



Effect of Pre-Treatments and Drying Methods on Quality of Green Chilli Powder

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ABSTRACT

The present investigation entitled “Effect of pre-treatments and drying methods on quality of green chilli powder” was conducted at Post Harvest Technology Laboratory, College of Horticulture, Venkataramannagudem, West Godavari district, Dr.Y.S.R Horticultural University during the year 2016-17. The experiment was laid out in Factorial CRD having 4 pre-treatments i.e., blanching, blanching + 0.01% KMS, blanching + 1% CaCl₂, blanching +1% ascorbic acid, tried with two varieties i.e., CA 960 and LCA 655 and two drying methods i.e., tray drying and sun drying. Pre-treatments used in the experiment have improved the quality of green chilli powder over blanching alone. The capsaicin is an important parameter in determining the quality of green chilli powder. From the present investigation, it was revealed that green chilli powder prepared from the variety LCA 655 treated with blanching + 0.01% KMS and dried by using the tray drying retained the highest capsaicin %, where as the ascorbic acid was highest in the variety LCA 655 pre-treated with blanching + 1% ascorbic acid dried by using the tray drying. Lowest moisture content was observed in variety LCA-655 pre-treated with blanching + 1% CaCl₂ dried by tray drier.

Key words: Green chilli powder, Pre-treatments, Drying method, Capsaicin.

INTRODUCTION

Green chilli is an important commercial spice and vegetable for small and marginal farmers. It belongs to the family solanaceae. Chillies occupy an important place in diet over worldwide, which constitutes major share in important ingredients in daily consumed dishes such as pickles, curries, chutneys, sauces. Chilli is a rich source of Vitamin-A, C,

E, K, P (rutin), protein and fat. Chillies are known for their pungency. The pungency of chilli is mainly due to the presence of six chemically related compounds capsaicin, dihydrocapsaicin, norcapsaicin, norhydrocapsaicin, homocapsaicin and homo dihydrocapsaicin which constitute the capsaicinoids group⁴.

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Capsaicin is present in placenta and pericarp of the fruit. Capsaicin content of chilli is an important parameter that determine commercial quality. Capsaicin has anti-bacterial, anti-carcinogenic, analgesic and anti-diabetic properties. Drying is the simplest and most natural of all food processing technologies and preserves fresh produce by removing most of its free water. The lower water content slows the rate of respiration, enzymatic action. The pre-treatments are given to produce before drying is to reduce the quality loss. Hence the present study was undertaken to know the effect of pre-treatments and drying methods on quality of green chilli powder.

MATERIAL AND METHODS

The present investigation was conducted at Post Harvest Technology Laboratory, College of Horticulture, Venkataramnagudem, West Godavari district during 2016-17 with an objective of finding best pre-treatment, variety and drying method on quality of green chilli powder. The experiment was laid in factorial CRD with three factors at unequal levels and replicated thrice. The pre-treatments used to treat the green chillies were blanching, blanching with 0.01% KMS, blanching with 1% CaCl_2 , blanching with 1% ascorbic acid. Two varieties were *i.e.*, CA-960 and LCA-655 were dried by using tray drier and sun drying. The chillies selected for experiment were harvested at mature green stage. The chillies were washed after removal of stems and blanched at 85-90°C for 2 minutes. The chillies were given longitudinal cuts in order to absorb the pre-treatment solution after blanching. The green chillies were pre-treated with the solution containing 0.01% KMS, 1% CaCl_2 and 1% ascorbic acid, after blanching by giving 10 minute soaking in above solutions.. The ratio of pre-treatment solution and sample is 4 litres per 1 kg of green chillies *i.e.*, 4:1. After giving pre-treatment chillies were dried in tray drier and under the sun to reach the desired moisture level (10-12%). After complete drying the dehydrated chilli samples were subjected for grinding in the food processor to make into a fine powder. After processing capsaicin%, ascorbic acid (mg

100g⁻¹), moisture content (%) of green chilli powder was estimated. Capsaicin content was estimated following the method described by Bajaj and Kaur¹. Ascorbic acid content of dried powder was estimated as suggested by Ranganna⁵. Moisture content of green chilli powder samples was determined on percentage basis by using the Shimadzu MOC63u Infrared moisture analyzer.

