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Postharvest Management in Agriculture

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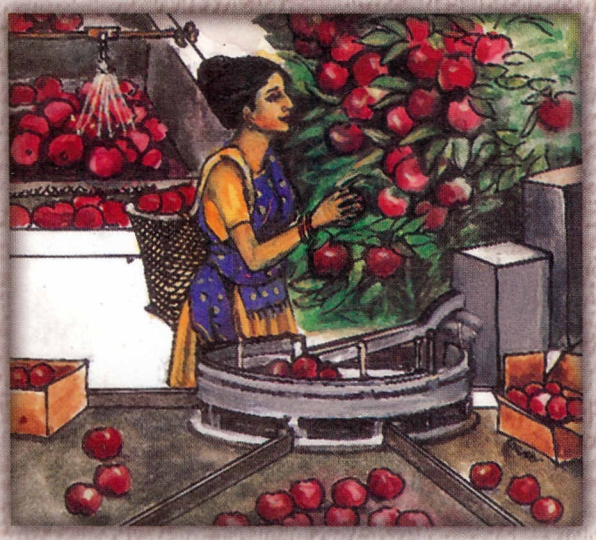

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CONTENTS

cooking methods: soaking in tap water for 6, 12 and 18 h; sprouting for 40 and 60 h; ordinary cooking of unsoaked seeds and seeds soaked for 12 h; and autoclaving of unsoaked and soaked seeds. In vitro, starch digestibility (mg maltose released per g meal) and protein digestibility (%) of raw rice bean varied from 29.3 to 36.5, and 57.2 to 62.8, respectively. Both starch and protein digestibilities improved significantly on soaking, sprouting, cooking and autoclaving. There was a progressive and significant increase in starch and protein digestibility with successive increase in soaking and sprouting period.

478 KATARIA, A; CHAUHAN, BM; PUNIA, D. 1990. **Effect of domestic processing and cooking methods on the contents of carbohydrates of amphidiploids (black gram X mung bean)**. *Food Chemistry*, 36: 1, 63-72; 14 ref.

The effects of soaking, ordinary and pressure cooking of soaked and unsoaked seeds and the effects of sprouting on sugar and starch contents of amphidiploid (black gram X mung bean) seeds were investigated. Soaking reduced the values of total soluble sugars, reducing sugars, non-reducing sugars and starch significantly. Cooking (both ordinary and pressure cooking) increased the concentrations of sugars of soaked as well as unsoaked seeds; starch contents, however, decreased. Germination decreased starch, thereby increasing the soluble sugars.

479 RAMAMOORTHY, K; PANDIAN, M; KALAVATHI, D. 1989. **Soaking-drying treatment for maintaining viability and vigour in lima bean (*Phaseolus lunatus L*) cv. LPS 1**. *Annals of Plant Physiology*, 3: 2, 122-125; 9 ref.

P. lunatus seeds stored for 4 months under ambient conditions were soaked in water for 15 or 30 min, dried to original moisture content and subjected to accelerated aging at 98% RH and 40 ± 1°C for 15 d. The treated seeds gave 71-73% germination. Germination was decreased to 68 and 50% in treated seeds which had been soaked for 1 and 2 h, respectively Membrane integrity and dehydrogenase activity were not adversely affected in treated seeds which had been soaked for a shorter duration (15 and 30 min).

LENTILS

480 BAKR, MA. 1994. **Postharvest processing and quality of lentil in Bangladesh**. *Lentils in South Asia: proceedings of a Seminar*. (IARI, New Delhi: 1991: 11-15 Mar)/edited by W Erskine; MC Saxena. p. 195-205.

481 LAL, SS. 1993. **Stored pulses can be saved by proper management**. *Indian Farming*, 42: 12, 31-32.

482 VISHUNAVAT, K; SHUKLA, P. 1983. **Effect of different temperatures, humidities and period of storage upon prevalence of seed mycoflora of lentil**. *Indian Journal of Mycology and Plant Pathology*, 13: 1, 109-111; 8 ref.

The results are tabulated of the effects of 3 temps. (6-8°, 25° and 38-16°C) and 4 RHs (75, 85 and 92% and in a desiccator without salt solutions) on *Aspergillus flavus*, *A. fumigatus*, *A. niger*, *A. sydowi*, *A. terreus*, *Fusarium oxysporum*, *Alternaria alternata*, *Curvularia lunata* [*Cochliobolus lunatus*], *Penicillium oxalicum* and *Rhizopus arrhizus* in stored lentils.

STARCH CROPS

Postharvest handling

483 AGRAWAL, MP; SRIVASTAVA, HM. 1987. **Effect of storage temperature on the post-harvest quality of sugarbeet**. *Indian Journal of Agricultural Sciences*, 57: 11, 825-828; 8 ref.

Experiments were conducted to determine weight loss and quality deterioration in sugarbeet stored in heaps at subtropical temp. between harvesting and processing. 4 harvesting dates and 6 storage durations (0, 24, 48, 72, 96 and 120 hours) were studied and weekly average max. air temp. and RH after each harvest date were recorded. Min. losses for harvested on 15 April was for 24 h storage and increased for longer storage periods. Losses was 6% for 15 April harvest and 9% for others (30 Apr, 15 and 30 May). Sucrose, Na, K, amino-N & total Na^{++} K^{+} levels were measured.

