Table 2. Germination and vigour of fresh and old seeds

Parameters	Undivided and Ungraded	Fresh Pods			Undivided and Ungraded	Old Pods		
		A	M	D		B	M	D
Germination (%)	62	95	97	83	41	56	62	48
Root length (cm)	61	7.6	8.4	5.3	5.7	6.4	6.8	4.1
Shoot length (cm)	4.6	5.5	6.3	4.0	3.6	4.7	6.2	3.2
Drymatter production (mg/10 seedling)	8.4	15.3	17.4	10.2	8.2	11.6	12.5	8.0
Vigour index	663.4	12.44	14.25	771	381	621	806	359

Y - Yellow Colour Pod B - Brown Colour Pod A - Apical region M - Middle region D - Distal region

of desert teak pods decline from apical to distal regions of pod and the gradual decrease in moisture content of pods is noticed as the drying process proceeds. Harvesting the pods at yellow to brown colour stage of pod is very important for collection of seed with good seedling vigour.

The problem of ill filled seeds can be solved by proper cleaning and grading. The fresh and good seed with embryo is readily germinable and has recorded higher germination per cent compared to old and ungraded seeds (Table 2). Rao *et al.*, (1982) found in variety of crop seeds that germination per cent dropped from the initial level of 50 per cent to zero per cent under storage in ambient condition. The loss of viability due to ageing is a natural process and it can be controlled by monitoring the storage environment and management of seeds.

REFERENCES

ANDREWS,C.H. (1966). Some aspects of pod and seed development in Lee Soyabeans, Ph.D. Thesis, Mississippi State University State College, Mississippi.

BARTON,L.V. (1961). **Seed Preservation and Longevity of Seeds.** Leonard Hill, London.

BONNER,F.T. (1970). Hardwood seed collection and handling 19th. Annual Forestry symposium; Silviculture and Management of Southern Hard Woods, pp. 52-63

BONNER,F.T. (1976). Maturation and collection of yellow poplar seeds in the mid south. Southern Forest Experiment Station. New Orleans, Lousiana. **USDA Forest Service Research Paper** pp 50-121

CERL,C.M. and SNOW,A.G., (1971). Maturation of sugar maple seed. **USDA Forest Service Research Paper WE.** pp. 217-218

CROOSLEY,D.I. (1953). Seed maturity in white spruce. **Canadian Department of Resource and Development Silviculture Research Note 104** : 1-16

GAWANDE,R.S. (1985). Standardisation of seed production techniques and evolving cheap storage practices in kapak, *Ceiba pentandra* (L. Gaerthm). M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

RAO,N.K.V., MAESEN and RAMANADHAN,P., (1982). Seed viability of pigeonpea stored in two environments. **Neth.J.Agric.Sci. 30** : 99-103

RANDHAWA,M.S. (1983). **Flowering Trees.** National Book Trust, New Delhi

TECKRONY,D.M., EGLI,D.E. and ALLES,J.A. (1980). The effect of the field production environment on soyabean seed quality. In.**Seed Production** (ed. P.D.Hebblethwaste) Butterworths, London.

Madras Agric. J., 82(1): 47-50 January, 1995
https://doi.org/10.29321/MAJ.10.A01123

EFFECT OF FUSED CALCIUM SALTS ON POST HARVEST PRESERVATION IN FRUITS

G.PATHMANABAN, M.NAGARAJAN, K.MANIAN and K.ANNAMALAINATHAN
Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore 641 003

ABSTRACT

The exposure of fruits to fused $CaCl_2$ or fused $CaCO_3$ in closed poly bags retarded the ripening, peel colour development and textural softening. The shelf life of the fruits exposed to fused $CaCl_2$ or $CaCO_3$ was extended by more than 10 - 12 days. The moisture loss was higher in untreated fruits during the period of storage whereas only minimum water loss was observed in treated fruits. An organoleptic evaluation indicated improvement in consumer satisfaction of $CaCl_2$ or $CaCO_3$ exposed fruits.

