



Drying or Dehydration of Fruits and Vegetables

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The removal of water from fruits and vegetables is one way of preservation. The drying of fruits and vegetables under the influence of non conventional energy sources like sun and wind is known as drying while dehydration means the process of removal of moisture by the application of artificial heat under controlled conditions of temperature, humidity and air flow. In the former, there is no control of temperature and humidity.

In the process of dehydration, a single layer of fruits or vegetables either whole or pieces or slices are spread on trays which are placed inside the dehydrator. The initial temperature of the dehydrator is usually 43⁰C which is gradually increased to 60-66⁰C in the case of vegetables and 66-71⁰C for fruits.

Factor affecting rate of drying: Composition of raw material, Size, shape and arrangement of stacking of produce, Temperature, humidity and air velocity of the dehydrator, Pressure (barometric or vacuum), Heat transfer to surface (conductive, convective or radiative).

Advantages of dehydration over sun drying : The process of dehydration is very rapid, Dehydration requires less floor area, Dehydration is done under hygienic condition, Mechanical dehydration is not dependent on the weather, The colour of dehydrated product remains uniform.

Advantages of dehydration over other methods of preservation: Weight of the product is reduced to ¼ to 1/9th its original or fresh weight and thus cost of transport is reduced, Due to reduction in bulk of the product, it requires less space for storage, Cost of dehydration is very low, as less labour is involved and the absence of sugar addition to the product.

Principle of drying or dehydration: The micro organisms require plenty of free water for their survival. Drying or dehydration removes biologically active water, thus growth of microorganisms is stopped. This also results in reduced rate of enzyme activity and chemical reactions. The food value, natural flavor and characteristic cooking quality of fresh material are retained after drying. Fruits show no sign of moisture or stickiness and vegetables become brittle on drying. The residual moisture should not be more than 6-8 per cent in vegetables and 10-20 per cent in fruits. Dried fruits can be used as such or after soaking, while dried vegetables are usually soaked in water over night before cooking.

Flow chart for drying/dehydration of fruits and vegetables

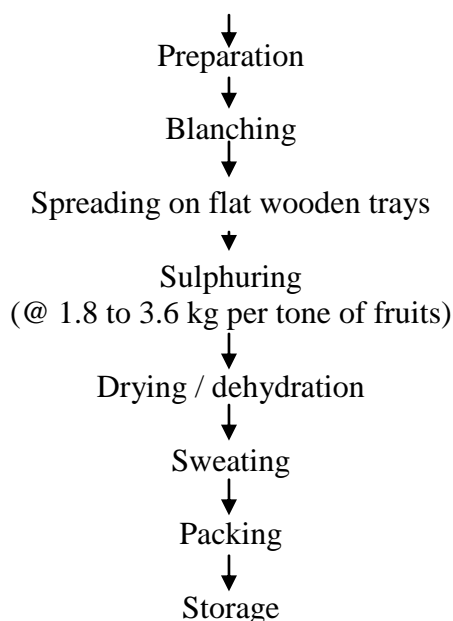
Fruits/vegetables



Washing



Peeling

**Schedule for drying of fruits and vegetables:**

Fruit/vegetables	Preparation and pre-treatment	Sulphuring time	Drying temperature
Banana	Wash, peel, cut lengthwise or slice 12mm thick	30 min	55-60 ⁰ C
Date	Wash, dip in boiling 0.5% caustic soda solution then rinse	-	45-50 ⁰ C or sun drying
Fig	Wash	1 hr	55-60 ⁰ C or sun drying
Grape	Dip in boiling 0.5% caustic soda, then rinse	1 hr	55-60 ⁰ C or sun drying
Mango	Wash, peel, cut into 12 mm thick slices	2 hr	45-50 ⁰ C or sun drying
Papaya	Wash, peel, remove seeds, cut into 6 mm thick slices	2 hr	60-65 ⁰ C or sun drying
Apple	Wash, peel, core and cut into 5 mm thick slices	30 mts. Or immerse in 1-2% KMS for 30 mts and drain	60-65 ⁰ C or sun drying
Amla	Wash, grate, add salt @ 40 g per kg grated material	-	Sundrying
Cauliflower and cabbage	Wash remove stalks, break flowers apart/cut into fine shreds	Blanch 4-5 min, immerse in 0.5-1% KMS solution for 60 Mts (cauliflower) for 10 mts (cabbage)	55-60 ⁰ C or sun drying
Peas	Wash, remove shell and collect the seeds	Blanch for 3-4 min, immerse in 0.5% KMS solution and drain	60-65 ⁰ C or sun drying

Onion and garlic	Remove outer dry scales, cut into 5mm thick slices	Dip for 10 min in 5% salt solution and drain	60-65 ⁰ C or sun drying
Leafy vegetables	Sort, peel and cut into 10 mm slices	Blanch for 2 min	60-65 ⁰ C or sun drying
Potato	Wash, peel and cut into 10mm slices	Blanch for 3 to 4 min and immerse in 0.5% KMS solution	60-65 ⁰ C or sun drying
Bitter gourd	Wash, ct both ends, cut 10 mm slices	Blanch for 7-8 min	60-70 ⁰ C or sun drying

Reconstitution of dried products

Water is added to the product which is restored to condition similar to that when it was fresh. This enables the product to cook as if the fresh fruit or vegetable is used.

Methods of reconstitution

- 1) **Quick method:** Cold water, ten times the weight of dry product, is added to the dried product. The container is covered, brought to the boil and immersed until the product is tender. The cooking time may be 15 to 45 minutes after boiling point has been reached.
- 2) **Slow method:** Cold water is added to the dried product and is left to soak for 1 to 2 hours before cooking. The product is then cooked in the same water and the time will be shorter than the above method.



Ref: Post harvest management of horticultural crops by S. Saraswathy, T.L.Preeti, S. Balasubramanian, J.Suresh, N.Revathy and S.Natarajan.