"Effect of different wrapping materials on shelf-life of Papaya (*Carica papaya* L.) *cv*. Red Lady"

Abstract: The current study entitled "Effect of different wrapping materials on shelf-life of Papaya (Carica papaya L.) *cv*. Red Lady" conducted during the year 2023 at Fruit Science Lab in Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, (C.G.). The experiment of completely randomized design and replicated thrice with a total of 07 treatments where (T1) newspaper, (T2) tissue straw, (T3) paddy straw, (T4) foam net, (T5) polythene, (T6) CFB (corrugated fiber board box) and (T7) control. T5 polythene exhibited better performance in relation to most of the parameters like Physiological loss in weight (%) (2.73, 5.98, 8.84 and 10.41), Percentage of ripening (%) (25.74, 33.51, 47.73 and 57.37), Ascorbic acid (%) (34.16, 53.51, 67.55 and 56.12), TSS (0B) (7.53, 12.54, 16.6 and 13.43), fruit length (cm) (22.23, 21.73, 21.30 and 20.29), total sugar (%) (5.85, 9.95, 11.42 and 10.24), reducing sugar (%) (4.40, 6.83, 9.68 and 7.65), acidity (%) (0.18, 0.12, 0.11 and 0.06) at 3, 6, 9 and 12 days respectively. Based on outcomes of present studies, it can be concluded that the papaya fruits wrapped in polythene exhibited superiority with respect to shelf life and quality of papaya. Hence the treatment T5 (polythene) may be recommended for wrapping materials for improvement of quality parameters of papaya *cv*. red lady.

Keywords: Papaya, Wrapping, Redlady.

1. Introduction:

Papaya (*Carica papaya* L.) is an important tropical fruit plant, belongs to the family Caricaceae. There are about 48 species under genus *Carica*, in which *Carica papaya* is grown only for edible purpose. It may be developed through hybridization and is closely related to *Caricapeltata*which occurs in this area. In India, papaya has been introduced during 16th century and grown in almost all the tropical and subtropical countries of the world (Crisosto & Kader, 2000).

Papaya is a multipurpose fruit plant grown for various uses. Fully ripe fruits are delicious, refreshing and nutritious, rich in carotenoid content next to mango. Mature green fruits are diuretic, mildly laxative and used as vegetables mostly in north eastern state and also in other state. Papaya fruit is a good source of antioxidants like vitamin A, vitamin C, ascorbic acid and potassium. 100-grams of papaya contains 88.06 g moisture, 10.82 g carbohydrate, 0.47 g protein, 0.26 g fat, 43 Kcal energy, 20 mg calcium, 10 mg phosphorus, 0.25 mg iron, 182 mg potassium, 8 mg sodium, 47 μg carotene (Vit. A), 0.023 mg thiamine (Vit. B), 0.027 mg riboflavin (Vit. B_2) and 60.9 mg ascorbic acid (Vit. C) (Aravind *et al.*2013).

In Chhattisgarh, area under papaya cultivation is 14.37 thousand ha. and production of 373.84 thousand MT (Anon.,2022-23). In Chhattisgarh it is mainly cultivated in Durg, Raipur, Bilaspur, Mahasamund and Bemetara.Fruits as well as other plant parts contain white milky juice as papain having proteolytic properties. It has remedial value against dyspepsia and also used for clarification of beer and tenderizing the meat (Wilson, 1974). The seed of papaya have different properties like anti-helminthic activity (Kermanshai*et al.*2001), antimicrobial activity (Calzada and Yepez-Mulia, 2007) and anti-amoebic activity while, leaves are used against jaundice and urinary problem.

Papaya is the most important nutritious fruit crops that give high economic returns per unit area next to banana. However, there is a lack of high yielding varieties in the country and the farmers having huge demand for promising high yielding varieties that can grow successfully in various environmental conditions. Papaya cultivar Red Lady is very promising for this purpose. Being gynodioecious in nature, they produce female and hermaphrodite flowers *i.e.*, 100 % productive plants. They are also dwarfs in nature, early bearer and having high yield potential. Therefore, it may be beneficial to popularize this cultivar among the farmers for its cultivation (Sharma *et al.* 2015).