Post harvest losses in fruits are quite considerable to the extent of 50 to 70 per cent. Harvest injuries, lack of efficient storage facilities and diseases cause heavy losses. Shrivelling due to

Madras Agric. J. 82(1) 47-52

weight loss arising from exposure to high ambient temperatures and poor appearance reduce the marketability. Although sophisticated techniques are available to extend the storage life and minimise storage losses in perishable produce, the usefulness of refrigeration is limited as they are sensitive to chilling temperatures (Wills *et al.*, 1981). Simple and relatively cheaper treatments such as post harvest fungicidal dips and coating with wax and other agents offer better prospects for reducing post harvest losses in fruits (Passam and Blunden, 1982; Motlagh and Quantick, 1988). Calcium compounds have shown promise in the quality retention of fruits and vegetables (Shear, 1975; Huber, 1983) through maintaining firmness, reducing respiratory rates and ripening processes (Poovaiah, 1986). The present study reports on the effects of calcium chloride dipping as well as exposure to fused $CaCl_2$ or $CaCO_3$ in closed containers on the shelf life and quality of fruits and vegetables stored under typical ambient temperature.

MATERIALS AND METHODS

Uniform size mature fruits free from physical injuries were used for the following treatments. T_1 - control (fruits kept in ambient temperature, T_2 - $CaCl_2$ (4%) dipping of fruits for 1 hr and then kept at ambient temperature, T_3 - $CaCl_2$ exposure treatment for which the fruits were kept in poly bags along with fused $CaCl_2$ at 15 g/kg contained in vial with perforated lid. The poly bag was closed air tight. T_4 - $CaCO_3$ exposure treatment for which the fruits were kept in poly bags along with fused $CaCO_3$ at 15 g / kg contained in a vial with perforated lid, and the container sealed. Based on the preliminary work, the quantity of fused calcium chloride and fused $CaCO_3$ necessary for preventing desication, it was fixed as 15 g/kg of fruit / vegetable for the present study. The fruits used in the above treatments were stored under ambient conditions. (25 - 31^{0}C and 70 - 85% RH). Fruit ripening was evaluated by assessment of ground peel colour development scored on 5 point scale : 1 dark green; 2 light green; 3 green with yellow; 4 yellow with green, and 5 - yellow. The textural softening was scored as 1- very firm; 2 - more firm than soft; 3 - more soft than firm; 4 - soft; and 5 - oversoft. Shelf life was taken as the number of days that fruits remained in a marketable condition. Fresh weight loss was calculated based on the initial weight and final weight at end of shelf life period. A panel of eight tasters evaluated fruits at ripenness, at the end of the experiment for organoleptic acceptability using the six point scale (Tirmazi and Wills, 1981): Data were analysed by analysis of variance procedures for treatment means.

RESULTS AND DISCUSSION

The results obtained indicated that in case of fruits, storing in polybags with $CaCl_2$ or $CaCO_3$ was quite effective in prolonging shelf life in all the fruits tested. Dipping the fruits in 4 per cent $CaCl_2$ though it retained the colour, texture and had a shelf life for only a few days. Although calcium has been implicated in reducing decay in stored fruit by stabilising or strengthening their cell

Table 1. Prolonged shelf life (in days) in fruits under different storage conditions

Fruits	Control stored at room temperature	$CaCl_2$ 4% dipping for 1 hr. and stored at room temperature	Fruits stored in poly bags with	
			Fused $CaCl_2$ @ 15 g/kg	Fused $CaCO_3$ @ 15 g/kg
Acid lime (green matured)	4	7	12	12
Guava (green matured)	4	6	10	9
Sapota (matured unripe)	4	6	12	11
Papaya (green matured)	4	6	10	8
Grapes (green matured)	3	5	8	8
Anona (green matured)	3	5	9	8
Orange (green matured)	4	6	8	8
CD for treatment at 5%	1.28*			

Table 2. Total moisture loss in fruits at the end of storage period (in %)

