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Effect of packaging materials, storage methods, and storage durations on functional qualities of red-hot pepper powder Etefa OF, Dulo HZ, Forsido SF, Tola YB, Astatkie T

Introduction

- Red hot pepper is the most widely grown vegetable in Ethiopia
- Ethiopia is the second largest producer after Madagascar in Africa
- Red hot pepper quality loss in storage is the main constraint
- Up to 27.56% loss was reported in red pepper value chain due to post harvest handling practices
- Ethiopia lost over 10 million USD due to rejection by the European market
- The objective of this study is to investigate the effects of packaging materials, storage method, and storage duration on the functional qualities of red-hot pepper powder

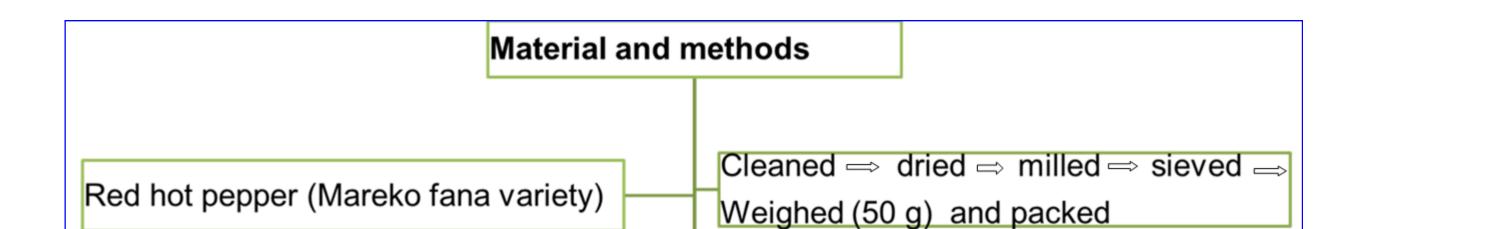
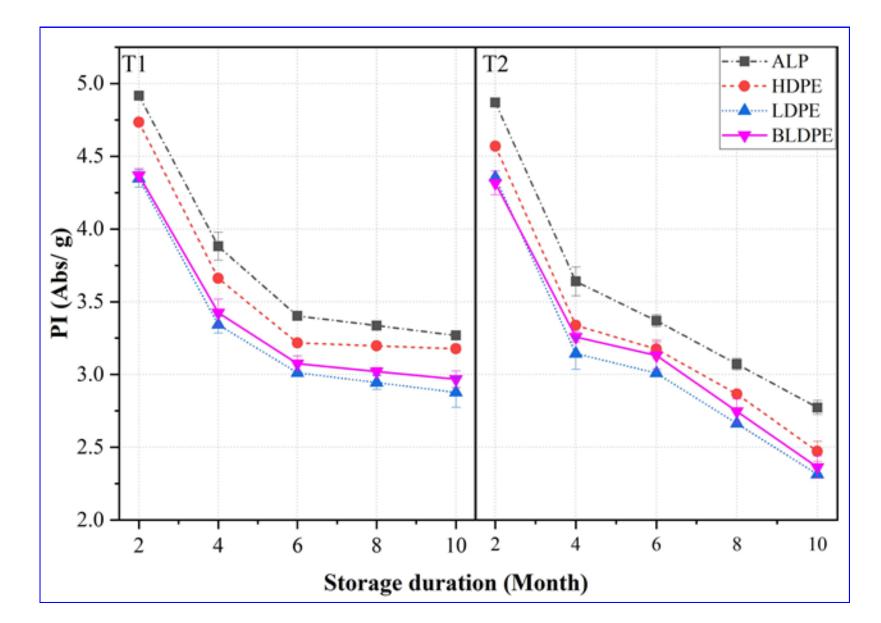


Table 1. The initial value of the studied parameters

	Parameters	Initial value
j-	Moisture Content (%)	10.6
	TCC (µg/g)	4158.95
	PI (abs/ g)	5.01
	Oleoresin (%)	12.25
	TAOC (AAE mg/100g)	752.96



Pungency index (PI)

