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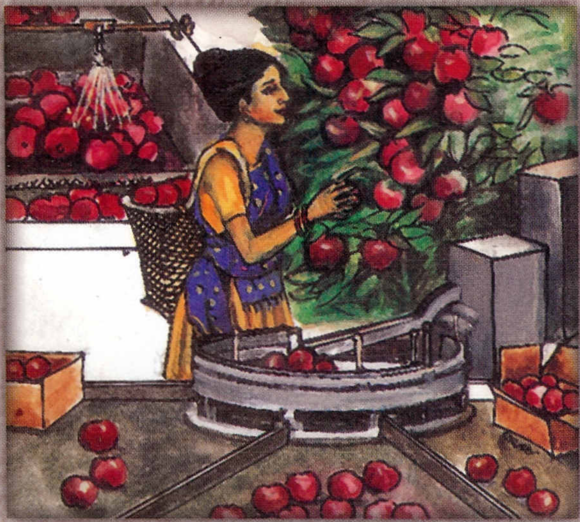

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CONTENTS

salers collected the produce from local markets. Of the four marketing channels studied, i.e. channel-I (producer-forwarding agent-commission ageat-wholesaler-retailer-consumer), Challel-II (Producerprimary wholesaler secondary wholesaler retailer consumer) Challel-III (Producervillage trader wholesaler retailer consumer) and Channel-IV (producer retailer consumer), Channels-I and II were the most common. Channel-I qas followed in case of tomato and capsicum, while bean and peas were disposed of through Chanel-II. Morever, channel-II was found more efficient in case of tomato and capsicum, whereas in case of beans and peas channel-I was better. Among the various factors influencing marketed surplus of vegetables, total production and per cent losses to total production were found maindeterminants. Lack of standerd grades, scarcity of wooden boxes, cheap and quick transportation, malpractices by traders and lack of market information were the main constraints in marketing of vegetables.

Processing

1022 AMIRUZZAMAN, MD.; CHAUDHURY, JCS. 1994. **Improved technologies for vegetable processing**. *Proceedings of a symposium on recent advances in vegetable development of Bangladesh*/Comp. by ML Chadha and others (Gazipur: 1994: 24-25 April). BARI, Gazipur, Postharvest Technology Division. Taiwan: Asian Vegetable Research and Development Center (AVRDC) p. 167-170.

Most vegetables grown in the country are highly perishable and postharvest losses reach 25-30%. Some methods of preservation are of particular significance in terms of economic importance. They are efficient, comparatively simple in operation, have universal application and are of commercial importance. Preservation by application of heat is perhaps the earliest and the most common method next to drying or dehydration method. Sun-drying may be extensively employed to dry vegetables. Dehydration or artificial drying is an improvement over ordinary sun-drying. Low-temperature drying, freeze-drying, accelerated freeze-drying foam-mat drying, etc., are refinements in the technique of dehydration. Freeze preservation is a modification of the well-known cold storage method of increasing the storage life of fresh vegetables. With the introduction of deep-freeze cabinets at home and facilities for transporting in the frozen state, this preservation method is likely to develop rapidly in the near future. Preservation by addition of sugar and application of heat are other important methods in vegetable processing. Finally, fermentation and pickling are easy-to-use and inexpensive techniques in preserving vegetables. A harvested vegetable is a living entity that actively carries on its physiological functions like transpiration, respiration, etc. which deplete the metabolites and moisture without being replenished. Moreover, sufficient heat is produced to allow microbial growth and to accelerate the physiological functions. Due to loss of metabolites, weight and nutritional losses occur while moisture loss causes loss of turgidity, gloss, and freshness. Vegetables are extremely perishable items and are subject to huge postharvest losses both in quantity and quality. Intensive research efforts are underway all over the world to prolong the shelf life of these highly perishable products but with partial success until now. An alternative way of preserving these nutritious crops is by processing. Setting up of small, simple, and inexpensive processing facilities at the rural level is expected to alleviate the financial loss of vegetable growers who are compelled to dispose off their produce at reduced prices during production season.