Papaya is a widely consumed tropical fruit appreciated for its flavor, aroma and nutritional profile. However, its perishability remains a challenge limiting its storage and transportation to markets Papaya has a short shelf life of

3-5 days under conventional storage due to its high respiration and ethylene production rates that accelerate the ripening process and make it susceptible to mechanical injuries and pathogen infections during postharvest handling (Sharma *et al.*2015).

Different techniques have been used to extend the shelf life of papaya including low temperature storage, controlled or modified atmosphere, packaging, edible coatings and waxing (Palou *et al.*2011).

Among the approaches, wrapping materials play an important role in modifying the internal atmosphere and minimizing transpiration, respiration and ethylene production within the package, thereby retarding fruit senescence and decay (Kader, 2003). Recent studies have shown that bio-based wrappings like banana leaf newspaper, polythene, foam nets and sugarcane bagasse sheets were effective in maintaining papaya quality during storage compared to conventional polyethylene wraps (Thawait*et al.*2015). However, there is limited research on comparative evaluation of different commercially available wrapping films for papaya shelf-life extension.

Recent studies have explored the use of unconventional materials like newspaper, tissue paper, paddy straw, foam nets and corrugated fiberboard boxes (CFB) for wrapping fruits and vegetables. Conventional polythene wraps are also commonly used (Kumar &Kanwar, 2014). Therefore, the objective of the present study was to evaluate the effect of popular wrapping materials like news paper, tissue paper, paddy straw, foam nets, polythene film, CFB and without wrapping (control) on quality attributes and shelf life of papaya during ambient storage.

Findings from this study entitled **"Effect of different wrapping materials on shelf-life of Papaya (*Carica papaya* L.) *cv.* Red Lady"** was conducted at the Fruit Science Lab of Pt. K.L.S. College of Horticulture and Research Station in Rajnandgaon, (Chhattisgarh), during the 2022-23 period. The research aimed to investigate how various wrapping materials could impact the shelf life of papayas of the Red Lady cultivar. The study likely sought to evaluate different wrapping materials for their ability to extend the freshness and quality of papayas during storage, potentially aiming to improve the fruit's marketability and reduce post- harvest losses.

2.Methodology

2.1 Procurement of Papaya fruits *cv.* Red lady

Fruits were procured from a private orchard located in Rajnandgaon village, 05 km from Rajnandgaon district. The orchard is owned by Mr. Bharat. Red Lady cultivar fruits were used for all experiments. After harvesting, the fruits were carefully wrapped in newspapers and placed in trays and cartons. Then, the fruits were transported in a private vehicle to the processing laboratory of the Fruit Science Lab of Pt. K.L.S. College of Horticulture and Research Station in Rajnandgaon, (Chhattisgarh) and one day before the experiments were scheduled to begin. The Taiwan red lady cultivar was developed by Known-You Seed Company in Taiwan, has become the preferred choice for commercial papaya production, replacing varieties like CO-2 and Coorg Honey Dew etc. This early and productive variety has a long shelf life and bears fruits at a height of 30 feet on the trunk, with each plant producing over 30 fruits per season. The green skins of the fruits turn yellow when ripe to reveal a sweet-flavoured, salmon-coloured flesh inside likened to a melon. The plant starts flowering just 4 months after planting and bears its first fruits only 7 months later. Remarkably, each plant is capable of producing around 60 kilograms of fruits. It exhibits gynodioecious characteristics, with short-oblong fruits on female plants and long-oblong fruits on bisexual plants. The flesh is thick, aromatic and red, with a high sugar content of over 13 percent. Additionally, it displays resistance to common diseases, bacteria and viruses that plague other crops. Not only can it withstand high temperatures up to 46 degrees Celsius, but the plant has a lifespan of 3 years with stable yields and quality. All these attributes make it a reliable fruit crop for tropical regions.

2.2 News paper

Normally papaya fruits were packed in newspaper.

2.3 Tissue paper

Tissue paper is commonly utilized for packaging papaya fruits, with tissue sheets measuring 20×30cm being used for this purpose.