The pungency index of red hot peppers is an indicator of the heat produced by

Factors

Packaging materials

- -Aluminium laminate pouch
- -High density polyethylene
- -transparent low density polyethylene
- -black low density polyethylene

Storage temperature

Ambient and refrigerated storage condition

Storage duration

Ten months (data was taken at two months intervals)

Factorial design with three replications was used

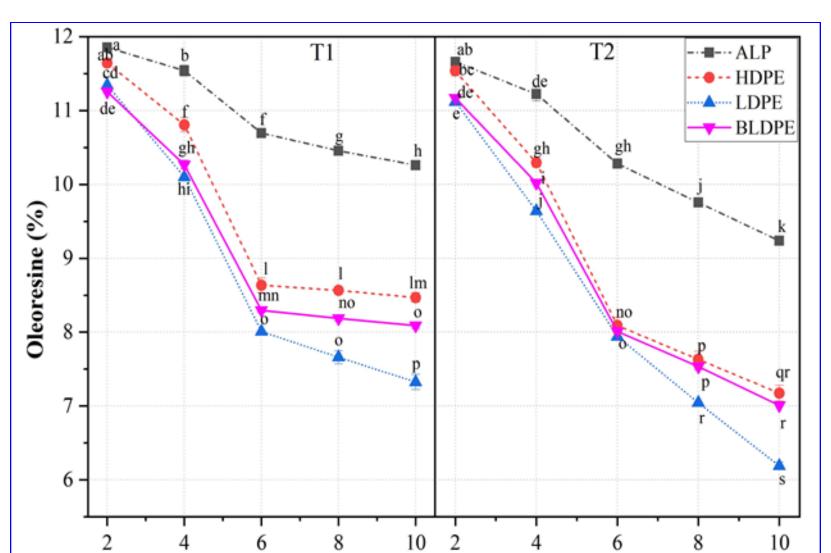
- Functional qualities: moisture content, total carotenoids, pungency index, oleoresin content and total antioxidant capacities were analyzed
- Data before storage used as baseline
- Minitab version 21 was used for statistical analysis
- Tukey's multiple range tests was used for mean comparisons to generate letter of significance

capsaicinoids, which are alkaloids in the pods of red hot peppers.

the PI decreased by 60.30, 43.28, 50.11%, and 40.11% in LDPE, HDPE BLDPE, and ALP under refrigerated storage, whereas it decreased by 65.2, 49.11, 55.01, and 45.24% in LDPE, HDPE BLDPE, and ALP at ambient temperature.

Figure 3 Effect of packing materials, storage methods and storage duration on pungency index (Abs/g) of paper powder. T1 represents refrigerated storage, and T2 represents room temperature storage.





