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Home Preservation of Vegetables

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Introduction

There are various methods for home-scale preservation of vegetables such as prepackaging of fresh vegetables, canning and bottling in brine, canning with curried gravy, sun drying & dehydration and pickling.

Prepackaging of fresh vegetables: Restricted degree of respiration coupled with optimally required humidity conditions achieved by the proper choice of the pre-packaging material viz. polythene bags of appropriate gauge and provided with the requisite number of vents of appropriate sizes have been found to help in considerably prolonging the storage life of the perishables (particularly the vegetables) both at the room temperature and in the frigidaire. For prepackaging: use fresh produce, remove inedible portions, wash in cold running water, wipe to remove adhering water and pack loose. Store only one commodity at a time in the film bag. Clean the bags with water and dry before re-use. The prepackaging characteristics and comparative data on the shelf life of vegetables are given below:

Prepackaging characteristics of prepackaged commodities

Description of the polyethylene bag	Fresh vegetables	Fresh leafy vegetables
Size	25-30 cm	25-30 cm
Film Guage	200	100
No.of vents	20-24	15-20
Size of vents (dia.)	6 mm	3 mm
Quantity to be packaged	0.5 kg	50-75 g

☞ For beetle and curry leaves, bags need no vents.

Shelf life of prepackaged commodities

Commodities	Under room temperature conditions (25-28^{0}C, 40-80% RH	
	Unpacked (days)	Prepackaged (days)
Fresh vegetables		
Brinjals	3-4	8-9
Carrots	2-3	6-8
Green chillies	2-3	5-6
Lady's finger	2-3	7-8
Snap beans	3-4	7-8
Sweet Pepper	5-6	13-14
Leafy Vegetables		
Beetle leaves	3	6-8
Curry Leaves	1-2	14
Mint leaves	1	3

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Canning and Bottling in Brine: The technique consists in preparing the selected vegetables in the same way as for cooking, giving the prepared vegetable a pre cook in boiling water or steam (blanching), packing in hermetically sealable containers (sanitary cans or glass jars with rubber rings), filling the interspace with hot brine (two to three per cent common salt), expelling the dissolved air by keeping the filled tins/glass jars in boiling water (exhausting), hermetically closing the container with its contents (sanitary can with a can sealer) and cooking it under steam pressure (processing) for appropriate length of time followed by cooling under running cold water. All these operations are aimed at inactivating the spoilage organisms, yet getting a tasty and attractive product. Since the vegetables are invariably contaminated with spoilage organisms derived from the soil, the use of pressure cooker is essential for better sterility. The stored cans should be tested before use, when they should show a positive vacuum with the vacuum gauge**.**

Canning with curried gravy: The technique is similar to the canning of vegetables in brine except that in place of two to three per cent common salt solution, the liquid medium consists of the gravy prepared from various ingredients. The quantity of gravy sufficient for one dozen tins of A21/2 size is got by the following recipe:

Mustard (whole)	**20 g**
Coriander (powder)	20 g
Red chillies (powder)	15-20 g
Caraway seed	20 g
Turmeric (powder)	40-50 g
Common salt (powder)	90 g
Vegetable fat (hydrogenated oil)	400 g
Water	Sufficient to make up required quantity of gravy

The procedure, in brief, is given below.

The vegetable oil is heated in a pan to a temperature at which mustard grains added to it produce a crackling sound. The entire quantity of the mustard is added to the hot vegetable oil and fried, after which the other spices and salt are likewise added and fried. The requisite quantity of water for the gravy is added and the contents of the pan stirred thoroughly till the boiling stage. The prepared vegetable (or combinations) are filled into sterile cans A21/2 and gravy added as follows:

Combination of vegetables	Weight of vegetables (g)	Weight of gravy (spiced liquid) (g)
Potatoes-cauliflower	480-500	300-320
Potatoes-cauliflower-tomatoes	500	240
Potatoes-tomatoes	680	110
Potatoes-peas	425	370
Potatoes-peas-cauliflower	450	340

