

# Allelic variation in a putative gene related to pungency in pepper (*Capsicum* spp.)

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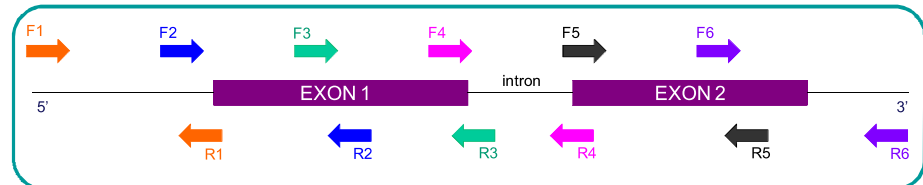


## INTRODUCTION

The capsaicinoids, responsible for pungency in peppers (*Capsicum* spp.), exhibit a wide genetic and environmental control variation. Pungency in pepper is one of the most interesting quality traits and it requires a greater knowledge about its genetic control. At this moment, not all the genes involved in the capsaicinoid biosynthesis pathway have been characterized. From a previous work, a partial DNA sequence, possibly related to pungency was identified (Garcés-Claver et al., 2007). The aim of this work was to obtain and analyze variation of the complete DNA sequence in several pepper genotypes from different species.

## MATERIAL AND METHODS

To obtain the full DNA sequence from a model genotype, *C. annuum* 'Yolo Wonder' the Genome Walking technique was used and several pairs of primers were designed along that sequence.



Those primers were used to obtain the full DNA sequence in the following selected genotypes:

Three model pepper genotypes:

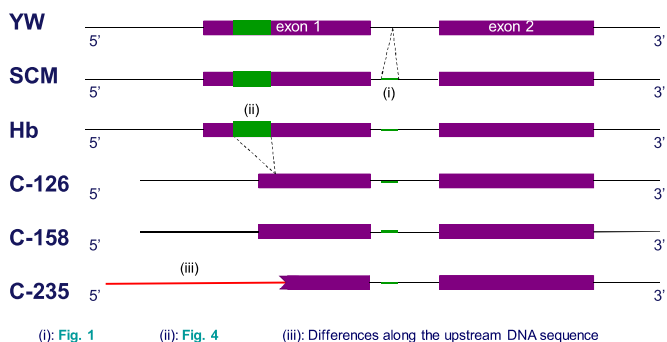
- C. annuum* 'Yolo Wonder' (YW), non-pungent.
- C. annuum* 'SCM-334' (SCM), pungent.
- C. chinense* 'Habanero' (Hb), pungent.

Three genotypes due to their particularities concerning to pungency trait:

- C. chinense* 'C-158', pungent.
- C. frutescens* 'C-126', pungent.
- C. baccatum* 'C-235', pungent.

## RESULTS

Diagram of alignment of the six sequences



YW	T A C T - - - - - G - - - C C A C A T G C A G C A G G
SCM	T A C T T C C A A C A T G C A T G A T A C C A C A T G C A G C A G G
Hb	T A C T T C C A A C A T G C A T - A T A C C A C A T G C A G C A G G
C-126	T A C T T C C A A C A T G C A T G A T A C C A C A T G C A G C A G G
C-158	T A C T T C C A A C A T G C A T G A T A C C A C A T G C A G C A G G
C-235	T A C T T C C A A C A T G C A T G A T A C C A C A T G C A G C A G G

Fig. 1. 15 bp deletion on *C. annuum* YW.

YW	T A T A A C A T T T T A A T C T T T T A
SCM	T A T A A C A T T T T A A T C T T T T A
Hb	T A T A A C G T T T T A A T C T T T T A
C-126	T A T A A C G T T T T A A T C T T T T A
C-158	T A T A A C G T T T T A A T C T T T T A
C-235	T A T A A C G T T T T A A T C T T T T A

Fig. 2. Example of SNP specific to *C. annuum* YW and SCM.

YW	C T C T T C T T T T C A A A T A T G C A
SCM	C T C T T C T T T T C A A A T G T G C A
Hb	C T C T T C T T T T C A A A T G T G C A
C-126	C T C T T C T T T T C A A A T G T G C A
C-158	C T C T T C T T T T C A A A T G T G C A
C-235	C T C T T C T T T T C A A A T G T G C A

Fig. 3. Example of SNP related to pungency trait.

Alignment of the six sequences showed allelic variability :

A 15 bp deletion was found only in the non pungent genotype (Fig. 1). This result was confirmed when more non-pungent genotypes were studied.

Several Single Nucleotide Polymorphisms (SNPs) were identified, ones distinctive of species (Fig. 2) and others pungent-specific (Fig. 3).

A 51 bp deletion was found on C-158 (*C. chinense*) and C-126 (*C. frutescens*) (Fig. 4).

Differences along the upstream DNA sequence region in C-235 (*C. baccatum*) were observed (iii).

YW	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA
SCM	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA
Hb	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA
C-126	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA
C-158	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA
C-235	CTTCTACGCATAAAATTCACAAGCTATCCCTTGTGGATCAATCCCTCAGTAATATGTATATCCCTTTGGCATTCTTTTAA

Fig. 4. 51 bp deletion on *C. baccatum* C-235.

Sequence polymorphisms may be involved in phenotypic trait variation concerning capsaicinoids composition and/or content. The detected allelic variation has to be further investigated, to better know how it could affect at the phenotypic level of the pungency trait.

References: Garcés-Claver A, Moore Fellman S, Gil Ortega R, Jahn MM, Arnedo Andrés MS. 2007. Identification, validation and genotyping of a single nucleotide polymorphism SNP associated with pungency in *Capsicum* spp. Theoretical and Applied Genetics 115, 7: 907-916.

Acknowledgements: This study was supported by the Spanish Ministry of Science (project INIA RTA2008-00095-00-00) and by the Aragón Government (Group A16).