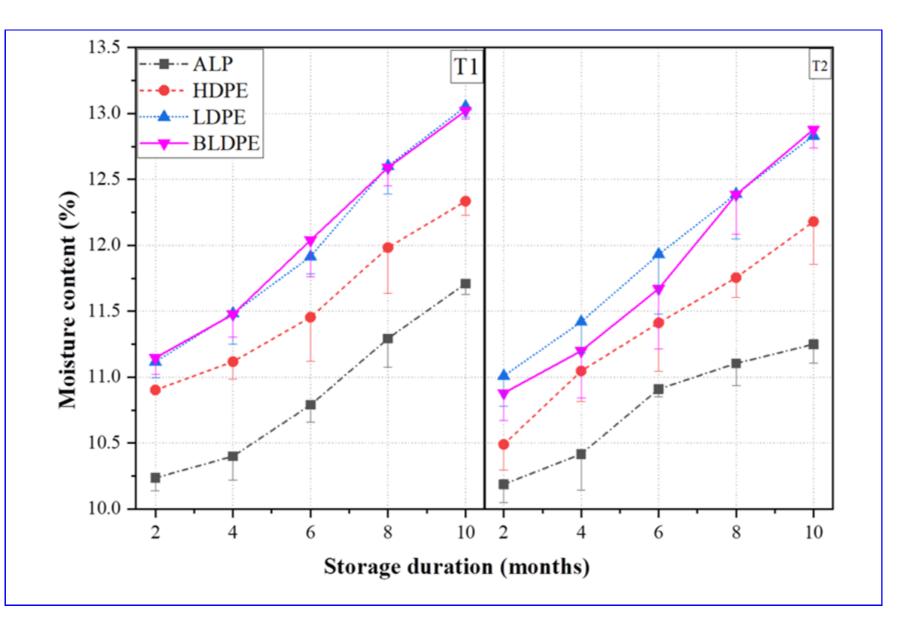
Oleoresin content

Oleoresin is an oil-soluble crude extract that is a dark red or black-red in color and has a viscous texture. Red pepper oleoresin is used for its spicy characteristics and food coloring

Oleoresin content loss was 20.77, 37.82, 37.25 and 44.34% at ambient temperature and 13.42, 27.25, 28.16 and 32.27% at refrigerated temperature in ALP, HDPE, LDPE and BLDPE respectively.

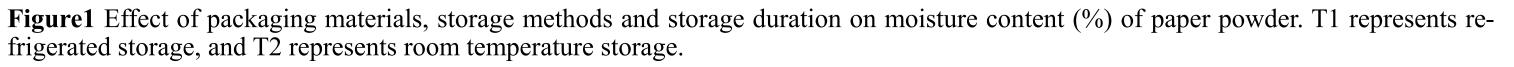
Results

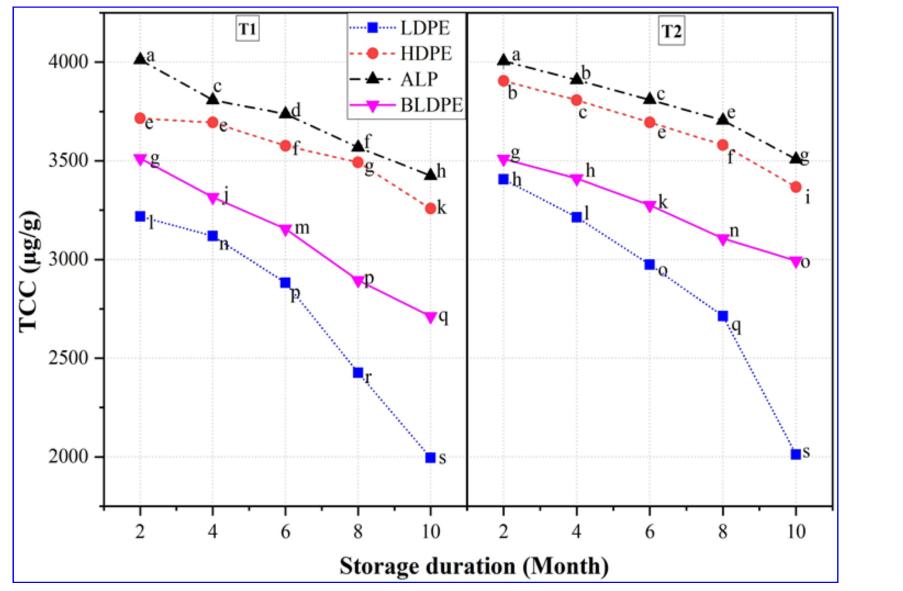
- The interaction effect of packaging materials, storage temperature, and storage duration significantly affected the total carotenoid content, oleoresin content and total antioxidant capacity of red hot pepper powder during ten months storage except for moisture content and pungency index (Fig 1. 2, 3, 4, and 5)
- Cold storage temperature retained more functional qualities and recorded the greatest moisture content (Fig 1, 2, 3, 4, and 5)
- The quantity of functional qualities are degraded with increased storage period in all packaging materials (Fig 1, 2 and 3)
- Aluminium pouch laminate (ALP) preserved more Functional qualities as compared to other packaging materials Fig 1, 2, 3 and 4)



Moisture content

- Moisture content of foods significantly influences their stability during storage.
- The moisture content increased from 10.24-11.71%, 10.90-12.34%, 11.12-13.03%, and 11.15-12.59% under refrigerated conditions respectively.
- And from 10.19-11.25%, 10.49-12.18%, 11.01-12.83%, and 10.88-12.88%, under ambient conditions in ALP, HDPE, LDPE, and BLDP bags respectively



