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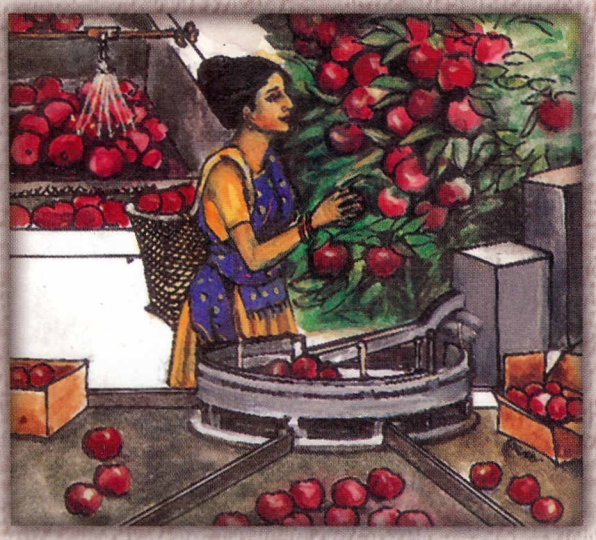

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A S Chandel and R M Kamal

SAARC Agricultural Information Centre (SAIC)

SAARC Agricultural Information Centre (SAIC)
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CONTENTS

cent and TSS was noted with the increase in storage period. Loss in weight of fruits in different fertilizer treatments was in the range of 7.93 to 8.94% and 27.97 to 32.21% at the end of 7 and 15 days of storage, respectively.

733 RAMANJULU, V; REDDY, MRS. 1989. **Post-infection changes in Sathgudi sweet orange fruits caused by *Gloeosporium limetticola*.** *Indian Phytopathology*, 42: 1, 191-192; 6 ref.

Freshly harvested, apparently healthy Sathgudi oranges of uniform wt and maturity were inoculated with *G. limetticola* and incubated at 28-32°C. After 4-12 d, fruit juice was extracted and analysed. The decrease in titratable acidity (citric acid) during incubation was more in infected fruits (21.4%) than healthy fruits (1.1%). There was a slight increase in total soluble solids (8.6%) in infected fruits (possibly due to a rapid fall in citric and ascorbic acid contents) compared with a slight increase (5.2%) in healthy fruits (attributed to a gradual loss of moisture content during storage). Inoculated fruits had a greater wt loss (8.1%) compared with healthy fruits (3.8%).

734 RANA, GAJENDER SINGH. 1989. **Effect of fungicides, packages and storage conditions on the shelf life of sweet orange (*Citrus sinensis Osbeck*) (M.Sc: thesis)**. Haryana Agricultural University, Hisar.

Total soluble solids and sugars increased, while ascorbic acid, acidity and juice content decreased during storage of sweet orange. Losses due to physiological processes and decay increased with the subsequent increase in storage period. Fruits stored in wooden box with polythene bag had lost less weight due to more relative humidity. Benlate, topsin-M and oil emulsion were effective in reducing the post-harvest losses. The treatments which were effective in increasing the self life were also effective in reducing fruit rot, loss in weight and maintaining edible quality for 50 days at room temperature and 80 days in zero energy cooling chamber storage.

735 SAMS-UD-DIN, M; LINDSAY, D. 1988. **Comparative effectiveness of three commercial fungicides in controlling mould wastage in Valencia oranges.** *Bangladesh Horticulture*, 16: 2, 1-6; 16 ref.

Valencia oranges were artificially damaged and inoculated with a mould-coated (*Penicillium digitatum*, *P. italicum* and *Geotrichum candidum*) puncturing device. The infected fruits were treated in (a) 2% sodium o-phenylphenate [sodium orthophenylphenoxide] (SOPP), (b) 0.05% benomyl, (c) wrapping in diphenyl [biphenyl] impregnated tissue paper (DITP) or (d) rinsing in water. The treated oranges were stored at 21 ± 2°C, assessed for mould wastage and fungicidal effect on *P. digitatum*, *P. italicum* and *G. candidum*. SOPP treatment was found to be most effective (50% rot after 26.94 d) which were significantly different from DITP wraps (5.23 d), benomyl immersion (2.81 d) and water rinse (2.56 d), respectively. SOPP and benomyl effectively controlled *P. digitatum*, while DITP was effective against both *P. digitatum* and *P. italicum*. All the treatments were least effective against *G. candidum*.