2.4 Paddy straw

Paddy straw also used to wrap papaya fruits which controls the ripening process and controls the loss of moisture.

2.5 Foam nets

Foam nets are also used as packaging material which avoids abrasions.

2.6 Polythene

Papaya fruits were packed in Normal Polythene.

2.7 CFB (Corrugated Fiber Board Box)

Papaya fruits were packed using CFB boxes that measured 35 x 20 cm and featured 6 ventilation holes.

2.8 Control (Without wrapping material)

No wrapping material was used for the papaya fruits.

2.9 Methodology adopted in recording observation

In this Study, observations were recorded on the three parameters *viz*. flowering and fruit set, quality and yield parameters.The collected data on the different parameters of study were statistically analyzed as described by Panse and Sukhatme (1985) and significance was tested by 'F' test.

3. Result and Discussion

3.1 Physiological loss in weight (%)

The data pertaining to effect of different wrapping materials used in Physiological loss in weight (%) on shelf-life of papaya have been presented in Table 1.On 3rd day after storage the treatment T_5 (Polythene) had the significantly lowest physiological loss in weight at (2.73 %) followed by the treatment T_3 (paddy straw) (3.45 %), whereas significantly highest physiological loss in weight wasrecorded by treatment T_7 [Control (without wrapping material)] (5.14%).On 6th day after storage the treatment T_5 (Polythene) had the significantly lowest physiological loss in weight at (5.98 %) followed by the treatment T_3 (paddy straw) (6.70%) whereas significantly highest physiological loss in weight was recorded by treatment T_7 [Control (without wrapping material)] (9.35%). Similar trend was noticed on 9^{th} day of storage, except that on 9^{th} day. Control fruits shown end of their shelf life and accordingly on 9^{th} day, lowest physiological loss in weight was noticed in T_5 (Polythene) (8.84%) and highest physiological loss in weight was noticed in T_6 (CFB) (11.21%).On 12^{th} day after storage significantly effect on physiological loss in weight, except that on 12^{th} day CFB fruits shown end of their shelf life and accordingly on 12^{th} day, lowest physiological loss in weight was noticed under the treatmentT_5 (Polythene) (10.41%) and highest physiological loss in weight was noticed in T_4(Foam net) (11.62%).The reduced weight loss may be possible due to slow rate of transpiration caused by wrapping material because they reduce the temperature between outer and inner atmosphere. Reduction in the rate of transpiration is suggested to be one of the major criteria for extending the post-harvest life of fruits. The control treatment without any wrapping (T_7) exhibited the highest physiological loss in weight every time due to direct exposure of fruit to the surrounding atmosphere and rapid water loss through transpiration from the fruit surface. The results obtained in the present investigation are in close conformity with those of Arundathi *et al.* (2019).

3.2Percentage of ripening (%)

The data pertaining to effect of different wrapping materials used in percentage of ripening (%) on shelf-life of papaya have been presented in Table 1. On 3^{rd} day after storage the treatment T_5 (Polythene) had the significantly lowest percentage of ripening (%) at (25.74 %) followed by treatment T_3 (paddy straw) (31.01 %), whereas significantly highest percentage of ripening (%) was recorded by treatment T_7 [Control (Without wrapping material)] (45.01%).On 6^{th}day after storage the treatment T_5 (Polythene) had the significantly lowest percentage of ripening (%) at (33.51%), which was at par with treatment T_3 (36.34 %), whereas significantly highest percentage of ripening (%) was recorded by treatment T_7 [Control (Without wrapping material)] (57.35%).Similar trend was noticed on 9th day of storage, except that on 9th day. Control fruits shown end of their shelf life and accordingly on 9th day, lowest ripening was noticed in T_5 (Polythene) (47.73) and highest ripening was observed in T_6CFB (Corrugated Fiber Board Box) i.e., (60.25) treated fruits.On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4Foam nets and T_5 Polythene treated fruits. Lowest ripening is seen in T_5 (57.37) which is followed by T_3 (58.31) and the highest ripening was recorded by T_4 i.e. (59.62) in foam net.The reason of using stiffened wrapping materials like polythene (T_5) were most effective in slowing down the ripening process andreducing physiological weight loss in papaya. This is because non-porous materials create a modified atmosphere with higher CO_2 and lower O_2 levels which helps delay ripening. In contrast, the control (T_7) and porous materials like tissue paper (T_2) and newspaper (T_1) were least effective as they allowed gas exchange with the external environment. The high porosity led to faster ripening as evident from the higher percentage of ripening these treatments on the 3rd and 6th days of storage. Therefore, the varying porosity and permeability of the wrapping materials used directly impacted the internal atmosphere and ripening processing papaya during post-harvest storage. The finding of present study is in accordance with those of and Arundathi *et al.* (2019).

