Strawberry fruits are highly valued due to their flavor, aroma, and benefits for human health. Despite this, 30% of the population with food hypersensitivity also shows adverse reactions to strawberry (Franz-Oberdorf et al, 2016). The FaFra a 1 protein family, homologs of the major birch pollen allergen Bet v 1, is involved in this allergenicity to strawberry.

By RNAseq we have identified transcripts for 18 members of the FaFra a 1 family (from 1.01 to 1.18) in strawberry fruits. Although expressed in all tissues analyzed, each family member presents a unique pattern of expression, which suggests functional specialization for each FaFra a 1 protein. FaFra a 1.02 (Fra2 from now on) is the most expressed one in red fruits and is also the most allergenic among the family members tested (Muñoz et al. 2010; Franz-Oberdorf et al, 2016).

In order to understand the molecular bases of this allergenicity we crystalized Fra2 and obtained its structure by X-ray diffraction. Fra2 showed a very high structural homology to Bet v 1, and we asked whether the two proteins were recognized by the immune system in a similar way. For this, we generated five different mutant versions of Fra2 in sites described as important for allergenicity in Bet v 1 (Fernandes et al, 2016), and studied their potential allergenicity as well as their crystal structures. Three of the mutants had substitutions in loop 4 (E46R, D48R, E46/D48A) and the other two facing the cavity (A141F and Q64W). Compared to Fra2, all the mutants showed a significant reduction in their capacity to be recognized by the serum of patients with allergies to Bet v 1, and their crystal structures revealed conformational changes in the Bet v 1- IgG interaction sites. Together, these results support that Fra2 and Bet v 1 have
similar allergenic determinants We hope this research will aid in understanding how human IgGs interact with Fra2 and might help in the development of new cultivars with a lesser allergenic potential.


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