KINNOWS

Postharvest handling

736 JAIN, PK. 1989. **Studies on the packages, Transportation and storage behaviour of kinnow mandarin (Ph.D : thesis)**. Haryana Agricultural University, Hisar.

The present studies were undertaken during 1986-87. the studies revealed that fruits packed in corrugated paper box were best in terms of organoleptic acceptance and majority of other qualitative and biochemical parameters. Transportation by road was found comparatively better, whereas transportation by railway was cheaper. During storage corrugated paper box again maintained supremacy over other packages, while taking various factors, viz. quality, bio-chemical and physiological into consideration. Total soluble sugars of the fruits increased during storage while ascorbic acid, acidity and juice content decreased. Losses due to physiological processes and decay increased with the subsequent increase in storage period. Fruits stored under modified condition lost less weight due to more relative humidity. Among the post-harvest dip treatments, TBZ and benomyl were effective in reducing the post-harvest losses. The treatments which were effective in increasing the shelf life were also effective in reducing fruit rot, loss in weight, and maintained the edible quality for 56 days at room temperature and 77 days in zero energy cooling chamber storage. This extension in shelf life would be sufficient to allow the produce to be transported to distant market and allow greater flexibility in marketing by avoiding glut.

737 JAIN, PK; CHAUHAN, KS. 1993. **Evaluation of various packages for transportation of kinnow mandarin fruits by rail**. *Haryana Jr. Hort. Sci.*

738 JAIN, PK; CHAUHAN, KS. 1990. **Post-harvest studies on kinnow mandarin**. *Int. Seminar on New*

Fronties in Horticulture. Hisar, India.

739 JAIN, PK. 1994. **Response of various packages and mode of transportation on kinnow mandarin fruits**. *ICFOST*. New Delhi, India.

740 JAIN, PK; CHAUHAN, KS. 1991. **Studies on various packages and mode of transportation for kinnow mandarin**. *10th National Seminar on Citurs*. Hisar:

741 LAL, H. 1985. **Studies on post harvest life of Unshiu mandrin**. *Indian Botanical Reporter*, 4: 2, 169-171; 6 ref.

Treatment of these mandarins (*Citrus unshiu [C. reticulata]*) with Dithane M-45 [mancozeb] and boric acid (0.5%) prevented losses from rotting. Fruits treated with soap solution (1%), mustard oil (10%) and fungicidal emulsions retained better taste and flavour even after 5 weeks' storage.

742 NAGAR, PK. 1991. **Shelf life extension in kinnow mandarin fruits by some new ripening retardants**. *Indian Journal of Plant Physiology*, 34: 4, 401-405.

743 PREMI, BR; LAL, BB; JOSHI, VK. 1994. **Distribute pattern of bittering principles in kinnow fruits**. *J. Fd. Sci. Technol*, 140-141.

Storage

744 AHMAD, M; MAHMOOD, F; KHAN, I. 1987. **Effect of waxing on free amino acids of kinnow mandarins (*Citrus reticulata Blanco*) during storage**. *Pakistan Journal of Scientific and Industrial Research*, 30: 3, 235-238; 34 ref.

Seventeen free amino acids were identified in the fruit juice. The predominant free amino acids were serine, aspartic acid, glutamic acid, arginine, threonine and proline. There was no effect of waxing with a commercial wax emulsion (Britex-561) on free amino acids; however, there was considerable decrease in most of the amino acids during post-harvest storage under room conditions at 12-26°C and 68-90% RH.