3.3Ascorbic acid(mg/100g)

The data pertaining to effect of different wrapping materials used in ascorbic acid (mg/100g) on shelf-life of papaya have been presented in Table 1.

On 3rd day after storage the treatment T_5 (Polythene) had the significantly highest ascorbic acid (mg/100g) at (34.16 mg/100g) which was at par with treatment T_3 (Paddy straw) (33.09 mg/100g), whereas significantly lowest ascorbic acid (mg/100g) was recorded by treatment T_7 [Control (Without wrapping material)] (27.88mg/100g).

On 6th day after storage the treatment T_5 (Polythene) had the significantly highest ascorbic acid (mg/100g) at (53.31 mg/100g) which was at par with treatment T_3 (Paddy straw) (51.27 mg/100g), whereas significantly lowest ascorbic acid (mg/100g) was recorded by treatment T_7 [Control (Without wrapping material)] (43.98mg/100g).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9thday, highest ascorbic acid was noticed on treatment T_5 (Polythene) (67.55 mg/100) and lowest Ascorbic acid was observed in T_6 CFB (Corrugated Fiber Board Box) (50.33 mg/100).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. maximum ascorbic acid is seen under the treatment T_5 Polythene (56.12 mg/100) which is followed by T_3 Paddy straw (52.29 mg/100) and the minimum ascorbic acid was recorded by T_4 (51.39 mg/100) in foam net.

The substantial polythene wrapping created a modified atmosphere that helped retain ascorbic acid in papaya by slowing down respiration and oxidation. In contrast, highly porous materials like tissue paper and control allowed gas exchange, accelerating respiratory breakdown of ascorbic acid. The permeability of the wrapping materials directly correlated with the ability to retain ascorbic acid content during post- harvest storage of papaya. Also, similar results were reported by and Arundathi *et al.* (2019) and Sarika *et al.* (2011).

3.4 Total soluble solids(°Brix)

The data pertaining to effect of different wrapping materials used in total soluble solids (°Brix) on shelf-life of papaya have been presented in Table 1

On 3rd day after storage the treatment T_5 (Polythene) had the significantly highest total soluble solids (°Brix) at (7.53), which was at par with the treatment T_3 (Paddy straw) (7.46°Brix) and T_4 (Foam nets) (7.30°Brix), whereas significantly lowest total soluble solids (°Brix) were recorded by treatment T_7 [Control (Without wrapping material)] (6.90°Brix).

On 6th day after storage the treatment T_5 (Polythene) had the significantly highest total soluble solids (°Brix) at (12.54°Brix), which was at par with the treatment T_3 (Paddy straw) (11.72°Brix), whereas significantly lowest total soluble solids (°Brix) were recorded by treatment T_7 [Control (Without wrapping material)] (9.41).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9th day, highest total soluble solids was noticed on treatment T_5 (Polythene) (15.60°Brix) and lowest total soluble solids was observed in T_6 CFB (Corrugated Fiber Board Box) (13.06°Brix).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. maximum total soluble solidsis seen in T_5 Polythene (13.43) which was at par with the treatment Paddy straw (13.36) and the minimum total soluble solids was recorded by T_4 i.e. (13.29) in foam net.

The impermeable polythene wrapping (T_5) was most effective in retaining total soluble solids in papaya by creating a modified atmosphere that slowed respiration and conversion of sugars. More porous materials like tissue paper and control allowed gas exchange, accelerating respiration and loss of sugars seen as lower °Brix. Wrapping permeability correlated directly with ability to retain total soluble solids during storage. Similar results were also observed by and Arundathi *et al.* (2019).

