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## Effect of chemical treatments and drying methods on quality attributes in chilies cv. Indam-5

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### Abstract

An experiment was conducted on color chili variety Indam-5 to find out the effective chemical treatment and drying method for better quality dry chilies. The result showed that there was significant difference among the drying methods and postharvest chemical treatments for all the quality parameters except in weight loss during drying (%), pod length (cm) and pod circumference (cm). Oven drying (40 h) was found to be efficient method as compared to sun and polyhouse drying in time to reach 8-10% moisture. Lowest percent (5.85) of damaged pods, highest percent of oleoresins (8.91), highest capsaicin (0.52%) recorded in oven drying. Minimum (6.91%) percent of damaged pods, maximum content of oleoresin (8.78%), highest capsaicin (0.50) and Capsanthin (38828) were recorded in Calcium chloride treated pods. Among the interactions, calcium chloride with polyhouse drying resulted the minimum (5.18%) percent of damaged pods, maximum content of oleoresin (9.82%), maximum Capsanthin (40650) than other treatments.

**Keywords:** Chilli chemical treatments, drying methods, pod quality oleoresins and capsanthin

### Introduction

Chilli (*Capsicum annum* L.) is valued mostly for its pungency, coloring matter and oleoresin principles. Capsaicin is used in the preparation of balms, whereas the color extracts (Carotenoid pigments) are used as color addition in food industry, poultry and prawn feed industry. Chilli oleoresin is also used in self-defense sprays which are popular in western countries. Andhra Pradesh is leading both in area and production contributing on an average of 25% of total area and over 40-50% of total production in the country. It has a good potential for quality production (3.17 t/ha) which are in turn most suitable for international trade. (CMIE 2007). Traditionally in south India after harvest the fruits are dried in sun to a moisture content of less than 10 percent. These dried chilies are graded, packed in gunny bags for marketing and storage. The chilies before packing in the gunny bags, farmers add little water to the fully dried chili to avoid the brittleness. Then these chilies with moisture packed in the bags goes to storage before they are used. During drying and marketing the chilli pods are heavily infested with microbes and thereby deteriorate the export quality.

### Materials and Methods

The experiment was conducted at Post-Harvest Technology Laboratory, Department of Horticulture, College of Agriculture, Rajendranagar, Hyderabad. The chili variety used in experiment is Tejaswani, which is commercially grown as pungent variety in Khammam, Warangal and Guntur and Prakasam districts. The experiment was laid out in a completely randomized block design with factorial concept with three replications. The chemical treatments consists of 2.0% calcium chloride 0.1% sodium benzoate and untreated control whereas drying methods followed are oven drying, polyhouse and Sun drying as control. The fresh ripe chilli fruits are dipped in the prepared chemical solutions for 10 minutes and the excess solutions were drained out.

In polyhouse a continuous air inlet of 1 ft width was provided on top side of the poly house along the bottom of the vertical wall for the entry of natural air. Excepting this all other sides of poly house are fairly air tight. Hence natural air entered at one end of polyhouse chimney, which provided suitable condition for drying. The average metrological data recorded during the study in poly house ie. Wind speed 2.2 km/h, temperature 40.5 °C and relative humidity 30.85%. The oven dryer used for was designed and developed in the division of Agricultural Engineering, IARI, New Delhi. Chilies are spread uniformly in trays and are dried at 50 °C with the airflow rate of 0.019 m<sup>3</sup>/min. The moisture contents of the chilies were determined after every 2 h till it attained an optimum moisture content of 8-9 percent.

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## Results and Discussion

Among the treatments the data depicted in table 1 revealed that there was no significant influence on weight loss in drying, pod length, pod circumference, due to drying methods and pre-treatment with chemicals and their interactions. It indicates that pod length of chillies is not affected by drying methods and pre-treatment with chemicals. Similar results were reported by joy *et al.* (2001) [2] and Papakumari *et al.* (2003) [6]. There was significant visual difference with drying methods on pod shape and colour was observed. Oven drying was effective with less number of wrinkles whereas highest wrinkles in control. Similar results are reported by Mangaraj *et al.* (2001) [4], Paliniappan (1997) [7]. The color of the pods was Burgundy (5123) in oven drying, Scarlet red (5502) in poly house drying and red (5117) in Sun drying. The color of the calyx was observed to be greenish (5305) in oven drying, light greenish (5205) in poly house drying and pale (5109) color in Sun drying.

The data in Table 2 revealed that Oven drying was found to be most efficient method to reduce the time to reach 8-10% moisture in comparison with Sun drying and Polyhouse drying. Similar better performance of oven drying was reported by Mangaraj *et al.* (2001) [4]. It is interesting to note that there was no significant difference in drying time due to treatment with chemicals indicating that the chemicals used in this investigation have no effect on drying time but there was significance difference between drying methods. Among the drying methods, oven drying took least time (40 h) followed by polyhouse drying (49 h) and Sun drying (53 h) which are significantly different.

