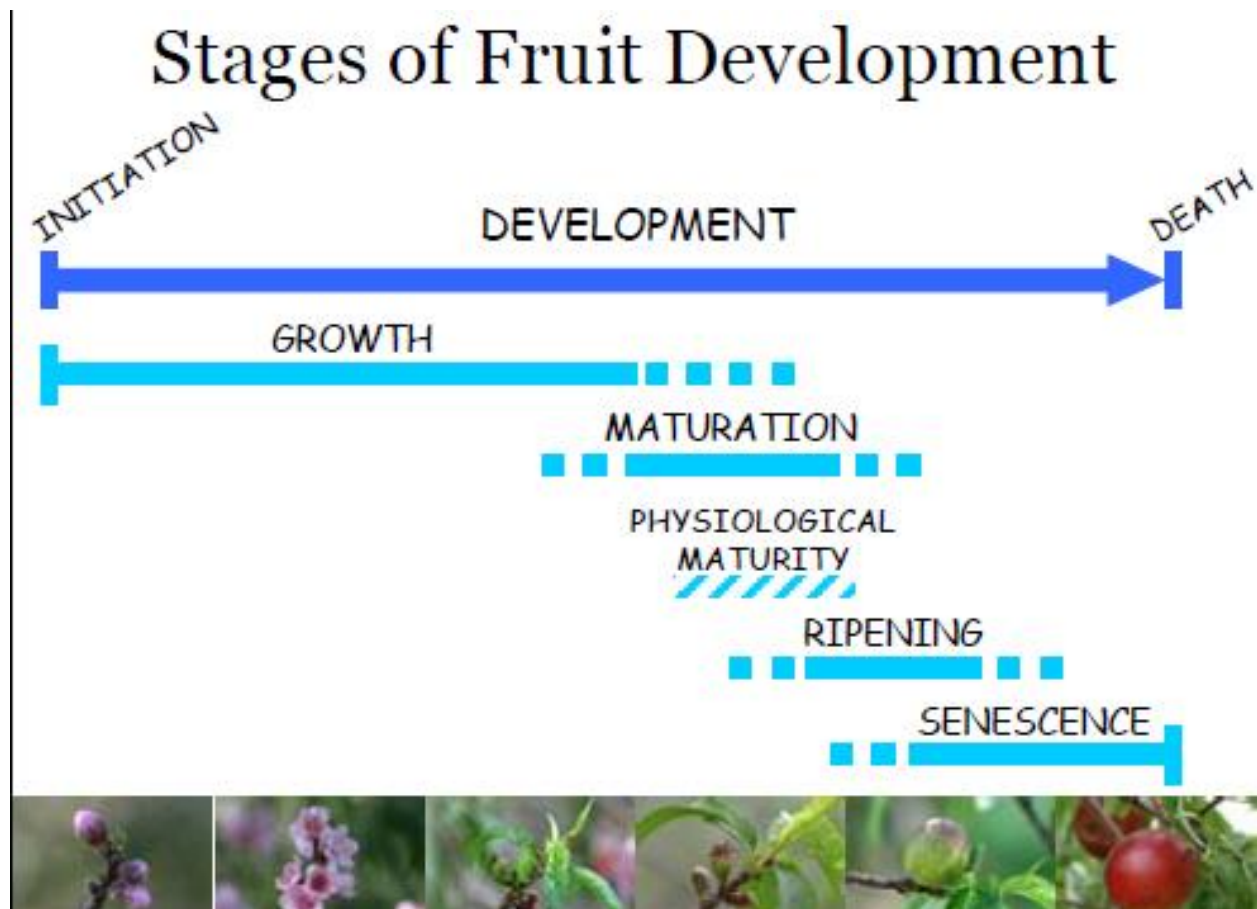
Source: Kader, AA 1992. Postharvest Technology of Horticultural Crops. University of California Press, Oakland, California. USA.

