

## Estimation of Proximate Composition of Selected Species of Capsicum (*Capsicum annuum* and *Capsicum chinense*) Grown in India

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### ABSTRACT

The study was conducted with objective to assess nutritional composition of *Capsicum chinense* and *Capsicum annuum* grown in India. Fresh fruits were collected from the surroundings of Delhi, India, during the late rainy season in the month of June- October in 2012 and identified at Indian Agriculture Research Institute (IARI), Delhi. Moisture, protein, fat, ash and crude fiber contents were determined by AOAC method (1990) while carbohydrate content was determined by difference. The moisture content was determined by hot air oven method at 105°C. The Macro Kjeldahl method was used for the determination of protein content. The fat content was determined by using soxhlet extraction method. Ash content was determined by incineration in muffle furnace. The crude fiber was determined by Fibra plus method. Calcium was determined by AOAC method, potassium and sodium were estimated by using flame photometry method, zinc was estimated by using atomic absorption spectrophotometry. Iron estimation was done by the Wong's method. Results indicated no significant difference between proximate composition of *Capsicum annuum* and *Capsicum chinense* except ash, protein and fiber content. *Capsicum chinense* and *Capsicum annuum* contained 8.4% and 8.2% moisture; 29.26% and 33.17% crude fiber; 7.33% and 6.36% ash; 50% and 47.23% Carbohydrate; 5.06% and 2.1% fat; 8.2% and 11.22% protein; 0.06% and 0.08% calcium; 0.03% and 0.01% zinc; 0.03% and 0.02% sodium; 50.41% and 69.25% potassium; 0.04% and 0.07% iron respectively. As evident from results the level of potassium, crude fiber, and zinc were markedly higher in that of *Capsicum annuum*.

**Key words:** *Capsicum chinense*, *Capsicum annuum*, Fiber, Carbohydrate.

### INTRODUCTION

The genus, *Capsicum* consists approximately 20-27 species, five of which are domesticated which include the *Capsicum annuum*, *Capsicum baccatum*, *Capsicum chinense*, *Capsicum frutescens* and *Capsicum pubescens*<sup>1</sup>. They are widely cultivated

because of their spicy nature, vegetable, medicine and nutritional value. Pepper is the second most important vegetable in the world ranking after tomatoes and it is the most produced type of spice used for flavoring and coloring food while providing vitamins and minerals<sup>2</sup>.

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Capsicum species are essential crops of the tropics and grow better in Africa, south and Central America, parts of the U.S.A and southern Europe<sup>3</sup>. Nowadays, it is almost impossible to imagine the dishes of Asia and Pacific region without chili peppers while the traditional African sorghum or maize porridge would be tasteless without them<sup>4</sup>.

Pepper is an important crop not only because of its economic importance but also for the nutritional value of its fruits being a major source of natural colours and antioxidant compounds<sup>5</sup>. The intake of these compounds as food is an important health protecting factor, they have been recognized as being beneficial for prevention of widespread human diseases, including cancer and cardiovascular diseases when taken daily in adequate amounts<sup>6</sup>. These peppers are used either fresh or dried in preparation of traditional diets but they are commonly used fresh.

Aspects like cultivars and environmental conditions have influence on the nutritional constituents of Capsicum<sup>7</sup>. However, there is limited information available about nutritional constituents of Capsicum species grown in India. Therefore, the specific objective of the study was to evaluate nutritional composition of *Capsicum annuum* and *Capsicum chinense* grown in India.

## MATERIAL AND METHODS

The fresh fruits of two varieties of Capsicum were collected from the surroundings of Delhi, India, during the late rainy season in the month of June- October in 2012 and identified at Indian Agriculture Research Institute (IARI), Delhi. The varieties of Capsicum used for the study were *Capsicum annuum* and *Capsicum chinense* respectively.

Fresh fruits of both varieties of Capsicum were washed thoroughly with

distilled water and dried. *Capsicum chinense* was sun drying and *Capsicum annuum* was oven air dried. Dried sample were finely ground to fine powder, which were then used for testing, extract preparation and incorporation in food products.

Moisture, protein, fat, ash and crude fiber contents were estimated by AOAC method.<sup>8</sup> The carbohydrate content was determined by difference: 100- (%Moisture + %Ash + %Protein + %Fat + %Crude fiber). The moisture content was determined by hot air oven method at 105°C. The Macro Kjeldahl method was used for the determination of protein content. Crude protein is a measure of dietary protein that is based on the assumption that the average amino acid in a protein contains 16 per cent nitrogen. Thus, total chemically estimated nitrogen  $\times 6.25$  ( $100 \div 16$ ) = crude protein.

