

## Allergy to Moth Plant (*Araujia sericifera*) and Passion Fruit

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

Cross-reactivity between aeroallergens and food allergens gives rise to pollen-food syndrome [1] and latex (*Hevea brasiliensis*)–fruit syndrome, although in the latter, dermatological sensitization could be involved [2]. The latex allergens Hev b 6.02 (hevein) and Hev b 11 are the main elicitors of this syndrome. Hev b 6.02 is homologous with several chitin-binding lectin domains [3] and may be responsible for cross-reactivity to other plants and food proteins. Hev b 11, a class I chitinase, comprises a hevein-like domain sharing 58% identity with Heb v 6.0 and is associated with occupational latex allergy and latex-fruit syndrome [4]. Cross-reactivity with clinical symptoms between *H brasiliensis* latex and passion fruit has been described [5]. There have also been case reports of IgE-mediated allergy induced by latex from species other than *H brasiliensis* such as *Ficus benjamina* [6] and *Euphorbia pulcherrima* sap [7], as well as *F benjamina*–fruit syndrome [8].

We report the case of a 43-year-old nonatopic male farmer who developed recurrent episodes of rhinoconjunctivitis, bronchospasm, and eyelid edema after pulling out weeds in his orange fields. He usually wore protective leather gloves to pull out the weeds, although sometimes he used his bare hands. The patient gave his written informed consent for his data to be published in the present case report.

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

Protein extracts from *A sericifera* stems, leaves, and fruits were prepared by homogenization in phosphate-buffered saline (20% wt/vol), dialyzation, and lyophilization. Skin prick tests (SPTs) with the *A sericifera* extract (stems, leaves, and fruits) were positive (8×7 mm, 7×8 mm, and 7×7 mm, respectively). Negative results were recorded for SPTs with common allergen extracts (*Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Alternaria alternata*, dog and

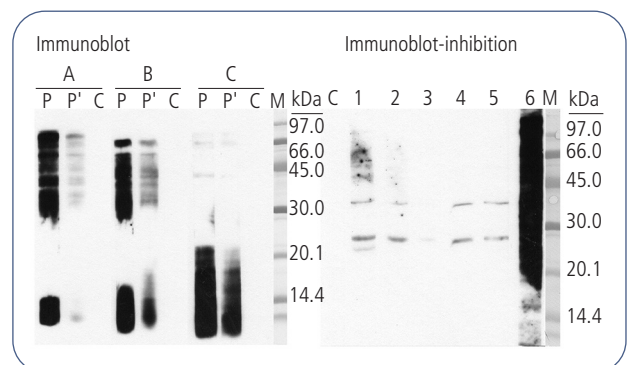
cat dander, and pollen from *Cupressus arizonica*, *Platanus acerifolia*, *Olea europaea*, *Lolium perenne*, grass mix, *Artemisia vulgaris*, *Salsola kali*, and *Parietaria judaica*), Pru p 3 (peach nsLTP), and profilin (Pho d 2).

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

The serological study (ImmunoCAP, Thermo Fisher Scientific, Phadia) was performed to measure serum total IgE (659 kU/L) and specific IgE (ImmunoCAP; kU<sub>A</sub>/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 for rHev v 6.02 (1.80) and rHev v 11 (5.05). The ISAC microarray result was only positive for rHev b 6 (0.4 ISU).

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

Immunoblot inhibition assay with passion fruit pulp extract in the solid phase and *A sericifera* extracts as inhibitors revealed inhibition of total IgE binding with *A sericifera* leaf extract and almost total inhibition of IgE binding with *A sericifera* stem and fruit extracts (Figure, Immunoblot-inhibition). The higher inhibition observed with *A sericifera*



**Figure.** Immunoblot. A, *Araujia sericifera* leaf extract. B, *A sericifera* stem extract. C, *A sericifera* fruit extract. Lane P, P', patient serum (2 dilutions); Lane C, control serum (pool of sera from nonatopic individuals); Lane M, molecular mass standard. Immunoblot-inhibition with passion fruit pulp extract in solid phase. Lane C, control serum; Lane 1-6, patient serum preincubated 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), and with lamb extract (lane 6); Lane M, molecular mass standard.

leaf extract than with passion fruit pulp extract (positive control of inhibition, homologous inhibition) points to primary sensitization to *A sericifera*.

CAP-inhibition with patient serum and *A sericifera* extracts as inhibitors revealed complete IgE inhibition for 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 primary sensitization to *A sericifera*. 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 37-kDa *A sericifera* protein that could be a  $\beta$ -1,3-glucanase homologous with Hev b 2. The patient we describe had no history of previous sensitization or clinical symptoms related to latex exposure. Similarly, he had no risk factors for sensitization to latex. Therefore, the clinical history and inhibition results pointed us toward primary sensitization to *A sericifera*. Positive specific IgE levels to Hev b 6.02 and Hev b 11, negative sIgE levels to latex, and the cross-reactivity detected between these latex allergens and *A sericifera* proteins point to *A sericifera* chitinases as the primary allergens in the symptoms described. The specific IgE that was negative against a complete latex extract but positive against 2 purified extracts of its molecular components could be explained by the low-medium affinities of these sIgE against latex molecules if they were primarily synthesized to recognize some *A sericifera* proteins. Nevertheless, primary sensitization to natural rubber latex cannot be completely ruled out. As the patient sometimes pulled out the weeds with his bare hands, 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 associated with latex-fruit syndrome, the sensitization to *A sericifera* chitinases might have predisposed the patient to an allergic reaction to passion fruit due to cross-reactivity between passion fruit and *A sericifera* proteins.

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#### Conflicts of Interest

The authors declare that they have no conflicts of interest.

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