1023 ANAND, JC; MAINI, SB; SETHI, V. 1993. **Processing of vegetables**. *Advances in Horticulture Vol. VI*/edited by KL Chadha and G Kaloo. New Delhi: Malhotra Publishing, p. 1107-1144.

1024 AZIZI, A; RANGANNA, S. 1993. **Thermal processing of acidified vegetables**. *Jrl. of Food Science and Tech.- Mysore*, 30: 6, 422-428.

1025 ROY, SK. 1985. **What to do with vegetables after harvest**. *Delhi Gargen Magazine*, p. 27.

1026 VIJAY, S. 1990. **Evaluation of different vegetables for lactic fermentation**. *Indian Journal of Agricultural Science*, 60: 9, 638.

CARROTS

Postharvest handling

1027 CHAKKARAVARTHI, A; MATH, RG; WALDE, SG; RAO, DG. 1993. **Grinding characteristics of carrots (*Daucus carota L.*)**. *Journal of Food Engineering*, 20: 4, 381-389.

The grinding characteristics of carrots (*Daucus carota L.*) in the form of grits were studied in a hammer mill. The grits were first dried to different moisture contents, before being ground to a powder; the energy required for grinding was noted. Kick's law, Rittenger's law, and Bond's law were applied to the grinding process, and the constants of these various laws were found The moisture content of the dried grits had a significant effect on the grinding energy, which increased as moisture content increased from 10 to 15% decreased as moisture content rose to 18% and, again, increased as moisture content rose to higher values. A moisture content of 18%, therefore, could be recommended for grinding operations as it requires the least grinding energy.

1028 CU, JQ; PERINEAU, F; DELMAS, M; GASET, A. 1990. **Extraction of volatile compounds of lovage root, celery seed and carrot seed by different solvents**. *Proceedings of the 11th International Congress of Essential Oils, Fragrances and Flavours. V. 4: Chemistry - Analysis and Structure.* (New Delhi: 1989: 12-16 November, 1989)/edited by SC Bhattacharyya; N Sen; KL Sethi. London: Aspect Publishing, p. 89-97; 16 ref.

This study was carried out to compare solvent extraction with the traditional technique of hydrodistillation and its effects on the quality and quantity of essential oil. Lovage root (*Levisticum officinale*), celery seed (*Apium graveolens*) and carrot seed (*Daucus carota*) were extracted with 1,1,2-trichloro-1,2,2-trifluoroethane (TTE), ethanol, dichloromethane, methyl furan (sylvan), hexane, cyclohexane and benzene. The concretes obtained were subjected to steam distillation for separation of volatile compounds. Oils were analysed by GC, GC-MS and GC-FTIR. Yields for lovage root essential oil were 0.15% (direct hydrodistillation), 0.30% (TTE), 0.29% (dichloromethane), 0.24% (cyclohexane), 0.34% (hexane) and 0.38%-0.39% (ethanol, sylvan, benzene), and 8.24% (ethanol) and 2.61% (sylvan) for concrete yield. Quality of lovage essential oils was optimum using TTE with respect to the major constituent phthalides. For celery seed the average yields of concrete and essential oil were 0.71% and 0.16% (TTE), 13.23% and 0.86% (ethanol) and 2.0% and 0.13% (dichloromethane), respectively. 27 compounds were identified. Isopulegone, alpha-ionone and epoxycaryophyllene may not have previously been reported in celery seed oil. Average yields for carrot seed oil were 1.10% and 0.37% (TTE), 4.79% and 0.47% (sylvan), 3.30% and 0.87% (ethanol) and 1.70% and 0.18% (dichloromethane), respectively. Major constituents were found to be similar for solvent extraction and hydrodistillation.