Fruits	Control	$CaCl_2$ 4% dipping	Exposure treatment to	
			$CaCl_2$	$CaCO_3$
Acid lime	21.40	18.60	2.80	3.50
Guava	6.30	21.50	2.10	2.80
Sapota	14.60	10.60	1.80	2.00
Papaya	18.50	14.80	4.20	4.00
Grapes	20.60	16.80	2.80	2.10
Anona	10.40	8.50	1.60	1.80
Orange	18.30	14.80	2.80	2.90
CD for treatment at 5% level	3.90*			

walls (Conway and Sams, 1984), in the present study, dipping treatment for guava, papaya, anona, sapota and acid lime did not improve keeping quality. Skin injury and secondary microbial growth due to $CaCl_2$ dipping treatment were reported in mangoes (Tirmazi and Wills, 1981). The fruits exposed to fused $CaCl_2$ or $CaCO_3$ showed prolonged shelf life for 8 - 12 days (Table 1). The shelf life varied with the fruits under study. For sapota and anona, the mature fruits did not ripen in T_3 or T_4 treatment at the end of storage period indicating the possibilities for long distance transport for marketing without any loss. All the fruits when exposed to fused $CaCl_2$ or $CaCO_3$ showed prolongd shelf life for more than 8 - 12 days without drastic changes from initial colour and quality. In acid lime, high ascorbic acid content, (36.1 mg / 100 ml) and low pH of the juice (3.0) in T_3 or T_4 treatment indicated no quality deterioration as compared to control fruits. Colour development and textural softening were significantly retarded in fused $CaCl_2$ or $CaCO_3$ exposed fruits compared to control. The fresh weight loss was quite evident in fruits under control treatment (10 - 26%) over a storage period of 8 - 12 days where as in $CaCl_2$ or $CaCO_3$ exposed fruits, the total moisture loss was quite low (1.6 to 4.2%) (Table 2). Among the fruits, maximum water loss was from guava (26.30%) and least from annona (10.4%). In all the fruits exposed to $CaCl_2$ or $CaCO_3$, the ripening process was delayed as evidenced from lack of anthocyanin or carotene pigment formation and the initial texture and colour were persistant. No shrivelling was observed in $CaCl_2$ or $CaCO_3$ exposed fruits even after 10 - 12 days. The organoleptic ratings of fruits enclosed with $CaCl_2$ or $CaCO_3$ were significantly higher than that of 4 per cent $CaCl_2$ dipped fruits or control (Table 3). The low organoleptic rating of untreated fruits resulted from higher incidence of rotting, and over softening compared with $CaCl_2$ or $CaCO_3$ exposed fruits which maintained firm texture and good external appearance.

Fused $CaCl_2$ or $CaCO_3$ used in the present study acted as a descicant maintained sufficient vapour pressure inside the closed polybag to avoid huge loss of moisture and this maintained tissues under turgid conditions. This enabled delaying the

Table 3. Effect of post harvest storage treatments on organoleptic rating of fruits

Fruits	Control	$CaCl_2$ 4% dipping	Exposure treatment to	
			$CaCl_2$	$CaCO_3$
Guava	1.4	2.0	4.2	3.8
Acid lime	1.2	2.4	4.0	3.8
Grapes	0.8	2.0	4.2	4.0
Orange	2.0	2.0	4.0	3.8
Papaya	1.5	1.8	3.6	3.5
CD for treatment at 5% level	0.44*			

Sapota and anona - did not ripen at the end of storage period

Rating = 0 - Very poor; 1 - Poor; 2 - Fair; 3 - Good; 4 - Very good; 5 - Excellent.

ageing process without loss of membrane integrity and deterioration of proteins. The extension of shelf life coupled with the retardation of textural softening should translate into decreased injury and losses during handling transport and minimise the cost of low temperature storage.