Canning schedule for non-acid vegetables					
Vegetables	**Preparation before canning**	**Processing time (minutes) at 16ºC or 0.7 kg steam pressure**			
		Type of can	**No.2 can**	**No. 2 ½ can**	**Glass jars (pint)**
Beans (lima)	Shell, grade, boil for 10-15 minutes, pack loosely	Plain	30	30	35
Beans (string)	Wash, snap, boil for 5 minutes, pack nature beans	Plain	25	30	30
Beets	Wash, retain 2.5 cm stems, boil for 15 minutes, slip skins, pack	Lacquered	30	30	35
Brussel sprouts	Wash, boil for 15 minutes, add salt, pack	Plain	25	30	30
Carrots	Wash, scrape, boil for 5 minutes, pack	Plain	30	30	35
Cauliflower	Soak in cold brine, boil for 3 minutes, pack	Plain	25	25	30
Cabbage	Wash, boil for 10 minutes, add salt, pack	Plain	40	45	45
Okra	Wash, remove cap, boil for 3 minutes, pack	Plain	20	25	25
Parsnips	Wash, scrub, boil for 15 minutes, pack	Plain	30	30	35
Peas	Shell, grade, boil for 3-5 minutes, pack loosely	Plain	40	45	45
Potatoes (sweet)	Wash, boil or steam for 15 minutes, peel, pack	Plain	115	145	120
Potatoes (white)	Peel, blanch for 3 minutes in boiling water and pack	Plain	35	40	40
Pumpkin or squash	Wash, cut into pieces, cook until tender, pack	Lacquered	70	95	75
Spinach or all greens	Steam in covered vessel for 15 minutes or until wilted, use the smallest possible amount of water, pack loosely	Plain	50	55	55
Turnip	Peel, slice, blanch and pack	Plain	30	30	35

In this case, the cooking of cans with their contents in the pressure cooker is done for 60 to 75 minutes at 115°C (or 0.7 kg steam pressure) or for 40 to 45 minutes at 121°C (or 1.05 kg steam pressure). These depend upon the size of the can, the kind and maturity of the vegetables etc. The contents of the can are used only after being heated suitably so that the fat used gets melted and equitably distributed.

The common causes of spoilge of canned vegetable are: carelessness in processing i.e. not heating the vegetables to complete sterilization, improper closing thus allowing leakages, overfilling the cans with vegetables, delays during different stages of canning, improper cooling, storage in warm or wet places and chemical action between the container and the contents.

Sun drying: This technique has been practised since time immemorial and is still being used advantageously wherever conditions permit and adverse conditions like the rain and storm do not interfere. Except in certain cases, sun drying is done with the prepared vegetable (suitably cut and blanched, if necessary) spread on long wooden trays mounted on frames at least a foot above the ground. These are continously looked after till the moisture content reaches a level of five to eight per cent. The dried vegetable reconstitute in warm water fairly well and almost instantaneously, except in certain caseswhen they are required to be soaked in water overnight and for immediate use by boiling water being added.

Dehydration: Dehydration is a technique involving the use of controlled conditions of temperature and humidity achieved in specially constructed chambers called dehydrators. This equipment has the advantage of giving a uniformly standard quality product which is free from dust, eggs of flies and damage by rain/storm etc. Besides, the dried product is obtained in a much shorter time. The home drier is recommended as a single unit for home scale use or in a battery of three or four units for cottage scale dehydration. It consists of a strong galvanized iron sheet box 90 cm x 60 cm x 90 cm with a strong perforated iron sheet bottom, the whole structure being enclosed in a wooden framework. This rests on iron stand 40 cm high. There are two slits 60 cm x 40 cm along the length on both sides of the drier and about 10 cm down from the top. These slits are flexible metallic flaps which can be opened and closed to regulate the flopw of the evaporating moist air. There are seven trays (80 cm x 60 cm) fixed with 60 mesh screen. The positions of these trays in the cabinet are so arranged that the hot air moves over the tray from one side of the cabinet to the other, thus covering the maximum surface area of the

loaded trays. The heating is done at the bottom surface of the iron sheet either with an electric stove or charcoal hearth. The fresh dry air enters from the perforations in the bottom sheet and the moisture escapes from the two slits at the top.