745 JAIN, PK; CHAUHAN, KS. 1994. **Effect of modified atmosphere storage in combination with fungicides on the shelf-life of kinnow**. *Haryana J. Hort. Sci.*, Hisar:

746 JAIN, PK; CHAUHAN, KS. 1991. **Studies on storage behaviour of kinnow mandarin under different storage conditions**. *10th national seminar on citrus*. Hisar:

747 KUMAR, J; SHARMA, RK; RAN SINGH; GODARA, RK. 1990. **Increased shelf-life of Kinnow mandarin (*Citrus reticulata*) by different storage conditions and chemicals**. *Indian Journal of Agricultural Sciences*, 60: 2, 151-154.

Uniform fully-ripe fruits packed in wooden boxes were placed in polyethylene bags and the mouth of the bag was opened at weekly intervals for 10-15 minutes to remove excess moisture. One-half of the fruits were kept at room temperature (≈25°C and 45% RH) and the other half in zero-energy chambers (≈20° and 60% RH) for up to 70 days. Each treatment was divided into 3 sub-treatments viz. Captaf at 0.2% or diphenyl at 0.5 g/pack was applied or no treatment (control). No marked differences in physiological weight loss after 70 days were noted between the treatments. Losses due to decay after 70 days were lowest (1.99%) in zero-energy chambers with Captaf application and highest (19.11%) in the control at room temperature. No appreciable differences in fruit quality were observed between the treatments.

748 KUMAR, S; CHAUHAN, KS. 1990. **Effect of fungicides and calcium compounds on shelf-life of Kinnow mandarin during low temperature storage**. *Haryana Journal of Horticultural Sci-ences*, 19: 1-2, 112-121; 8 ref.

Twelve-year-old trees were sprayed 10 days before the anticipated harvest date with 1% calcium nitrate, 0.1% Rovral [iprodione], or 0.1% Bavistin [carbendazim] or a mixture of these substances. The fruits were stored at 4 ± 1°C for up to 112 days. Fruits treated with calcium nitrate together with Rovral or Bavistin maintained acceptable quality for up to 98 d whereas the untreated control fruits did so for only 56 days.

749 NAGAR, PK. 1993. **Effect of different harvesting periods on shelf-life and quality of kinnow fruits**. *Journal of Food Science and Technology, Mysore*, 30: 1,44-45.

The Kinnow mandarin fruits were harvested at different periods and stored at ambient temperature (15-20°C) to evaluate their shelf-life and quality. Delaying harvesting beyond second week of January was found to result in greater loss of fresh weights than the fruits harvested

earlier. While the fruits harvested in the last week of December and middle of January showed 11.60 and 13.10% losses during 25 days of storage, the corresponding losses in fruits harvested in 3rd and 4th week of January were 20.60 and 25%, respectively. Total soluble solids and sugars gradually increased during storage irrespective of harvesting dates and storage. Ascorbic acid and juice contents decreased sharply during storage tn fruits harvested after 2nd week of January.

750 RAN SINGH; SHARMA, RK; KUMAR, J. 1989. **Effect of some chemicals on shelf life of Kinnow mandarin**. *Research and Development Reporter*, 6: 1, 87-91; 9 ref.

Fully ripe fruits were harvested and stored at room temperature for up to 42 days after dipping in solutions of 2% sesame oil, 2% sesame oil + 0.1% captafol or 0.1% captafol; or 1000 and 2000 p.p.m. KMnO4, or diphenyl [biphenyl] at 5 g/3 kg pack was used. KMnO4 was applied on the cushioning material (paper lining) and dried before packing while diphenyl as naphthalene balls was kept as such in the packing. The sesame oil treatment was the best; it gave minimum weight loss. Diphenyl was the next best treatment. Various quality parameters such as TSS and acidity were not greatly affected by the treatments.

751 SANDHU, SS. 1992. **Effect of pre-harvest sprays of gibberellic acid, vipul, calcium chloride and bavistin on the tree storage of Kinnow fruits**. *International Symposium on Tropical Fruit: Frontier in Tropical Fruit Research*. (Pattaya City (Thailand): 1991: 20-24 May)/edited by S Subhadrabandhu. Wageningen: International Society for Horticultural Science, p. 366-371.