REFERENCES

CONWAY,W.S. and SAMS,C.E. (1984). Possible mechanisms by which post harvest calcium treatments reduces decay in apples, **Phytopathology 24** : 208 - 210

HUBER,D.J. (1983). Role of cell wall hydrolases in fruit softening. **Hort.Rev.,5** : 169 - 171

MORLAGH,F.H. and QUANTIC,P.C. (1988). Effect of permeable coatings on the storage life of fruits I. Prolong treatment of limes. **Int.J.Food Sci. Tech., 23** : 99 - 105

PASSAM,H.C. and BLUMDEN,G. (1982). Experiments on the storage of limes at tropical ambient temperature. **Trop Agric., 59** : 20 - 24

POOVAIAH,B.W. (1986). Role of calcium in prolonging storage life of fruits and vegetables. **Food Tech., 40** : 86 - 89

SHEAR,C.B. (1975). Calcium related disorder of fruits and vegetables. **Hort. Sci. 10** : 361 - 365

TIRMAZI,S.I.H. and WILLS,R.B.H. (1981). Retardation of ripening of mangoes by post harvest application of calcium. **Trop.Agric., 58** : 137-141

WILLS,R.B.H., LEE,T.H., GRAHAM,D., McCLANSON,W.B. and HALL,E.G. (1981). **Post harvest : An introduction to the Physiology and Handling of Fruits and Vegetables.** West Port: AVI. Pub. Co.

Madras Agric. J., 82(1): 50-51 January, 1995

VAMBAN-1 - A SHORT DURATION, HIGH YIELDING RED GRAM

K.S.JEHANGIR, D.PACKIARAJ, K.THIAGARAJAN, A.THIAGARAJAN, N.RAMAMOORTHI and R.RATHNASAMY.
National Pulses Research Centre, Tamil Nadu Agricultural University, Vamban 622 009.

ABSTRACT

Vamban-1 short duration, high yielding red gram is a double cross (Prabath x Hy 3A) x (T_{21} x 102) derivative tested widely both under rainfed and irrigated conditions in Tamil Nadu and other states under Co-ordinated research programme. It is suited for intercropping with groundnut both under rainfed and irrigated conditions in all seasons. The plant is 80-90 cm tall with determinate growth habit. Its maturity ranged from 95-100 days and could be harvested along with groundnut. This cultivar recorded an yield of 840 kg/ha under rainfed condition. Under all India Co- ordinated trials, it out yielded UPAS 120 by seven per cent.

Red gram is an important pulse crop grown in Tamil Nadu mostly for grain purpose as it is widely used in vegetarian diet. The productivity of red gram could be increased considerably by growing short duration red gram as intercrop in groundnut growing areas in all seasons without reducing the area and productivity of groundnut. In Pudukkottai district, around Alangudi, Karambakudi and Keeranur taluks, growing red gram both under rainfed and irrigated crop as intercrop in groundnut is being practised. A culture called *Kurivai thuvarai* with a duration of 105-110 days, was in cultivation. Since this practice has been discontinued due to low yield and impurity of the erstwhile variety, farmers of this tract have been demanding a variety for simultaneous harvest along with groundnut both under rainfed and irrigated conditions with high yield. So after concerted efforts, a cultivar *Vamban-1* with and yield potential of 840 kg/ha as pure and 350-400 kg/ha as intercrop with groundnut under rainfed situation has been evolved and released for general cultivation in 1992.

MATERIALS AND METHODS

Double cross was effected between four popular varieties (Prabath x Hy 3A) x (T_{21} x 102) of central and north peninsular area and a segregant (A3-1) was isolated in 1985 to satisfy the above needs. This isolate was evaluated under station trials from 1986 and multilocation trial in 1987 *khariff* and tested in farmers' holdings since 1987 *to 1990 kharif* as culture VR1 under rainfed condition in pudukkottai district along with ICPL-87 and UPAS 120.

RESULTS AND DISCUSSION

Studies conducted both under rainfed and irrigated conditions during 1986-89 over two seasons, *Vamban-1* recorded higher yield than all the standard varieties. The grain yield under rainfed cultivation ranged from 587 to 1100 kg/ha with a mean of 850 kg/ha. The increase over the two standard varieties ranged from 7 to 100 per cent. Under irrigated condition, in intercropping trial,