3.5 Fruit length (cm).

The data pertaining to effect of different wrapping materials used in fruit length (cm) on shelf-life of papaya have been presented in Table 1.

On 3rd day after storage the treatment T_5 (Polythene) had the significantly maximum fruit length (cm) at (22.23), which was at par with the treatment T_3 (Paddy straw) (21.75) and T_4 (Foam nets) (20.89), whereas significantly minimum fruit length (cm) was recorded by treatment T_7 [Control (Without wrapping material)] (16.40).

On 6th day after storage the treatment T_5 (Polythene) had the significantly maximum fruit length (cm) at (21.73), which was at par with the treatment T_3 (Paddy straw) (21.25) and T_4 (Foam nets) (20.39), whereas significantly minimum fruit length (cm) was recorded by treatment T_7 [Control (Without wrapping material)] (15.70).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9th day, maximum fruit length (cm) was noticed on treatment T_5 (Polythene) (21.30) and minimum fruit length (cm) was observed in T_6 CFB (Corrugated Fiber Board Box) (16.49).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. maximum fruit length (cm)is seen in T_5 Polythene (20.29) which is followed by T_3 Paddy straw (19.20) and the minimum fruit length (cm) was recorded by T_4 i.e. (19.13) in foam net.

The impenetrable polythene wrapping (T_5) was most effective in retaining fruit length in papaya by reducing moisture loss and shrinkage. More rigid packaging like CFB boxes (T_6) provided mechanical support to maintain fruit shape. Porous materials like foam nets (T_4) and control (T_7) showed greater moisture loss, leading to reduced fruit length. Wrapping permeability and rigidity directly impacted fruit physical parameters during storage. Also, similar results were reported by Kanwar *et al.* (2020).

3.6 Total sugar (%)

The data pertaining to effect of different wrapping materials used in total sugar (%) on shelf-life of papaya have been presented in Table 2.

On 3rd day after storage the treatment T_5 (Polythene) had the significantly maximum total sugar (%) at (5.85), which was at par with the treatment T_3 (Paddy straw) (5.67), whereas significantly minimum total sugar (%) was recorded by treatment T_7 [Control (Without wrapping material)] (4.48).

On 6th day after storage the treatment T_5 (Polythene) had the significantly maximum total sugar (%) at (9.95), which was followed by the treatment T_3 (Paddy straw) (9.20) and T_4 (Foam nets) (8.94), whereas significantly minimum total sugar (%) was recorded by treatment T_7 [Control (Without wrapping material)] (8.34).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9th day, maximum total sugar (%) was noticed on treatment T_5 (Polythene) (11.42) and minimum total sugar (%) was observed in T_6 CFB (Corrugated Fiber Board Box) (9.46).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. Maximum total sugar (%) is seen in T_5 Polythene (10.24) which is followed by T_3 Paddy straw (9.78) and the minimum total sugar (%) was recorded by T_4 i.e. (9.58) in foam net.

The stiffened polythene wrapping (T_5) was most effective in retaining total sugars in papaya by creating a modified atmosphere that slowed respiration and conversion of sugars. More porous materials like tissue paper and control allowed gas exchange, accelerating respiration and loss of sugars seen as lower total sugar content. Wrapping permeability correlated directly with ability to retain sugars during post- harvest storage. Similar result was also found by Arundathi *et al.* (2019 .

3.7 Reducing sugar(%)

The data pertaining to effect of different wrapping materials used in reducing sugar (%) on shelf-life of papaya have been presented in 1.2.

On 3rd day after storage the treatment T_5 (Polythene) had the significantly maximum reducing sugar (%) at (4.40), which was at par with the treatment T_3 (Paddy straw) (4.28) and T_4 (Foam nets) (4.10), whereas significantly minimum reducing sugar (%) was recorded by treatment T_7 [Control (Without wrapping material)] (3.40).