The data pertaining to the post-harvest chemicals and drying methods and their interactions on percent of damaged pods in Indam-5 are depicted in Table 2 and the results revealed that there was significance difference between drying methods and

post-harvest chemicals and their interactions. Minimum (5.85 percent) of damaged pods was observed in poly house drying and oven drying (5.87 percent) and Sun drying showed highest (11.16 percent) of damaged pods. Calcium chloride treatment resulted lowest percent of damaged pods (6.91 percent) followed by sodium benzoate (7.42 percent) and untreated control (8.55 percent).

lowest percent (5.18) of damaged pods observed in Calcium chloride and Sodium Benzoate treated pods (5.61) dried at poly house and oven drying which are significantly different whereas highest (12.98) percent damage pods recorded in open yard sun drying control.

The data in table 3 indicated that the higher percentage of capsaicin was recorded by oven drying (0.52%) which was superior over other drying methods. It could be attributed to uniformity in drying temperature. Similar results were reported by Mini *et al.* (2000) [4]; Mangaraj *et al.* (2001) [4]; Topuz and Ozdemir (2004) [9]. With chemical treatments the maximum capsaicin content was recorded with sodium benzoate (0.51%) than other treatments. The beneficial effect of sodium benzoate 0.1% on the prevention of deterioration in capsaicin content could be attributed to the interfering mechanism of cell division, permeability of cell membrane and activity of enzymes as explained by Srivastava and Sanjeev kumar (2002) [8].

Chilli pods treated with calcium chloride and dried in polyhouse has resulted significantly higher (40650 EAO colour value) capsanthin than control. It could be due to uniform air circulation of air which helps in maintain the optimum temperature and also protection from UV rays by poly house and also the strong adsorption affinity of capsanthin with adsorbents like calcium compounds as explained by Krishnamurthy and Natarajan (1973) [3].

**Table 1:** Effect of Post-Harvest Chemicals and drying methods on weight loss (%), pod length (cm) and pod circumference (cm) in Chilli cv. Indam-5

Drying Methods	Post Harvesting Chemicals											
	Weight Loss (%)				Pod Length (cm)				Pod Circumference (cm)			
	Control	CC	SB	Mean	Control	CC	SB	Mean	Control	CC	SB	Mean
OYSD	66	67	67	67	8.65	8.92	8.89	8.82	0.90	0.93	0.90	0.91
PHD	62	65	63	63	8.74	8.83	8.94	8.84	0.89	0.93	0.94	0.92
OD	62	61	64	62	8.68	8.84	8.70	8.74	0.89	0.92	0.90	0.90
Mean	63	64	65		8.69	8.86	8.84		0.89	0.93	0.91	
	SEm +	CD@1%			SEm +	CD@1%			SEm +	CD@1%		
Chemicals(C)	1.64	N.S			0.17	N.S				N.S		
Drying (D)	1.64	N.S			0.17	N.S				N.S		
CxD	2.84	N.S			0.3	N.S				N.S		

OYSD – Open yard Sun Drying; PHD – Polyhouse drying; OD – Oven drying; CC – 2% Calcium Chloride; SB – 0.1% Sodium benzoate

**Table 2:** Effect of Post-Harvest Chemicals and drying methods on Time (h) required to reach 8-10% moisture, percent of damaged (whitened) pods and oleoresin (%) in chilli cv. Indam-5

Drying Methods	Post Harvesting Chemicals											
	Time (h) required to reach 8-10% moisture				Percent of damaged (whitened) pods				Oleoresin (%)			
	Control	CC	SB	Mean	Control	CC	SB	Mean	Control	CC	SB	Mean
OYSD	68	54	56	53	12.98	9.92	10.59	11.16	7.75	7.88	8.23	7.95
PHD	48	45	48	49	6.30	5.18	6.07	5.85	8.85	9.82	8.18	8.95
OD	42	37	40	40	6.36	5.64	5.61	5.87	8.90	8.64	9.18	8.91
Mean	52	45	48		8.55	6.91	7.42		8.50	8.78	8.53	
	SEm +	CD@1%			SEm +	CD@1%			SEm +	CD@1%		
Chemicals(C)	0.83	N.S			0.18	0.52			0.04	0.12		
Drying (D)	1.3	3.88			0.18	0.52			0.04	0.12		
CxD	2.1	N.S			0.30	0.90			0.07	0.21		

OYSD – Open yard Sun Drying; PHD – Polyhouse drying; OD – Oven drying; CC – 2% Calcium Chloride; SB – 0.1% Sodium benzoate

**Table 3:** Effect of Post-Harvest Chemicals and drying methods on Capsaicin (%) and capsanthin (EOA color value) in Chilli cv. Indam-5

Drying Methods	Post Harvesting Chemicals							
	Capsaicin (%)				Capsanthin (EOA color value)			
	Control	CC	SB	Mean	Control	CC	SB	Mean
OYSD	0.45	0.48	0.49	0.47	32440	35937	34846	34408
PHD	0.45	0.48	0.50	0.48	37963	40650	38378	38997
OD	0.49	0.53	0.55	0.52	30457	33897	35249	33201
Mean	0.46	0.50	0.51		35201	36828	36157	
	S <sub>Em</sub> +	CD @ 1%			S <sub>Em</sub> +	CD @ 1%		
Chemicals(C)	0.006	0.01			223	632		
Drying (D)	0.006	0.01			223	692		
CxD	0.011	N.S			403	1200		

OYSD – Open yard Sun Drying; PHD – Polyhouse drying; OD – Oven drying; CC – 2% Calcium Chloride; SB – 0.1% Sodium benzoate

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