

Chemicals for hastening and delaying ripening of fruits and vegetables

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Hastening ripening

- sodium 2,4-D
 - 2,4,5 -T
 - Para- chloro- phenoxy acetic acid
 - Ethephon
 - Smoking
 - Calcium carbide
 - Sprays one week before harvest hastens ripening
 - ABA (at 1ppm),
 - Thio- urea at 20%.
 - CCC 4000ppm,
 - Ethrel (200-300ppm)
- Lemons**
- Banana**
- Grape, tomato, coffee, pear, plum, peach, citrus**
- Banana, mango**

Delaying ripening

- Auxins generally slows down ripening
- Auxins inhibits ethylene formation
- Auxin has to be broken down by peroxidases (IAA oxidases) to control fruit ripening
- Gibberellins can stop colour changes in banana

Chemicals that delay ripening

- (1) Kinetin,
- (2) GA,
- (3) Auxin,
- (4) Growth retardant (MH, maleic hydrazide),
- (5) Alar (Daminozide),
- (6) CCC (Chlormequat chloride)
- (7) CIPC (Isopropyl N-(3-chlorophenyl) carbamate)

- (8) Metabolic Inducers-
 - (a) Cycloheximide, Actinomycin-D
 - (b) Vitamin-k,
 - (c) Maleic acid,
 - (d) Ethylene Oxide,
 - (e) NA-DHA (Sodium Dehydro Acetic Acid),
 - (f) Carbon monoxide,
- (9) Ethylene absorbents-
 - (a) KMnO₄
 - (b) Fumigants like methyl bromide
 - (c) Reactants

Non-ethylinic Volatiles

- Air purification with
 - activated carbon,
 - H_2SO_4 and
 - NaOH
- } slowed down the ripening of pre-climacteric apples in a recirculation system.

Delaying ripening

- The shelf life of fruits like apple, banana and others can be improved by storing the fruit in low oxygen tension or
- by absorbing ethylene with a suitable absorbent like alumina or silica gel impregnated with potassium permanganate.
- MH, GA(10-6M), IAA(10-6M) sprays one to two weeks before harvesting and
- post harvest dip of Cycocel, Alar, GA(150ppm), Vit K3, $KMNO_4$, $Ca Cl_2$, Waxol delays ripening.

USE OF CHEMICALS FOR INCREASING SHELF LIFE OF FRUITS AND VEGETABLE

(A) Ethylene absorbent

(B) Antifungal Agents

- SOPP: Sodium orthophenylphenate
- Diphenyl wraps protection against moulds, stem-end rot.
- Dibromotetrachloroethane and esters give better flavour.

(C) Use of Inhibitors

Treatment	Crop	Chemical	Concentration
Post-harvest	Mango	MH	1000-2000 ppm
After fruit formation	Apple	2-Dimethyl-hydrazide	10,000 ppm

(D) Use of Auxins

Also helpful to advance in ripening and may increase shelf life.

Chemical	Concentration	Crop	Stage
2,4-D	5 ppm	Grape	Pre-harvest
2,4,5-T	25 ppm	Fig	Pre-harvest
2,4,5-T	100 ppm	Mango	After harvesting

E) Vegetables can be preserved by lactic acid and may increase the shelf life.

F) Post harvest dipping of papaya fruits either in 100 ppm GA3 or CaCl₂ at 2% extended shelf life up to 9 days without any decline in quality.