ANALYSIS OF CAPSAICIN AND ASCORBIC ACID IN DIFFERENT VARIETIES OF *CAPSICUM* SP.

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ABSTRACT

Capsicum fruits are valued as part of the diet for different reasons in many parts of the world. Color, aroma, and pungency are important for quality classification. High levels of pungency as well as very low levels or even the absence of pungency may be desirable. Capsaicin (8-methyl N-vanillyl-6-nonamide), dihydrocapsaicin, and nordihydrocapsaicin are the most important capsaicinoids responsible for pungency. Capsaicin is one of the highly exploited biomolecules due to its versatility in application. So far, researchers have reported capsaicin as anti oxidant, antiarthritic, gastro protective, anti cancer (pro cancer also) and analgesic. *Capsicum* is also an excellent source of ascorbic acid, provitamin A, carotenoids, flavonoids and other phytochemicals Because of their antioxidant properties, ascorbic acid, carotenoids, and vitamin E are currently the object of much attention due to possible links to prevention of certain types of cancer, cardiovascular disease, atherosclerosis and delay of the aging process. In the present report we have analyzed 08 different varieties of *Capsicum* (*C. annuum* and *C. frutescens*) for ascorbic acid and capsaicin content. Result exhibit that green fruits have more capsaicin and ascorbic acid than mature ripened fruit. Highest capsaicin content was reported in variety of *C. frutescens* AW-1(Land race) and same was the case with the ascorbic acid. This study will help to commercialize *Capsicum* in the national and international market as it is extensively used by pharmaceutical, nutraceutical and cosmetic industry.

Keywords: *Capsicum, pharmaceutical, nutraceutical and cosmetic industry.*

INTRODUCTION

A wealth of information and scientific evidences are rapidly accumulating the beneficial effects of wide variety of food components on human health. The most important vitamin in fruits and vegetables is vitamin C 90% of the ascorbic acid in human diet was supplied by them. Chili peppers are the most important vegetable cum spice because of its color, taste, pungency, flavor and aroma grown in tropical and sub tropical regions of the world. They are extremely popular for the abundance content of vitamin C larger than other vegetables and fruits commonly recognized as a source of this substance (Durust *et al.,* 1997; Osuna-Garcia *et al.* 1998 and Pavithra and Dhasarathan, 2011). The ascorbic acid (Vitamin C) content in chili peppers has been reported by few workers (Howard *et al.,* 1994; Lee *et al.,* 1995 and Sheela, 2004). Ascorbic acid content was increases with fruit ripening while, losses during post harvest handlings (Martinez *et al.,* 2005). Hot chilli *(Capsicum chinense* Jacq.) is grown in the homesteads of Kerala for domestic and export purposes. Characterized by its typical flavour and aroma, the species is noted for its richness in oleoresin, pungency and ascorbic acid contents. Because of the unique qualities, it can find application in food, pharmaceutical and cosmetic industries. But so far, there is no commercial variety having desirable qualities available in the species, which can be recommended for extraction purposes. A critical estimate of genetic variability in the population is a pre-requisite for the effective selection of superior genotypes.Capsicum belongs to one of the group of the chilli used as vegetable. They are bell shaped, non-pungent and mild thick-fleshed. Biochemical changes associated with maturity play an important role during the fruit development.

Ascorbic acid content increases with fruit ripening while, losses during post harvest handlings (Martinez *et al.,* 2005). Despite many reports of ascorbic acid, content in chili peppers is inadequate. Therefore the present study is taken up to estimate the content of ascorbic acid during ripening in eighteen genotypes of chili peppers (*Capsicum* L) and to select genotypes having high content of ascorbic acid as parents in breeding programs. India is the secondary home for chilli. Portuguese brought this pungent hitter to India in 16th century. India is the largest producer, consumer and exporter of chilli; contributes to ¼th share of chilli exported in the world. Capsicum is marketed for pungency and aroma along with oleoresin. Capsaicin is responsible for pungency factor and bioactive alkaloid of *Capsicum* fruits. Biosynthesized by enzymatic condensation of vanillylamine, a phenyl propanoid intermediate, and 8-methyl-nonenoic acid, a fatty acid derivative from the leucine/valine pathway by capsaicin synthase.

MATERIALS AND METHODS

Six cultivars of *C. annuum* L and two cultivars of *Capsicum frutescens* L were grown in randomized design with three replicates and germplasm were procured from IIHR, Bangalore (Arka Lohit) and

DRDO, Pithorgarh (KTOC). The fruits were washed with tap water and cut into small pieces and homogenized with the help of mortar and pestle by adding 5 ml of 4% oxalic acid. The homogenates were centrifuged at 5000 rpm for 10 minutes then the supernatants were filtered with 541 Whatmann filter paper the obtained residues were made up to 25 ml with 4% oxalic acid. The ascorbic acid content was estimated by using 2, 4. dinitrophenylhydrazine reagent in conjunction with spectrophotometer at 540 nm (Sadasivam and Manickam, 1992) five samples from each lot were analyzed.