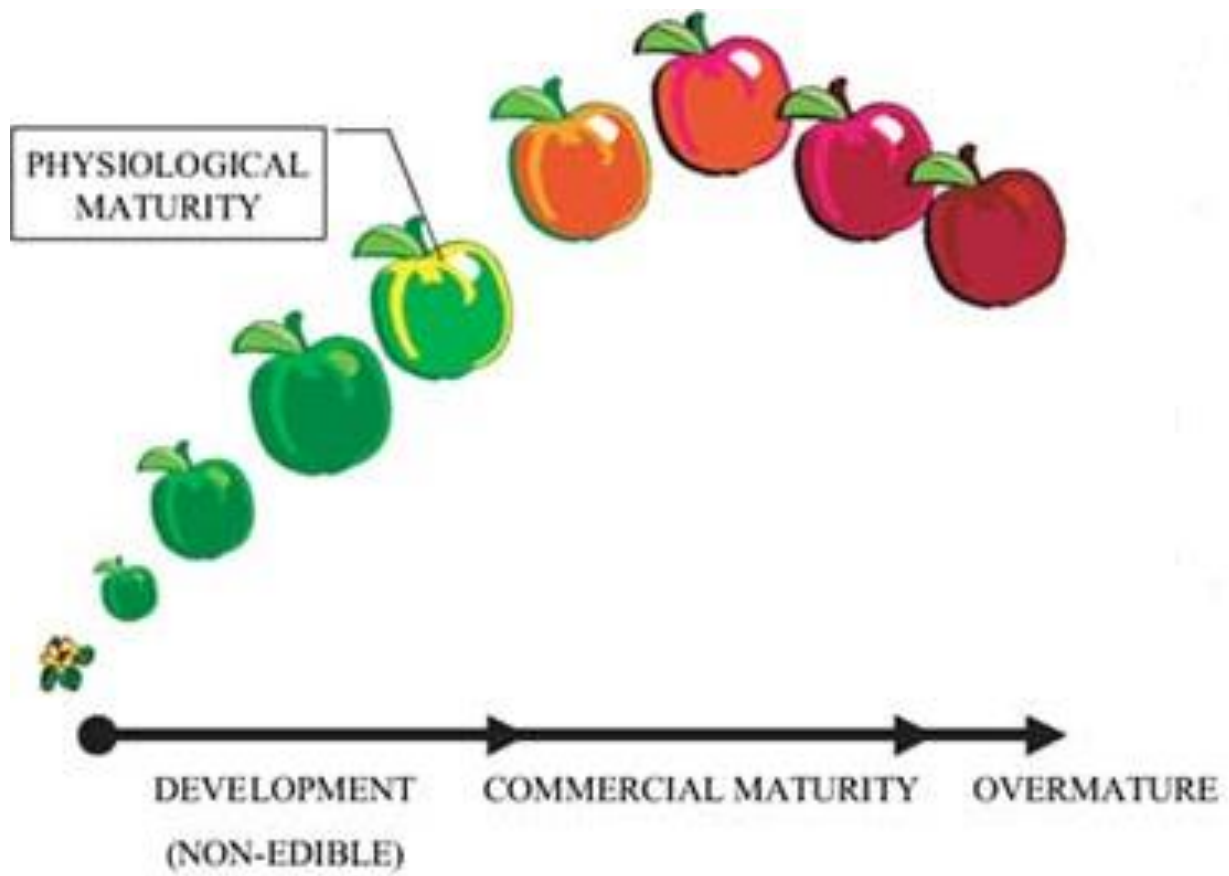
Maturity:

“Having completed its natural growth and development.”

Horticultural Maturity:

It is the stage of development at which a plant or plant part possesses the pre-requisites for use by the consumer for a particular purpose. A commodity can be horticultural mature at any stage of development.