On 6th day after storage the treatment T_5 (Polythene) had the significantly maximum reducing sugar (%) at (6.83), which was at par with the treatment T_3 (Paddy straw) (6.53), whereas significantly minimum total reducing (%) was recorded by treatment T_7 [Control (Without wrapping material)] (5.20).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9thday, maximum reducing sugar (%) was noticed on treatment T_5 (Polythene) (9.68) and minimum reducing sugar (%) was observed in T_6 CFB (Corrugated Fiber Board Box) (8.45).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. maximum reducing sugar (%) is seen in T_5 Polythene (7.65) which was at par with the T_3 Paddy straw (7.61) and the minimum reducing sugar (%) was recorded by T_4 i.e. (7.50) in foam net.

The impermeable polythene wrapping (T_5) was most effective in retaining reducing sugars in papaya by slowing respiration and conversion of sugars. More porous materials like tissue paper and control allowed gas exchange, accelerating respiration and loss of reducing sugars. Wrapping permeability correlated directly with ability to retain reducing sugars during post-harvest storage of papaya. Also, similar results were reported by Arundathi *et al.*, (2019).

3.8 Acidity(%)

The data pertaining to effect of different wrapping materials used in acidity (%) on shelf-life of papaya have been presented in Table 2.

On 3rd day after storage the treatment T_5 (Polythene) had the significantly minimum acidity (%) at (0.18), which was at par with the treatment T_3 (Paddy straw) (0.19) and T_4 (Foam nets) (0.20), whereas significantly maximum acidity (%) was recorded by treatment T_7 [Control (Without wrapping material)] (0.29).

On 6th day after storage the treatment T_5 (Polythene) had the significantly minimum acidity (%) at (0.12), which was at par with the treatment T_3 (Paddy straw) (0.13) and T_4 (Foam nets) (0.14), whereas significantly maximum acidity (%) was recorded by treatment T_7 [Control (Without wrapping material)] (0.20).

Similar trend was noticed on 9th day of storage, except that on 9th day Control fruits shown end of their shelf life and accordingly on 9th day, minimum acidity (%) was noticed on treatment T_5 (Polythene) (0.11) and maximum acidity (%) was observed in T_6 CFB (Corrugated Fiber Board Box) (0.18).

On 12th day all the treatments shown end of shelf life except T_3 Paddy straw, T_4 Foam nets and T_5 Polythene treated fruits. Minimum acidity (%) was seen in T_5 Polythene (0.06) and the maximum acidity (%) was recorded under T_4 i.e. (0.07) in foam net. decrease in acidity during ripening and storage could be attributed to the use of organic acids as respiratory substrate (Echeverria and Valich 1989). In polythene wrapped fruits the lowering of acidity was delayed which might be because of polythene film in delaying the respiratory and ripening process (Mahajan*et al* 2013). Results of papaya total acidity were similar to results obtained by Mahajan*et al*., (2014) in Kinnow fruits and Arundathi*et al*., (2019).