RESULT AND DISCUSSION

The pre-treatments and drying methods used in this experiment were significantly reduced the quality loss occurred during processing. The mean capsaicin percentage over the different treatment combinations was steadily decreased from (0.382%) on the initial day of processing to (0.334%) at 60 days after processing (Table1). At 60 days after processing blanching + 0.01% KMS recorded the highest capsaicin percentage (0.390%) might be due to the protective effect of KMS for heat damages, though capsaicin is easily oxidized by heat, which was followed by blanching + 1% CaCl_2 (0.343%). Among the varieties, the highest capsaicin content (0.479%) was noticed in LCA-655. The tray drying method resulted in higher capsaicin content (0.358%) as compared to sun drying method (0.310%) at 60 DAP, which might be due to the direct exposure of chillies to the air and took longer time to dry under the sun⁷. All the blanched samples contain more capsaicin when compared to fresh chilli. This can be explained in relation to the activity of peroxidase enzyme and temperature during drying. The vanillyl moiety of capsaicin could have been easily oxidized by the peroxidase enzyme which might be inactivated during the process of blanching. Gradual reduction of capsaicin during storage might be due to the sensitivity of capsaicin to oxygen, light and moisture when stored at ambient conditions. The mean ascorbic acid content over the different treatment combinations decreased from (55.79 mg 100g⁻¹) on the initial day of processing to (51.45 mg 100g⁻¹) at 60 days of processing as presented in the table 2. At 60 days after processing the pre-treatment blanching + 1% ascorbic acid recorded the highest ascorbic acid (66.13 mg 100 g⁻¹) is due to the soaking

of chillies in ascorbic acid solution³. which was followed by the blanching + 1% CaCl₂ (57.68 mg 100 g⁻¹).Among the varieties, the highest ascorbic acid (63.42 mg 100 g⁻¹) content was observed in LCA-655 as compared to the variety CA-960 (39.48 mg 100g⁻¹).The tray drying method resulted in higher ascorbic acid content (55.66 mg 100 g⁻¹) as compared to sun drying method (46.25 mg 100 g⁻¹). The higher loss of ascorbic acid in sun dried samples could be due to the oxidation, as the chillies were directly exposed to the direct sun light for longer time⁸. The loss of ascorbic acid content during storage might be due to irreversible conversion of L-ascorbic acid into dehydro ascorbic acid. The mean moisture percentages over the different treatment combinations increased from 7.37% on the initial day of processing to 8.28% at 60 DAP (Table3). At 60 days after processing (DAP), the pre-treatment blanching + 1% CaCl₂ recorded the lowest moisture content (7.32%) might be due to partial osmotic effect of calcium chloride upon reacting with water molecules². resulted in increased water

mobility and reduced drying time. Among the varieties the lowest moisture content (7.85%) was noticed in LCA 655 as compared to the variety CA 960 (8.71%).The tray drying method resulted in lower moisture content (7.62%) as compared to sun drying (8.94%). Among the drying methods tray dried samples retained less moisture as compared to sun drying in the earlier studies made by Singh et al.⁶. The increase in moisture content during storage could be attributed to hygroscopic nature of green chilli powder. From the present investigation it was concluded that green chilli powder prepared from the variety LCA 655 pre-treated with the blanching with 0.01% KMS and dried by using the tray drying retained the highest capsaicin content. The ascorbic acid content was highest in the variety LCA 655 pre-treated with blanching +1% ascorbic acid dried by using tray drying, where as the least moisture content was observed in the variety LCA-655 pre-treated with blanching with 1% CaCl₂ and dried by using the tray drying.