The fat content was determined by extracting 2g of sample with petroleum ether (boiling point of 40°C to 60°C) using Soxhlet extraction method. Ash content was estimated by weighing 2g of dry sample into a tarred porcelain crucible which was incinerated at 550°C in a muffle furnace until ash was obtained.

The crude fiber was determined by Fibra plus method by exhausting extraction of soluble substances in sample using 1.25% H<sub>2</sub>SO<sub>4</sub> and 1.25% NaOH solution after that the residue was ashed and the loss in weight was recorded as crude fiber.

## Determination of Mineral Elements

Calcium was determined by AOAC method<sup>8</sup>. Zinc was estimated by atomic absorption spectrophotometry. Potassium (K) and Sodium (Na) were determined with the flame photometry method<sup>9</sup>. Iron estimation was done by the Wong's method<sup>10</sup>.

## RESULTS AND DISCUSSION

### Proximate Composition

**Table 1: Proximate Composition of *Capsicum chinense* and *Capsicum annuum***

Nutrients (g/100)	Moisture	Ash	Fat	Protein	Crude fibre	CHO
<i>Capsicum chinense</i>	8.43±0.20	7.33±0.15*	5.06±0.05*	8.2±0.15*	29.26±0.03	50±0.01
<i>Capsicum annuum</i>	8.2±0.30	6.26±0.15*	2.1±0.10*	11.22±0.01*	33.17±0.05	47.23±0.24

\* Significant at 5% level of significance

As shown in Table 1 no significant difference ( $p > 0.05$ ) found between the two species in moisture, crude fiber and carbohydrate content. *Capsicum chinense* and *Capsicum annuum* contained 8.4% and 8.2% moisture; 29.26% and 33.17% crude fiber; 7.33% and 6.36% ash, 50% and 47.23% Carbohydrate, respectively. On the other hand, crude protein was high in *Capsicum annuum* when compared to *Capsicum chinense* while fat content was found to be high in *Capsicum chinense*.

The moisture content (8.2%), protein (11.22%) and ash content (6.26%) of *Capsicum annuum* found in the study were similar to moisture content (9.8%), protein

(12.5%) and ash content (4.7%) reported by Food and Agriculture Organization<sup>11</sup>. The reduced moisture content in the spices is an indication that their shelf life would be prolonged and that deterioration due to microbial contamination would be limited<sup>12</sup>. Ash content and crude fiber of *Capsicum annuum* were supported by an earlier study<sup>3</sup>. Total Fat content of *Capsicum annuum* was in line with other studies<sup>13,14</sup>. This suggests that Capsicum is a good source of crude fiber and total ash. Result of moisture content, ash, protein, fat and carbohydrate content of *Capsicum chinense* were supported by a study<sup>15</sup>.

### Mineral composition

**Table 2: Mineral composition of *Capsicum annuum* and *Capsicum chinense***

Minerals (mg/100g)	Calcium	Iron	Sodium	Potassium	Zinc
<i>Capsicum chinense</i>	60.12±0.02 <sup>ns</sup>	4.12±0.00 <sup>ns</sup>	36±0.05 <sup>ns</sup>	5041±0.13 <sup>ns</sup>	39.64±0.05 <sup>ns</sup>
<i>Capsicum annuum</i>	80.16±0.02 <sup>ns</sup>	7.73±.00 <sup>ns</sup>	22±0.00 <sup>ns</sup>	6925±0.07 <sup>ns</sup>	15.78±0.02 <sup>ns</sup>

ns= non-significant at 5% level of significance

The mineral analysis of the two species indicated their richness in sodium, calcium, iron, potassium and zinc. The mineral elements contained in these spices are very important in human nutrition. Sodium, potassium and calcium play a central role in the normal regulation of blood pressure<sup>16</sup>. Sodium content of *Capsicum annuum* was supported by an earlier research.<sup>17</sup> As evident from Table 2, the level of calcium (80.16mg/100g) and Iron (7.73mg/100g) in *Capsicum annuum* were high compared to *Capsicum chinense*. However, no significant difference ( $p \geq 0.05$ ) was found in calcium, iron, sodium, potassium and zinc among the two species.

### CONCLUSIONS

The findings suggest that both species of capsicum were rich in potassium, crude fiber and zinc. Other nutrients were also present in appreciable amount. Therefore, these spices could serve as supplements since they are usually combined in human diet daily.

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