Tr. No.	Physiological loss in weight (%)				Percentage of ripening (%)				Ascorbic acid (mg/100g)				Total soluble solids (^{0}Brix)				Fruit length (cm)			
	3 DAS	6 DAS	9 DAS	12 DAS	3 DAS	6 DAS	9 DAS	12 DAS	3DAS	6DAS	9 DAS	12 DAS	3DAS	6DAS	9DAS	12DAS	3DAS	6DAS	9DAS	12DAS
T_1	4.62	6.77	10.60	*	36.89	43.91	56.76	*	30.01	45.99	55.94	*	7.28	10.61	13.56	*	19.09	18.25	17.75	*
T_2	4.96	7.84	*	*	38.46	45.48	*	*	28.85	44.94	*	*	7.20	9.74	*	*	18.36	17.86	*	*
T_3	3.45	6.70	9.80	11.00	31.01	36.34	51.84	58.31	33.09	51.27	63.58	52.29	7.46	11.72	15.28	13.29	21.75	21.25	20.75	19.20
T_4	4.57	7.51	10.27	11.62	35.71	40.60	54.38	59.62	30.75	49.02	59.88	51.39	7.30	10.83	14.75	13.36	20.89	20.39	19.89	19.13
T_5	2.73	5.98	8.84	10.41	25.74	33.51	47.73	57.37	34.16	53.51	67.55	56.12	7.53	12.54	15.6	13.43	22.23	21.73	21.30	20.29
T_6	5.09	8.56	11.21	*	40.36	53.23	60.25	*	28.21	44.78	50.33	*	7.12	9.41	13.06	*	17.69	17.19	16.49	*
T_7	5.14	9.35	*	*	45.01	57.35	*	*	27.88	43.98	*	*	6.90	8.48	*	*	16.40	15.70	*	*
Sem ±	**0.17**	**0.21**	**0.24**	**0.16**	**1.06**	**1.45**	**1.05**	**0.68**	**0.82**	**1.20**	**1.18**	**0.64**	**0.12**	**0.30**	**0.28**	**0.22**	**0.56**	**0.47**	**0.21**	**0.25**
CD (0.05)	**0.51**	**0.64**	**0.74**	**0.50**	**3.23**	**4.38**	**3.18**	**2.06**	**2.48**	**3.65**	**3.58**	**1.95**	**0.35**	**0.91**	**0.85**	**0.68**	**1.71**	**1.41**	**0.63**	**0.75**
CV (%)	**6.71**	**4.86**	**5.81**	**6.01**	**5.09**	**5.65**	**4.69**	**4.69**	**4.65**	**4.37**	**4.81**	**4.88**	**2.77**	**4.95**	**4.74**	**6.76**	**5.02**	**4.27**	**2.61**	**5.11**

Table 1 Effect of different wrapping materials on PLW (%), Ripening percentage, ascorbic acid, TSS and Fruit Length of papaya

Table 2 Effect of different wrapping materials on Total Sugar, Reducing sugar and Acidity of papaya.

Tr. No.	Total Sugar (%)				Reducing Sugar (%)				Acidity (%)			
	3 DAS	6 DAS	9 DAS	12 DAS	3 DAS	6 DAS	9 DAS	12 DAS	3DAS	6DAS	9 DAS	12 DAS
T_1	4.79	8.76	9.60	*	3.93	5.93	8.87	*	0.22	0.19	0.17	*
T_2	4.60	8.67	*	*	3.78	5.78	*	*	0.28	0.18	*	*
T_3	5.67	9.20	11.19	9.78	4.28	6.53	9.40	7.61	0.19	0.13	0.12	0.07
T_4	5.33	8.94	10.74	9.58	4.10	6.21	9.13	7.50	0.20	0.14	0.16	0.07
T_5	5.85	9.95	11.42	10.24	4.40	6.83	9.68	7.65	0.18	0.12	0.11	0.06
T_6	4.53	8.49	9.46	*	3.58	5.48	8.45	*	0.27	0.15	0.18	*
T_7	4.48	8.34	*	*	3.40	5.20	*	*	0.29	0.20	*	*
Sem ±	**0.08**	**0.15**	**0.06**	**0.17**	**0.12**	**0.20**	**0.16**	**0.22**	**0.01**	**0.01**	**0.01**	**0.002**
CD (0.05)	**0.23**	**0.46**	**0.19**	**0.52**	**0.36**	**0.60**	**0.49**	**0.68**	**0.03**	**0.02**	**0.02**	**0.01**
CV (%)	**2.58**	**3.01**	**1.47**	**7.04**	**5.30**	**5.68**	**4.30**	**11.90**	**6.29**	**7.06**	**9.46**	**10.80**

4. Conclusion:

In the current study, the different wrapping materials had considerable influence on shelf life of papaya *cv*. Red lady. On the basis of the results obtained by the investigation entitled **"Effect of different wrapping materials on shelf-life of papaya (C*arica papaya* L.) *cv*. Red lady"** that different treatment T_5 (Polythene) showed the best results followed by paddy straw with respect of different parameters. The treatment T_5 (Polythene) proved better than all other treatments with respect of most of the parameters like physiological loss in weight (%), percentage of ripening (%), ascorbic acid (mg/100g), total soluble solid (^{0}Brix), Fruit length (cm), total sugar (%), reducing sugar (%) and acidity (%).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

5. References:

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