1029 LAL, B; AGARWAL, R; TEWARI, DK; ARYA, A. 1983. **A new rot of carrot (Daucas carota L.)**. *National Academy of Sciences, India, Science Letters*, 7: 1, 5-6; 3 ref.

Macrophomina phaseolina caused 15-25% loss of stored carrots in the Allahabad area, India.

1030 MISHRA, D; MISHRA, AB; RATH, GC. 1989. **Fungal rots of colocasia, yam, beet and carrot in Orissa markets**. *Orissa Journal of Agricultural Research*, 2: 3-4, 156-159; 9 ref.

From >1000 rot samples of these root vegetables 11 fungal species were isolated, associated with 22 different host-pathogen combinations. Rotting of *Colocasia*, yam and beetroot was caused by *Aspergillus niger, Colocasia* by Mucor and *Fusarium oxysporum*, *Colocasia* and beetroot by *Geotrichum candidum*, *Colocasia*, yam, beetroot and carrot by *Rhizopus arrhizus*, *Colocasia* and yam by *Rhizoctonia solani* and yam by *Sclerotium [Corticium] rolfsii*.

1031 PAL, RK; ROY, SK. 1986. **Change in physico-chemical composition of carrot**. *Vegetable Science*, 13: 1, 73-78.

1032 PAL, RK; ROY, SK; WASKAR, DP. 1991. **Effect of pre and post harvest treatments on shelf life and quality of carrot under different storage conditions**. *Maharastra J. Hortic.*, 5: 2, 98-105.

1033 RAM, HB; TRIPATHI, VK; SURJEET SINGH. 1981. **A note on the storage studies on carrot var. Deshi Red**. *Progressive Horticulture*, 13: 3/4, 33-35;

Topped and non-topped, washed or non-washed and polyethylene packed and non-packed roots were held at 23-33°C and 36-59% RH for up to 6 days. At 6 days low weight loss (16.8%) and spoilage (29%) were noted in topped, non-washed roots packed in perforated polyethylene with 0.8% ventilation. In some variants weight loss and spoilage were as high as 78.3 and 94%, respectively.

1034 SAIMBHI, MS. 1982. **Shelf-life of carrot varieties as influenced by pre-packing in polyethylene bags**. *Punjab Vegetable Grower*, 17/18, 48-50; 4 ref.

All 9 cultivars tested became unmarketable after 4 days' storage if left unwrapped, having lost 31-37% of fresh weight. Wrapping in polyethylene bags extended shelf life to 12 days in all cultivars, and to 20 days in American Beauty, Yellow Carrot and Waryana Selection; 5-11% of fresh weight was lost.

1035 VIJAY, S; ANAND, JC. 1982. **Physico-chemical and microbiological quality of carrot and *amla* preserves**. *Indian Food Pack.*, 36: 5,38-43.

1036 VIJAY, S; ANAND, JC. 1982. **Studies on the preparation, quality and storage of intermediate**

moisture carrot preserve. *Journal of Food Science and Technology*, 19: 4, 168.

POTATOES

Storage

1037 ANAND, JC; MAINI, SB; DIWAN, BRIJESH. 1982. **A simple way to preserve potato for chips making**. *Journal of Food Science and Technology, India*, 19: 6, 267-268.

Potato tubers were stored successfully for up to one yr after treatment with a solution containing 0.6% acetic acid and 0.2% potassium metabisulphite. Chips prepared from these tubers retained better colour during storage as well as after frying. Substitution of acetic acid with citric, tartaric or malic acid affected the cooking quality of tubers in the same way as acetic acid. Reduction of various chemical constituents of steeped potatoes after 2 months storage was found to be 24.2 to 22.8% for DM, 2.89 to 2.66% for ash, 12.9 to 11.6% for starch, 113.2 to 60.0 mg% for total phenols as tannic acid and 0.3 to 0.1% for reducing sugars. The quantity of phenolics leached out during one month was 34 mg/100 ml of steeping solution.