Table 1: Effect of pre-treatments, varieties and drying methods on capsaicin (%) in green chilli powder

VARIETY (V)	DRYING METHOD (D)	PRE-TREATMENT (P)																	
		Initial					30 DAP					60 DAP							
		BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN			
CA-960	TRAY DRYING	0.232	0.295	0.261	0.253	0.260	0.208	0.285	0.247	0.233	0.243	0.174	0.268	0.226	0.205	0.218			
	SUN DRYING	0.178	0.262	0.213	0.208	0.215	0.146	0.247	0.195	0.183	0.193	0.102	0.225	0.165	0.149	0.160			
	MEAN	0.205	0.279	0.237	0.231	0.238	0.177	0.266	0.221	0.208	0.218	0.138	0.247	0.196	0.177	0.189			
LCA-655	TRAY DRYING	0.503	0.578	0.545	0.530	0.539	0.479	0.568	0.532	0.511	0.523	0.445	0.552	0.510	0.483	0.498			
	SUN DRYING	0.478	0.554	0.518	0.509	0.515	0.446	0.540	0.499	0.485	0.493	0.403	0.514	0.469	0.452	0.460			
	MEAN	0.491	0.566	0.532	0.520	0.517	0.463	0.554	0.516	0.498	0.508	0.424	0.533	0.490	0.468	0.479			
For comparing pre-treatment (P) and drying method (D)																			
TRAY DRYING		0.368	0.437	0.403	0.392	0.400	0.344	0.427	0.390	0.372	0.383	0.310	0.410	0.368	0.344	0.358			
SUN DRYING		0.328	0.408	0.366	0.359	0.365	0.296	0.394	0.347	0.334	0.343	0.253	0.370	0.317	0.301	0.310			
MEAN		0.348	0.422	0.384	0.375	0.382	0.320	0.410	0.368	0.353	0.363	0.281	0.390	0.343	0.322	0.334			
Comparing means of		S Em±			CD at 5%			S Em±			CD at 0.05%			S Em±			CD at 0.05%		
P		0.004			0.012			0.003			0.009			0.002			0.006		
V		0.054			0.153			0.040			0.114			0.029			0.083		
D		0.054			0.153			0.040			0.114			0.029			0.083		
P x V		0.048			0.138			0.169			0.482			0.122			0.348		
V x D		0.102			0.291			0.076			0.217			0.055			0.157		
P x D		-			N.S			-			N.S			0.122			0.348		
P x V x D		0.106			0.302			-			N.S			-			N.S		

Table 2: Effect of pre-treatments, varieties and drying methods on ascorbic acid (mg 100 g⁻¹) in green chilli powder