484 GHULE, DB; SAWANT, AD; JADHAV, SJ. 1984. **Thin-layer chromatography of amino-acids in sugar cane and their changes during post-harvest storage and processing**. *Maharashtra Sugar*, 10: 1, 105, 107-109.

Harvested cane, stored for up to 120 h at room temparature and the juice was sampled every 24 h for analysis. Asparagine, glutamine, aspartic acid and glutamic acid were identified. The top portion of mature cane contained a greater total of amino acids than the bottom portion, whereas the converse was true for immature cane. Amino acid content fell during the first 24 hour, after which there was a gradual increase. Juices, syrups, massecuites and final molasses were also analysed.

485 HUSSAIN, IFA; URS, YSV; UDAYAKUMAR, M; RAO, KB. 1989. **Post-harvest studies in sugarcane.** *SISSTA Sugar Journal*, 15: 2, A6-A7.

In coastal Karnataka, India, sugarcane of 2 cultivars, Co. 419 and Co. 62175, was harvested 3 days after it had been sprayed with water or 2% sodium metasilicate solution or without spraying, and stored in the shade for 6 days. Data on cane weight and juice Brix, sucrose content and purity are tabulated. Weight loss in 6 days was 8.37% for Co. 419 and 4.98% for Co. 62175. Spraying with the metasilicate solution did not significantly affect the weight loss, but increased the post-storage sucrose content of juice significantly, to 17.62% compared with 15.80% in water-sprayed cane and 16.85% in the unsprayed control. Juice Brix was higher than in the control, and purity was higher than in the water-sprayed cane. Cane should be crushed within 24 h of harvesting, but sodium metasilicate helps to prevent deterioration even after 6 days' storage.

486 MADSEN, RF. 1991. **Colour formation in white sugar during storage.** *Pakistan Sugar Journal*, 5: 1, 19-21.

During the 1988 campaign in Denmark, white sugar with colour 23 IU (ICUMSA units, measured at 420 nm) was stored in a factory silo and a remote silo; upon withdrawal in March 1989, sugar from the remote silo had temperature 25°C and colour 25 IU, while that from the factory silo had temperature 40° and colour 39-60 IU, compared with 30-32 IU (from an initial 20 IU) in previous years. With a new washing system at the centrifugals, drier sugar had entered the silo, at 43° rather than 38°; its ventilation had been stopped at the end of the campaign. When SO_2 addition to thin juice was reduced from 80 p.p.m. to 40 or 0, sugar colour increased from 20 to 40-50 IU after a lag of about 8 h; a short factory stoppage increased this to 80 IU. During 100-160 days' storage, the colour of SO_2-free sugar increased from 38 IU to only 47-48 IU at 30° or to 53-54 IU at 50°. Darker sugar contained not only less monosaccharides and amino-N (which react to form colorants) but also less ash, particularly K; a significant part of the ash in normal white sugar is likely to be potassium imidodisulphonate.

487 MANOHAR RAO, PJ. 1990. **Sugar technology for administrators in the Indian sugar industry.** Pune: Jayajirao Shinde, Bharatiya Sugar, Ed. 2, 415 p.;

The book has 29 chapters. After chapters on world sugar production, the sugarcane plant and sugar industry terminology, each stage in the process of cane sugar manufacture is explained. Further chapters deal with boilers, turbines, auxiliary equipment, Indian sugar grades (+ packaging), routine laboratory control, energy conservation, pollution control, Government regulations, diffusers, sugarbeet cultivation in India, raw sugar manufacture and refining, and byproducts. A final chapter gives lists of relevant Indian Standards (classified by subject) and is followed by an appendix consisting of 21 tables of statistics classified by year and by region or state of India. The techniques described are those currently used in India; some are in general use in countries producing cane sugar, others are more specialized. Although 4 methods of supplying nuclei in a vacuum pan are mentioned, the only method explained is spontaneous nucleation (which in many countries has been superseded by shock-seeding or full seeding). Control instruments (for all process stages) are described only briefly, in a chapter entitled 'Miscellaneous equipment'. An index would have been useful, although there is a detailed (8 pp.) contents list. Some terms are used loosely, e.g. 'Brix per cent bagasse' in the chapter on chemical control (p. 248).

488 MATHEW, M; SHUKLA, LN. 1991. **Performance evaluation of a sugar cane (*Saccharum officinarum*) cleaner using feeding unit.** *Indian Journal of Agricultural Engineering*, 1: 1, 13-16.

A feeding unit was attached to a mechanical sugarcane cleaner with snapping cleaning rolls. The integrated sugarcane cleaner was evaluated for its overall performance. The cleaning efficiency was maximum for double cane feed-rate, which decreased with increasing feeding unit speed. Cane stalk and cane eye damage increased with increase in feed rate and feeding unit. The clean cane output increased by 52.26% in single cane feed rate owing to the integration of feeding unit to the cleaning mechanism.