1038 BADSHAH, N; IRITANI, WM; ROM, CR; PATTERSON, ME. 1990. **Studies on the sugars development of irradiated potatoes receiving different nitrogen levels during growth and stored at different temperatures**. *Acta Horticulturae*, No. 269, 267-275; 28 ref.

Potato cv. Russet Burbank tubers grown at Othello, Washington, USA with 0, 181.8 or 363.6 kg N/ha were irradiated with 0, 0.05, 0.1 or 0.2 kGy of gamma rays (Co60 source) and stored for 3 months at 10 or 15.5°C. Before storage, tubers contained no reducing sugars and 1.49-1.53% non-reducing sugars (DM basis). N and irradiation decreased reducing and non-reducing sugar contents after storage, while temperature had no significant effect. Reducing sugars decreased with increasing levels of N and irradiation. Tubers from unfertilized plots developed 1.5% reducing sugars. Irradiation at 0.2 kGy decreased reducing sugars from 1.7 to 0.9%. The breakdown of non-reducing sugars increased with increasing N levels but decreased with irradiation. Tubers from plots given 363 kg N had a 36% decrease of non-reducing sugars. Irradiation at 0.1 kGy dosage caused the least change (4.9% decrease) in non-reducing sugar content.

1039 BHANDAL, MS; NAIK, PS. 1991. **Storage behaviour and yield potential of potato genotypes stored in country and cold store**. *Journal of the Indian Potato Association*, 18: 1-2, 100-101; 2 ref.

Potato cv. Kufri Chandramukhi, Kufri Lauvkar, Kufri Sindhuri, Kufri Jyoti, BS/F-630 and JH-222 tubers weighing 30-40 g were stored in a thatched hut from the end of Mar. to the middle of June at 32 ± 4°C or in a cold store at 3 ± 1°C, and shrinking and rotting were recorded at 15 d intervals up to 75 d. During observations, rotted potatoes were removed. Percentage loss in weight after 75 d storage was 3.0-8.0% in the cold store and 15.2-59.4% in the hut. The greatest weight loss in both stores occurred in cv. BS/F-630 followed by Kufri Jyoti. The tuber yield from the stored potatoes was highest in cv. Kufri Jyoti (19.43 t/ha) followed by Kufri Lauvkar (13.46 t) both stored in the cold store, and it was lowest in JH-22 tubers (1.04 t) kept in hut.

1040 CHADCHAN, R; BIRADAR, DP; MANTUR, SM; MUMBARADDI, KH. 1989. **Impact of plant population and nitrogen levels on storage of potato tubers of different grades**. *Karnataka Journal of Agricultural Sciences*, 2: 4, 325-328.

In a field experiment at Dharwad during the 1985 *kharif* [monsoon] season, potato cv. Kufri Badshah and Kufri Chandramukhi were grown at inter-row spacings of 30, 45 and 60 cm and given 100, 150 or 200 kg N/ha. Harvested tubers were graded as small, medium or large and stored at room temp. for 5 weeks. Increasing N application increased the moisture loss significantly in all tuber sizes during storage. Tuber size class had no effect on moisture loss.

1041 CHAKRABARTI, AK; ROY, SK; PAL, RK. 1990. **Non conventional method of application of isopropyl n 3-chlorophenol carbamate to control sprouting of potato under low cost storage system**. *23rd International Hort. Congress*. Firenze, Italy: Abstract 2546.

1042 GOWDA, IND; KRISHNAPPA, KS. 1985. **Effect of post-harvest application of maleic hydrazide on the storage behaviour of potato stored at room temperature**. *Journal of the Indian Potato Association*, 12: 1/2, 110-114; 5 ref.

Potato cv. Kufri Jyoti cured seed potato tubers treated for 25 min with factorial combinations of 0, 250, 500, 1000 or 2000 p.p.m. MH and 0, 1000 or 2000 p.p.m. dimethylsulphoxide solutions did not differ significantly