Allergy to moth plant *(Araujia sericifera*) and passion fruit

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Araujia sericifera (moth plant) is a perennial vining plant which belongs to the family Apocynaceae. Originally from South America, it was introduced to Europe as an ornamental plant, but is now considered a noxious weed.

Cross-reactivity among aeroallergen and food allergens give rise to pollen-food syndrome (PFS) [1] and the latex (from *Hevea brasiliensis*)-fruits syndrome, although in this last one, dermatological sensitization could be involved [2]. Latex allergenic components Hev b 6.02 (hevein) and Hev b11 has been described as the main elicitors of this syndrome. Hev b 6.02 shows homology to several chitin-binding lectin domains [3] and may be responsible for certain cross reactivities to other plants and food proteins. Hev b 11, a class I chitinase, comprise a hevein-like domain with 58% identity with Heb v 6.0, and it is associated to occupational latex allergy and latex-fruits syndrome [4]. Cross-reactivity with clinical symptoms between *H. brasiliensis* latex and passion fruit has been described [5]. Also case reports of IgE-mediated allergy induced by latex from other species different to *H. brasiliensis* such as *Ficus benjamina* [6] or *Euphorbia pulcherrima sap* [7] have been published, as well as a syndrome of *F. benjamina*-fruit allergy [8].

We report the case of a male 43-year-old farmer, non atopic, who developed recurrent episodes of rhinoconjunctivitis, bronchospasm, and eyelid edema after pulling weeds out in his orange fields. He usually wore protecting leather gloves to pull out the weeds, but sometimes he did it by bare hand.

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Samples of the weed were identified as *A. sericifera.* He had never experienced food allergic symptoms, but 3 months after the first visit he developed urticaria, angioedema and dyspnea after the ingestion of passion fruit.

Protein extracts from *A. sericifera* stems, leaves and fruits were prepared by homogenization in phosphate buffer saline (20% W/V), dialyzation and lyophilisation. Skin Prick Test (SPT) with the extracts from *A. sericifera* (stems, leaves and fruits) were positive (8x7mm, 7x8mm, and 7x7mm respectively). SPT with extracts of common allergenic sources (*Dermatophagoides pteronyssinus, Dermatophagoides farinae, Alternaria alternata,* dog and cat dander and pollen from *Cupressus arizonica, Platanus acerifolia, Olea europaea, Lolium perenne,* grass mix, *Artemisia vulgaris, Salsola kali,* and *Parietaria judaica*), Pru p 3 (peach nsLTP), and profilin (Pho d 2) were negative.

Commercial SPT with extracts from latex and related food (avocado, banana, chestnut, kiwi, peach, passion fruit) were positive to latex (7x7mm), passion fruit pulp (9x9mm), passion fruit peel (8x8mm) and chestnut (7x7mm). Prick-prick test with papaya, banana, avocado, kiwi, mango, and passion fruit were positive to passion fruit pulp and peel extract (9x9mm in both tests). A latex challenge test with an entire latex glove on one hand was carried out with negative result.

The serological study (ImmunoCAP, ThermoFisher Scientific Phadia) was performed to measure serum total IgE (659 kU/L) and specific IgE (ImmunoCAP; kU_A/L) to Pru p 3, chestnut, latex (allergenic source) and recombinant Heb v allergens (rHev b 1, rHev b 3, rHev b 5, rHev 6.02, rHev b 8, rHev b 11). The results were negative except to rHeb v 6.02 (1.80) and rHeb v 11 (5.05). Microarray ISAC result was only positive for rHev b 6 (0.4 ISU).

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Immunoblot assay was carried out with stem, leaf, and fruit extracts from *A. sericifera* under standard conditions (2-mercaptoethanol) as described by Laemmli [9]. IgE-reactive bands were detected in both the leaf and stem extracts between 90–32 kDa, and between 16–10 kDa. Mainly an IgE binding area between 20 – 10 kDa was observed in the *A. sericifera* fruit extract. In passion fruit pulp and seed extracts IgE-reactive bands between 97 – 66 kDa, 37/36 kDa, 28/26 kDa and 23 kDa were detected **(Figure 1.I)**. These assays revealed IgE-reactive bands with molecular mass similar to latex components Heb v 6.01 (20 kDa) and Heb v 11 (30 kDa).

Immunoblot inhibition assay with passion fruit pulp extract in solid phase and *A. sericifera* extracts as inhibitors showed a total IgE binding inhibition with *A. sericifera* leaf extract and quasi-total IgE binding inhibition with *A. sericifera* stem and fruit extracts **(Figure 1.II).** The higher inhibition observed with *A. sericifera* leaf extract than with passion fruit pulp extract (positive control of inhibition; homologous inhibition) points to a primary *A. sericifera* sensitization.