Capsicum fruits of different genotypes were harvested after post-anthesis. They were dried at 60°C until it attained constant weight. Further, homogenization with quartz sand and acetonitrile in 1:10 (w/v) was performed. Extract was centrifuged at 10,000rpm at 4°C for 15 min. and the supernatant was taken. The sample obtained was dried in vacuum and resuspended with 1ml of HPLC grade methanol. Samples were centrifuged at 6000rpm for 15 mins. and loaded for analysis. Detection was done at 236nm.

Ascorbic Acid analysis: Total ascorbic acid was determined by the AOAC microfluorometric method. The sample composites were blended in metaphosphoric-acetic acid extractant (without the addition of ascorbic acid) to prevent ascorbic acid oxidation. Recovery of added vitamin C which was determined by standard addition (50 mg spike) prior to blending of the composites was 94 ± 4.2% . Sample preparation for ascorbic acid analysis was completed under yellow light (Sylvania Gold F40/GO, 40W) to minimize photo-oxidation. All analyses were completed in triplicates.

RESULTS AND DISCUSSION:

Result exhibit that green fruits have more capsaicin and ascorbic acid than mature ripened fruit. Highest capsaicin content was reported in variety of *C. frutescens* AW-1(Land race) and least was in Arka lohith (*Capsicum annum*), same was the trend in the ascorbic acid profile. same was the case with the ascorbic acid in the fresh weight of the fruit. The exact relationship between ascorbic acid and capsaicin is yet to be analyzed (Figure 1 and 2). All the experiments were conducted in the triplicates. Analysis of variance showed significant differences among the accessions for the characters studied, indicating the presence of wide variation. Capsaicin, the pungent principle of chilli was found to vary from 0.29 to 0.47 mg/100 ml (Table 1). This variation could probably be due to the presence of gene modifying factors for pungency and the ratio of placental tissue to seed and pericarp (Simmonne *et al.,* 1997). The graphs depicted above suggest that the amount of ascorbic acid produced in a specific variety of *Capsicum* is directly proportional to its capsaicin content.

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Table 1. Variation in the capsaicin and ascorbic acid in the various cultivars

Sl. No.	Genotype	Variety	Capsaicin (mg/100mg)	Ascorbic acid (mg/100mg)
1.	Arka Abhir	*C. annuum*	0.31	87.67
2.	Arka Lohith	*C. annuum*	0.29	78.30
3.	AW-1	*C. frutescens*	0.47	188.30
4.	AW-2	*C. frutescens*	0.43	179.71
5.	Pusa Jwala	*C. annuum*	0.39	118.33
6.	Bayadagii	*C. annuum*	0.37	100.30
7.	G-4	*C. annuum*	0.33	115.33
8.	Guntur	*C. annuum*	0.35	143.30

Figure 1. Ascorbic acid production.

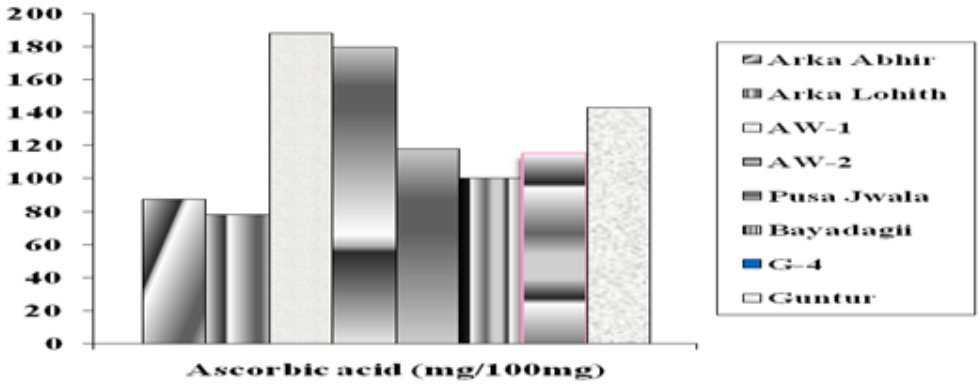
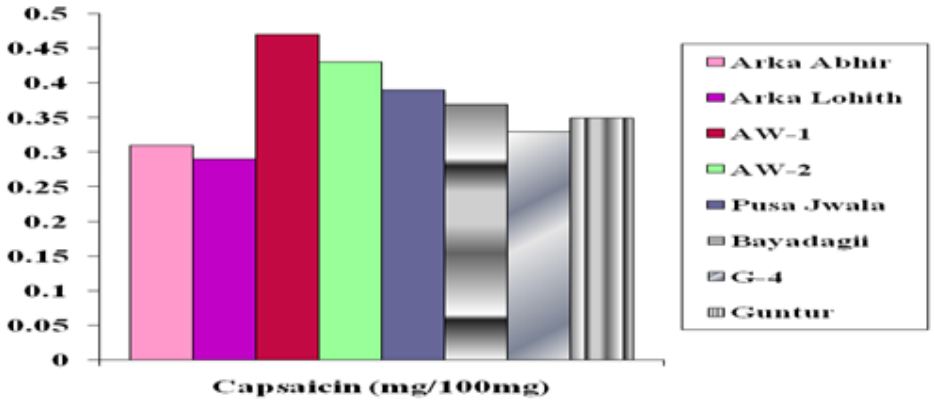


Figure 2. Capsaicin production.



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