Key Maturity Indices of Fruit and Vegetables

Sr#	Crop	Horticultural maturity indices
1	Apple/Pear	Change in ground/skin color (yellowish), ease of separation of fruit from spur, soluble solids (10.5-12.5 varieties diff) iodine- starch test, firmness, Blush, days from bloom
2	Apricot	Color (>1/2 area light yellow), size, loosening of pit
3	Banana	Disappearance of angularity in a cross section, bunch age, finger diameter
4	Citrus fruit	Color (Kinnow 75%, sweet orange 25%), TSS/Acid ratio, juice %
5	Cherries	Entire surface solid light red, Soluble solids 14-16% as per variety
6	Date Palm	Fruit weight, TSS, Acidity, Astringency, few varieties harvested at Doka stage
7	Grapes	Sugar contents (14-17% depending upon varieties)
8	Mango	Peel/pulp color, TSS, Skin smoothness, shoulder development (exception in some cvs)
9	Muskmelon	Stem slip naturally break, TSS, changes in color (green-yellow) and softening at the bloom end
10	Papaya	Change of skin colour from dark green to light green with some yellow at bloom end, flesh colour changes from green to yellow or red (depending on cultivar)
11	Peach	Ground/ Skin color, fruit color (green-yellow), size, firmness and suture filling
12	Persimmon	Yellowish-green to orange colour (depending upon cultivar)
13	Plum	Colour, and flesh firmness
14	Pomegranate	Red juice colour (red cvs) and below 1.85% acid in juice, TSS
15	Strawberries	>2/3 rd fruit surface showing pink/red colour
16	Water Melon	Sound when the melon is thumped, ground spot colour (yellowish), wither tendrils
Vegetables		
17	Bell pepper	Suitable size, firmness of fruit and colour
18	Cabbage	Leaf size (4-6'') and head firmness, days to harvest
19	Carrot	Size 5-6'' long and 3/4'' - 1/2'' dia near shoulder
20	Cauliflower	Curd size and colour (creamy white), tightness, head size (4'' dia)
21	Chilies	Suitable size, firmness of fruit and colour (green)
22	Cucumber	Suitable size (6-8''), colour (Dark green) and soft seed
23	Egg plant	Skin bright/Shiny colour
24	Garlic	Drying starts from top to down
25	Okra	Fruit size (2-3''), moderately firm
26	Onion	Fallen top, size min 1/2'' in dia
27	Peas	Pod filled colour (green), turgid
28	Potatoes	Top die back, size (1/2 to 2 1/4'')
29	Pumpkin	Colour (deep orange) and rind hardness
30	Sponge gourd	Size (4-6''), and colour
31	Tinda gourd	Suitable size, hairiness, firmness
32	Tomato	Change in colour (dark green to light green)
33	Spinach	Leaves size (15-30cm long), tenderness/Succulence

Maturity indices for selected fruits and vegetables

Index	Examples
Elapsed days from bloom to harvest	Apple, pear
Mean heat units during development	Peas, Apple ,sweet corn
Development of abscission layer	Some melons , apples
Surface morphology and structure	Cutical formation on grapes, tomatoes, netting of some melons, gloss of some fruits (development of wax)
Size	All fruits and many vegetables
Specific gravity	Cherries , watermelon, potatoes
Shape	Angularity of Banana fingers, full cheeks of mangoes, Compactness of broccoli & cauliflower
Solidity	Lettuce, Cabbage, Brussels sprout
Textural properties	
Firmness	Apple, pear, stone fruit
Tenderness	Peas
External colour	All fruits and most vegetables, Citrus, Jaman, Muskmelon
Internal colour and structure	Formation of jelly like material in tomato fruits, flesh colour of some fruits e.g watermelon, mango, citrus (pigmented varieties only)
Compositional factors	
Starch content	Apple, Pear
Sugar content	Apple, Pear, stone fruits, grapes
Acid content, Sugar/acid ratio	Pomegranate, citrus, papaya, melons, kiwifruit
Juice content	Citrus fruit
Oil content	Avocado
Astringency (tannin content)	Persimmons, dates, Ber
Internal ethylene concentration	Apples, pears
Respiration rate	Apple, Pear (climacteric fruits)