VARIETY (V)	DRYING METHOD (D)	PRE-TREATMENT (P)														
		Initial					30 DAP					60 DAP				
		BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN
CA-960	TRAY DRYING	33.84	41.26	54.85	61.58	47.88	30.14	39.28	53.75	59.28	45.61	27.64	38.16	52.28	57.28	43.84
	SUN DRYING	28.52	35.40	43.76	52.98	40.17	24.72	32.90	42.12	50.38	37.53	20.55	31.04	40.82	48.07	35.12
	MEAN	31.18	38.33	49.31	57.28	44.02	27.43	36.09	47.94	54.83	41.57	24.10	34.60	46.55	52.68	39.48
LCA-655	TRAY DRYING	58.42	69.26	78.34	87.78	73.45	55.26	67.16	76.84	85.42	71.17	52.28	66.02	75.84	83.76	69.48
	SUN DRYING	46.35	55.82	64.58	79.95	61.68	42.85	53.02	62.58	76.98	58.86	40.18	52.12	61.78	75.40	57.37
	MEAN	52.39	62.54	71.46	83.87	67.56	49.06	60.09	69.71	81.20	65.01	46.23	59.07	68.81	79.58	63.42
For comparing pre-treatment (P) and drying method (D)																
TRAY DRYING		46.13	55.26	66.60	74.68	60.67	42.70	53.22	65.30	72.35	58.39	39.96	52.09	64.06	70.52	55.66
SUN DRYING		37.44	45.61	54.17	66.47	50.92	33.79	42.96	52.35	63.68	48.19	30.37	41.58	51.30	61.74	46.25
MEAN		41.78	50.44	60.38	70.57	55.79	38.24	48.09	58.82	68.02	53.29	35.16	46.84	57.68	66.13	51.45
Comparing means of		S Em _±		CD at 0.05%			S Em _±		CD at 0.05%			S Em _±		CD at 0.05%		
P		3.12		8.87			2.36		6.72			1.71		4.86		
V		4.28		12.18			3.22		9.17			2.33		6.63		
D		4.28		12.18			3.22		9.17			2.33		6.63		
P x V		6.24		17.77			0.17		0.48			0.12		0.35		
V x D		8.14		23.15			6.13		17.43			4.43		12.59		
P x D		-		N.S			-		N.S			-		N.S		
P x V x D		11.10		31.57			-		N.S			-		N.S		

Table 3: Effect of pre-treatments, varieties and drying methods on moisture (%) in green chilli powder

VARIETY (V)	DRYING METHOD (D)	PRE-TREATMENT (P)														
		Initial					30 DAP					60 DAP				
		BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN	BLANCHING ONLY	BLANCHING + 0.01% KMS	BLANCHING + 1% CaCl ₂	BLANCHING + 1% ASC. ACID	MEAN
CA-960	TRAY DRYING	7.92	7.32	6.64	7.69	7.39	8.48	7.59	6.85	8.01	7.73	9.12	7.94	7.15	8.43	8.16
	SUN DRYING	8.74	8.03	7.24	8.50	8.13	9.32	8.56	7.65	9.06	8.65	9.98	9.21	8.14	9.71	9.26
	MEAN	8.33	7.68	6.94	8.10	7.76	8.90	8.08	7.25	8.54	8.19	9.55	8.58	7.65	9.07	8.71
LCA-655	TRAY DRYING	6.98	6.38	5.69	6.56	6.40	7.35	6.65	5.90	6.87	6.69	7.84	7.01	6.20	7.29	7.09
	SUN DRYING	8.04	7.42	6.89	7.90	7.56	8.62	7.95	7.30	8.29	8.04	9.28	8.60	7.80	8.78	8.62
	MEAN	7.51	6.90	6.29	7.23	6.98	7.99	7.30	6.60	7.58	7.37	8.56	7.81	7.00	8.04	7.85
For comparing pre-treatment (P) and drying method (D)																
TRAY DRYING		7.45	6.85	6.17	7.13	6.90	7.92	7.12	6.38	7.44	7.21	8.48	7.48	6.68	7.86	7.62
SUN DRYING		8.39	7.73	7.07	8.20	7.85	8.97	8.26	7.48	8.68	8.34	9.63	8.91	7.97	9.25	8.94
MEAN		7.92	7.29	6.62	7.66	7.37	8.44	7.69	6.93	8.06	7.78	9.06	8.19	7.32	8.55	8.28
Comparing means of		S Em _±		CD at 0.05%			S Em _±		CD at 0.05%			S Em _±		CD at 0.05%		
P		0.07		0.19			0.05		0.15			0.04		0.11		
V		0.14		0.41			0.11		0.31			0.08		0.23		
D		0.14		0.41			0.11		0.31			0.08		0.23		
P x V		0.18		0.52			0.17		0.48			0.12		0.35		
V x D		0.27		0.77			0.21		0.60			0.15		0.43		
P x D		0.18		0.52			0.17		0.48			-		N.S		
P x V x D		0.34		0.95			-		N.S			0.19		0.54		

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