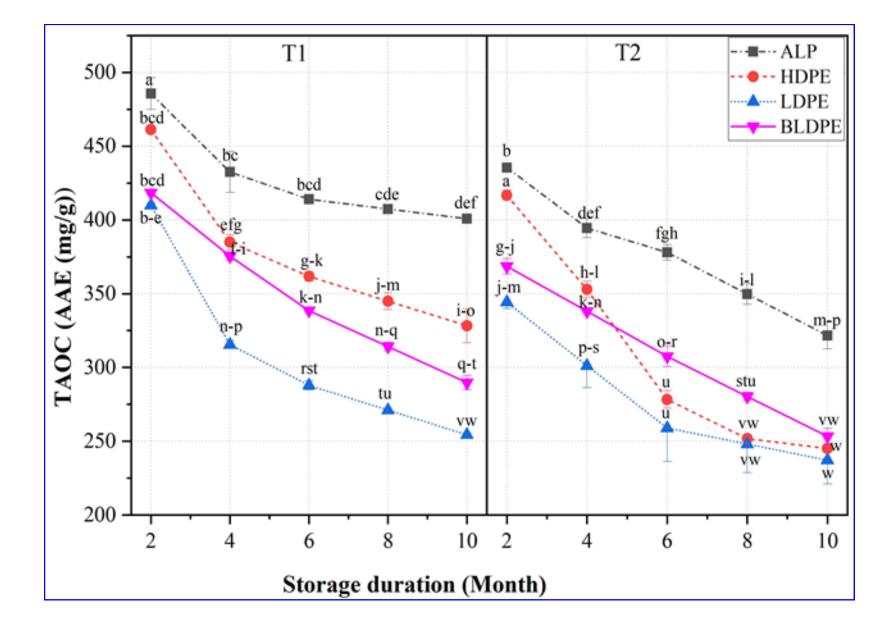


Total carotenoids

Storage duration (month)



Figure 4. Effect of packing materials, storage methods and storage duration on oleoresin (percent) water activity of paper powder. T1 = Refrigerated and T2 = room temperature



Total antioxidant capacity (TAC)

The total antioxidant activity values decreased from 752.96-400.85, 752.96-328.26, and 752.26-254.37 and 752.96-289.74 under cold storage,

and decreased from 752.96-321.59, 752-245.11, 752.9-237.15 and 752.26-253.26 under room temperature storage in ALP, HDPE, LDPE, and BLDPE, respectively.

Figure 5. Effect of packing materials, storage methods and storage duration on total antioxidant capacity (AAE mg/g) of paper powder. T1 = Refrigerated and T2 = room temperature

CONCLUSION

• Cold storage temperature retained more functional qualities and recorded the greatest moisture content • The quantity of functional qualities are degraded with increased storage period in all packaging materials · Aluminium pouch laminate preserved more Functional qualities as compared to other packaging materials

Carotenoids are the color source of red pepper

The total carotenoid values ranged from 4158.95-3809.03, 4158.95-3568.67, and 4158.95-3275.9 and 4158.95-2882.78 under cold storage,

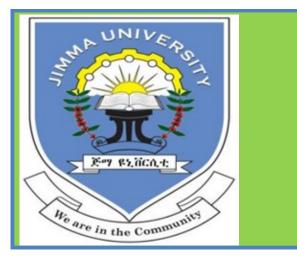
and ranged from 4158.95-3705.34, 4158.95-3424.87, 4158.95-3118.83 and 4158.95-1995.56 under room temperature storage in AIP, HDPE, LDPE, and BLDPE, respectively.

- All packaging materials can alternatively used for up to six months storage duration while aluminium pouch laminate can be used to ten months duration
- A study on the impact of packaging materials, storage methods, and storage duration on safety and nutritional quality parameters and cost benefit analysis are recommended.

Acknowledgements

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Figure2. Effect of packing materials, storage methods and storage duration on total carotenoids content (µg/g) of paper powder. T1 = Refrigerated and T2 = room temperature



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