CAP-inhibition with patient serum and *A. sericifera* extracts as inhibitors showed a complete IgE inhibition to Hev b 6.02 (98.3%, 98.8%, 98.8%) and Hev b 11 (94.4%, 94.8%, 96%) with fruit, leaves and stems respectively. These results showed the presence of cross-reactivity between Hev b 6.02, Hev b 11 and *A. sericifera* proteins and suggest a primary *A. sericifera* sensitization. A previous case of sensitization to *A. sericifera* has been described in a patient with bronchial asthma and known allergy to latex [10]. Inhibition studies demonstrated cross-reactivity between latex proteins and a *A. sericifera*-37-kDa protein that could be a β-1,3-glucanase with homology with Hev b 2. Our patient has no history of previous sensitization neither clinical symptoms related to latex exposition, and he has no risk factors to be sensitized to latex. So clinical history

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and inhibition results led us to suppose a primary sensitization to *A. sericifera*. Positive specific IgE levels to Hev b 6.02 and Hev b11, negative sIgE levels to latex, and cross-reactivity detected between these latex allergens and *A. sericifera* proteins points to *A. sericifera* chitinases as the primary allergens in the symptomatology described. The negative specific IgE against a complete latex extract but positive to two purified of its molecular components could be explained by the low-medium affinities of these sIgE against latex molecules if they were primary synthetized to recognize some *A. sericifera* proteins. Despite all this a primary natural rubber latex sensitization cannot be completely discarded. As the patient sometimes pull out the weed by bare hand, the route of sensitization could have been inhalation and /or contact. In the same way as Hev b 6.02 and Hev b 11 have been related with latex-fruit syndrome, the sensitization to *A. sericifera* chitinases might have predisposed the patient to suffer an allergic reaction by passion fruit consumption due to cross-reactivity phenomena between passion fruit and *A. sericifera* proteins.

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Conflict of interest

The authors declare that they have no conflict of interest.

Patient's written consent

Written consent has been obtained and retained from the patient using the JIACI patient consent form.

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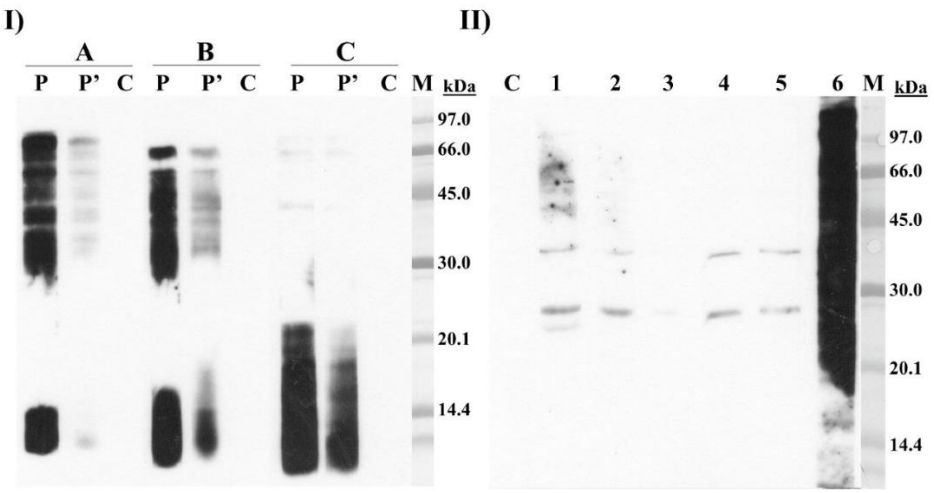
Figure. Immunoblot. A) *A. sericifera* leaf extract B) *A. sericifera* stem extract C) *A. sericifera* fruit extract D) Passion fruit pulp extract E) Passion fruit seed extract. Lane P, P': patient serum. Two dilutions, Lane C: control serum (pool of sera from non atopic subjects) Lane M: molecular mass standard. II) Immunoblot-inhibition with passion fruit pulp extract in solid phase. Lane C: control serum, Lane 1-6: patient serum pre-incubated with passion fruit pulp extract (lane 1), with passion fruit seed extract (lane 2), with *A. sericifera* leaf extract (lane 3), with *A. sericifera* stem extract (lane 4), with *A. sericifera* fruit extract (lane 5), with lamb extract (lane 6), Lane M: molecular mass standard.



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