489 NAZAR SINGH; NARANG, RS; 1987. **Post-harvest studies for efficient produce management in sugarbeet.** *Indian Journal of Agronomy*, 32: 3, 265-267; 4 ref.

In trials at Ludhiana, sugarbeet sown on 2 Sep., 23 Sep. and 14 Oct. was harvested on 2 Mar., 23 Mar. and 14 Apr., respectively The net losses in gross sugar yield during stacking for 24-72 h in the field increased progressively with delay in harvesting. After 72 h of field stacking the losses for harvests made in Mar. and Apr. were 9-14 and 22-25%, respectively The root wt decreased and the sugar content increased with increasing duration of stacking from 24 to 72 h. It was suggested that sugarbeet should be sown in Sep. instead of

October. for decreasing post-harvest losses in the Punjab.

490 RAMANATHAN, G; OYYARAM, G. 1989. **Quality sugar production in Ambur Co-op. Sugar Mills. An experience shared**. *SISSTA Sugar Journal*, 15: 2, M4-M9.

Measures taken at this Indian cane sugar factory to improve sugar quality and decrease losses in molasses are described. These included addition of phosphoric acid to mixed juice to give >300 p.p.m. P_2O_5, modifications to juice heaters and vacuum pans, use of a scale inhibitor, seeding 'B' and 'C' pans with Appel Boom slurry (prepared by a method which is described), washing 'A' massecuites in the centrifugal with superheated water, and drying the sugar with desuperheated steam at 210-220°C.

491 RAZZAQ, A. 1992. **Mechanization of sugarcane production in Pakistan**. *Progressive Farming (Pakistan)*, 12: 1, p. 38-42.

492 REDDY, GS. 1990. **Drying and cooling of sugar by fluidized bed - the first of its kind in Indian sugars industry**. *SISSTA Sugar Journal.*, 16: 3, 63-76.

In conventional drying by vibrated multi-tray hopper, attrition seriously damages crystals, decreasing the commercial yield, impairing brightness and polluting the workplace with dust. A gentler, more efficient system is a fluidized bed in which the air flow is adjusted to give a mixture of smoothly fluidized and agitated bubbling fluid bed. Confabs Thermo Systems Pvt. Ltd. of Bangalore have developed the CSL-I plug flow dryer-cooler, consisting of a bucket-and-chain elevator, drying and cooling sections (supplied with steam-heated and water-cooled air streams), and venturi-type scrubber. Its design is described with diagrams, and performance trials are reported with tabulated results. The design target (decreasing the moisture content from 0.95-2.0% to 0.06-0.10% at throughput 20 t/h) was achieved with air at 100°C; air at 120-130° caused some charring. Effects of using various hot and cold air blower openings on final temperature, moisture content and entrained crystal size are explained. Less floor space is needed than for the conventional equivalent, since drying and cooling occur in the same unit.

493 SOOD, HC. 1990. **Modernisation programmes for sugar industry**. *Modernisation of Indian Sugar Industry*. New Delhi: Arnold, p. 36-50.

The present status of and challenges to the industry are considered. Contributions from several national institutes and organizations are mentioned and new system designs and process techniques designed to achieve successful balanced, modernized, rehabilitated and expanded factories are outlined. The following are discussed: cane feed and crushing control; cane preparatory devices; Lotus roller; self-setting mills; hydraulic mill drive system; Two Roller Pressure Feed systems; high-pressure steam generation; cogeneration and surplus power; byproduct industries; distillery effluent treatment and energy generation system; Biostil process for continuous fermentation; mechanical vapour recompression; bagasse drying system; process innovations and control; automation of cane juice flow rate; juice pH control system; automatic evaporator control system; continuous juice treatment and filtration system; continuous vacuum pans, crystallizers and centrifugals, and automation at the sugar end. Continuous operations and automation are recommended for ensuring optimum performance and improved efficiency.

494 TAYAB, MAK; THEERTHAMALAI, K. 1990. **Opportunities on the frontiers of sugar processing technology: a brief review**. *SISSTA Sugar Journal*, 16: 3, 18-22; 6 ref.

Several processes discovered in the past ≈10 years are considered for use in the (Indian) sugar industry: raw juice filtration by deep sand bed filter; elimination of sulphitation by removal of colloidal material on sintered SS filters (pore size 0.01-0.5 μm) then decolorization with H_2O_2 or activated carbon; mild aerated defecation for making very low colour sugar, whose quality is closer to refined than plantation white sugar; raw juice purification by electroflotation; concentration of clear juice by reverse osmosis to e.g. 40°Bx, possibly followed by freeze-drying instead of evaporation; conversion of bagasse to high-value products, possibly doubling the revenue from each ton of cane and hence strengthening the industry.

CASSAVAS

Postharvest handling

495 BALAGOPAL, C; MAINI, SB; POTTY, VP; PADMAJA, G. 1980. **Microbial rotting of cassava roots**. *Seminar on Post harvest Technology*. 1980: 22-23 Feb. Trivandrum: pp. 23.

496 BALAGOPALAN, C; RAY, RC. 1993. **Biotechnological approaches for cassava utilization in India**. *First international scientific meeting cassava biotechnology network: proceedings*. (Cali (Colombia): /edited by