752 SURINDER, K. 1986. **Studies on maturity indices and storage behaviour of kinnow mandarin (Ph.D : thesis)**. Haryana Agricultural University, Hisar. 189 Pages.

The best time to harvest kinnow mandarin was found to be the second fortnight of December under Hisar Conditions, while considering the physico-chemical characters such as TSS acidity, TSS/acid ratio and specific gravity as criteria for maturity. Pre-and post-harvest application of fungicides, calcium compounds, waxol alone or in various combinations were effective in extending the shelf life of fruits. Calcium chloride 1.0% + bavistin 0.1%, calcium chloride 1.0% +- reveral 0.1% waxol-0-12% + bavistin 0.1 and captaf 0.1 were the best treatments which could extend the shelf life by 28 days and 56 days over control at room and at low temperature storage, respectively. The treatments which were effective in increasing shelf life were also effective in reducing fruit rot, loss in weight, respiration rate and maintained the edible quality for 56 days at room temperature and for 98 days at low temperature storage.

Storage decay

753 GUPTA, OP. 1986. **Effect of diphenyl and packing on the storage behaviour of Kinnow fruit at low temperature followed by room temperature**. *Progressive Horticulture*, 18: 3-4, 181-188; 5 ref.

Kinnow mandarins were packed or not in diphenyl-impregnated paper and kept at low (2°C) temperature for up to 126 days and later transferred to room temperature for 35 days. The weight loss of fruits was reduced with the use of diphenyl-impregnated material. Paper lining was better in reducing weight loss compared with unipack packaging of fruits. Decay losses were observed in the control and all fruits were spoiled the 126th day of storage. Fruit quality was better with the use of diphenyl-impregnated material. After transfer to room temperature the fruits retained better quality and had fewer decay losses with diphenyl-impregnated material than in any other treatment.

754 JOSAN, JS; SHARMA, JN; CHOHAN, GS. 1983. **Effect of different lining materials and wax emulsion on post-harvest life of Kinnow fruit**. *Indian Journal of Horticulture*, 40: 3/4, 183-187; 5 ref.

Fully ripe *Kinnow mandarins*, dipped in 0.2% Benlate for 1 minute, were packed in boxes lined with different materials, or the fruits were waxed and similarly packed. The boxes were held at 1.1 to 3.3°C and 80-85% RH for up to 105 days. Wax-coated fruits held in boxes lined with perforated polyethylene kept best, for 90 days.

755 KUMAR, SURINDER; CHAUHAN, KS. 1989. **Effect of certain fungicides and calcium compounds on post harvest behaviour of Kinnow mandarin**. *Haryana Journal of Horticultural Sciences*, 18: 3-4, 167-176; 9 ref.

Twelve-year-old trees were sprayed with 1% calcium nitrate, 0.1% Rovral [iprodione], 0.1% Bavistin [carbendazim] or combinations of the 3 chemicals. The treatments were applied 10 days before the anticipated harvesting date. Fully ripened fruits harvested in Dec. were packed into lined boxes and held at room temperature for up to 63 days. The least physiological weight

and decay losses and the best quality indices (fruits marketable for up to 56 days) were obtained with a mixture of calcium nitrate and Bavistin. Marketability in the control extended for up to 28 days.

756 MANN, SS; SINGH, K; MOHAN, C. 1988. **Effect of fungicides and wax emulsion on storage of Kinnow mandarin at ambient storage conditions**. *Haryana Journal of Horticultural Sciences*, 17: 1-2, 14-19; 9 ref.

Postharvest treatment with the fungicides captan, Bavistin [carbendazim] or Aureofungin or with wax emulsion reduced weight loss and increased the palatibility rating of the fruits. The palatibility rating was maximum in fruits treated with wax emulsion and the effect increased with increasing concentration (6-12%). TSS and acidity of the fruits increased until 45 days of storage and decreased thereafter. Treatment with fungicides or wax emulsion did not significantly affect TSS and acidity percentages. The treatments reduced the occurence of fruit rots [unspecified] during storage.