About 2-3 kg of the material for drying is fed on each of the seven trays. The drying operation which is carried out at temperatures varying from 60-70°C is completed in about five to ten hours. The dried material is packed in friction top cans to prevent moisture getting access to it. When reconstituted with hot water, the material is as good as the fresh one. The drying schedule for vegetables is given below.

Drying schedule for vegetables

Vegetables	Preparation for tray	Amount per sq m on tray (kg)	Treatment on Tray	Safe finishing temperature (°C)
Beans	Prepare as for canning	10	Steam blanch	70
Beets	Prepare as for canning, slice 0.6 cm thick	10		70
Cabbage	Shred, blanch for 2 minutes in boiling 1 per cent sodium bicarbonate solution rinse	5-10		65
Carrots	Peel and cube	10	Blanch in steam for 5 minutes	65
Sweet Corn	Husk, blanch on cob in boiling water for 10 minutes, cut the cobs	5-10		65
Onions	Peel, slice 0.3 cm thick, dip in 3% cold brine	5		60
Peas	Prepare as for canning	5-10	Steam blanching (optional)	65
Potatoes	Peel, slice or cube, dip in boiling water for 2 minutes	5-10	Steam blanching (optional)	65
Potatoes (sweet)	Peel, slice 0.6 cm thick	5-10	Blanch in steam for 5 minutes	65
Pumpkin	Remove seeds, slice or shred into thin pieces	10	Blanch in steam for 4-5 minutes	75
Spinach	Wash thoroughly	5		70
Tomatoes	Slice 1.25 cm thick or peel and halve	5-10	Sulphur 30 minutes (optional)	65

Pickling: This technique is mostly practised using vinegar, which increases the acidity of the medium i.e. four to six per cent of acetic acid basis. A number of soft and delicious vegetables e.g. cucumbers, onions, chillies etc are used for this type of pickling. The vegetables used are so treated that the micro organis,s do not survive under the prescribed conditions of pickling, particularly due to the presence of sufficient concentrations of common salt and certain organic acids like the lactic acid developed during the process of curing and the acetic acid which is added in the form of vinegar.

Brine pickling: A more recent method generally known as brine pickling is carried out either by the use of dried salt or solution of 10 to 15 per cent of common salt with or without the addition of one or more of the spices, particularly turmeric. This technique is based on the fact that salt used extracts the water some of the other soluble constituents from the vegetable and itself takes their place thus giving a uniform, attractive and crisp product. Even under these conditions, lactic acid is developed to the extent of about two per cent and this makes conditions for spoilage organisms unfavourable. Further protection is afforded by the spices (e.g. turmeric) which are invariably added to improve their taste and flavour.

In order to get pickles of good quality, the following suggestions may be noted. Fresh, tender but firm vegetables should be used. Before the prepared vegetables are finally pickled, they should invariably be cured in two or three per cent common salt solution. Where necessary, alum should be added in traces, which lends crispness to the vegetables. Use of vinegar with four to six per cent acidity (as acetic acid) and brown sugar is recommended. Spices should be used with caution to avoid over seasoning. Only containers made of glass, stone, enamel and aluminium should be used for pickles. Pickles should be stored in a cool, dark place. Pickles should be allowed to season for several weeks before being eaten. Yet another method of pickling is the one where oil is used as an additional ingredient and which affords the maximum protection to the pickle in its preservation. These pickles are accordingly kept covered with a layer of the oil at the top.