757 MISHRA, BP. 1989. **A note on control of blue mould of Kinnow fruits caused by *Penicillium italicum*, through diphenyl wrappers**. *Haryana Journal of Horticultural Sciences*, 18: 1-2, 65-66; 5 ref.

Diphenyl wraps (320 mg/30 ml acetone, 40 mg/wrap) gave complete control of blue mould in this mandarin hybrid as a pre-inoculation treatment and 89% control post-inoculation. The efficacy was greatly reduced by lowering the dosage.

758 SANDHU, SS; RANDHAWA, JS; DHILLON, BS. 1989. **Effect of different forms of calcium, diphenylamine and Bavistin on the shelf life of Kinnow fruits**. *Indian Journal of Horticulture*, 46: 3, 327-332; 10 ref.

Kinnow oranges [mandarins] of uniform size and colour harvested on 21 Jan. received 7 different dip treatments before being packed in perforated polyethylene bags and stored at 0 to 3.3°C and 85-90% RH for 2 months. Fruits dipped for 1 minute in 250 p.p.m. Bavistin [carbendazim] showed the least weight loss and storage decay after 60 days.

759 SINGHROT, RS; SINGH, JP; SHARMA, RK; SANDOOJA, JK. 1987. **Use of diphenyl fumigant in wax coating with different cushionings to increase the storage life of Kinnow fruits**. *Haryana Journal of Horticultural Sciences*, 16: 1 & 2, 31-39; 7 ref.

Kinnow mandarins were stored for up to 90 days at room temperature in wooden boxes with paper linings and/or individual wrapping as cushioning materials. The cushioning material was either untreated or dipped in diphenyl solution dissolved in acetone. Half the fruits were dipped in Waxol 0-12. Minimum physiological weight loss was observed in Waxol-coated fruits packed with a lining of diphenyl-treated paper. Percentage decay loss was also least with Waxol + diphenyl. Of the cushioning materials, paper lining was better than individual wrapping. Among quality parameters the TSS and ascorbic acid contents were increased in fruits dipped in Waxol + a lining of diphenyl-treated paper, thereby enhancing the shelf life.

760 ULLASA, BA; RAWAL, RD. 1988. **Occurrence of stem-end rot of Kinnow mandarin (*Citrus reticulata*) and its control through post-harvest treatment with fungicides**. *Indian Journal of Agricultural Sciences*, 58: 4, 324-326; 6 ref.

The incidence of stem-end rot, incited by *Colletotrichum gloeosporioides* [*Glomerella cingulata*] reached 60% during storage, particularly in fruits harvested during the monsoon. Of 9 treatments tested, best control was achieved with 5 min dips in 1000 p.p.m. Baycor [bitertanol] or Benlate [benomyl].

LEMONS

761 BABU, KJ; LAXMINARAYANA, P; REDDY, SM. 1983. **Evaluation of different volatile compounds in the control of fruit rot of lemon**. *Pesticides*, 17: 12, 35, 38; 10 ref.

Of 22 compounds tested against rots caused by *Colletotrichum gloeosporioides* [*G. cingulata*] and *A. niger*, 17 completely checked infection.

762 SHARMA, RK; RAN SINGH; KUMAR, J; SHARMA, SS. 1989. **Shelf life of *Baramasi lemon* as affected by some chemicals**. *Research and Development Reporter*, 6: 1, 78-82; 6 ref.

Fully ripe *Baramasi lemons* were harvested and stored at room temperature after dipping in a saturated sugar solution; sugar + 3% mustard oil; Waxol 0-12; 200 p.p.m. GA3; 200 p.p.m. GA3 + 0.1% captan; or 12% mustard oil emulsion. Waxol 0-12 was the most effective treatment; it reduced physiological weight loss and decay loss significantly. Quality parameters such as TSS, acidity and juice percentage showed no direct correlation with shelf life.

763 SHARMA, S; MISHRA, BP; SHARMA, RK. 1986. **Effect of some antifungal compounds to combat the post-harvest *Aspergillus* rot of *Baramasi***