

## Allergic Rhinitis Due To the Ornamental Plant *Sansevieria trifasciata*

Nin-Valencia A<sup>1\*</sup>, Tomás-Pérez M<sup>1,2\*</sup>, Bartolomé Zavala B<sup>3</sup>

<sup>1</sup>Department of Allergy, Hospital La Paz, Madrid, Spain

<sup>2</sup>Hospital La Paz Institute for Health Research (IdiPAZ), Madrid, Spain

<sup>3</sup>Roxall España, R&D Department, Bilbao, Vizcaya, Spain

\*These authors should be considered joint first author.

### Corresponding author:

Ana Nin Valencia

Paseo de la Castellana, 261, 28046. Madrid. Spain.

**Email:** anarcnin41@yahoo.com

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*Sansevieria trifasciata* [*S. trifasciata*] is a common plant widely found in homes and parks, commonly known as “snake plant” or “mother-in-law’s tongue”. It is herbaceous, perennial, succulent plant with long lanceolate leaves that belongs to the *Asparagaceae* family, in the *Asparagales* order.[1]. *S.trifasciata* is mostly used as an indoor ornamental plant and to improve indoor air quality [2]. There are cases of allergic rhinitis associated with indoor plants [3], although cases of sensitization to *S. trifasciata* have not been reported to date.

We report the case of a 37-year-old man previously diagnosed with atopic dermatitis and rhinitis by sensitization to grass pollen who attended our allergy service with a 1-year history of perennial sneezing and nasal congestion that he associated with being at home, especially in his living room where he had several plants.

An allergological study was carried out using a skin prick-test (SPT) with extracts of common allergenic sources (pollen from *Cupressus arizonica*, *Platanus acerifolia*, *Olea europaea*, *Lolium perenne*, Mixed grass, *Artemisia vulgaris*, *Salsola kali* and *Parietaria judaica*, as well as *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, cockroach, *Alternaria alternata*, *Aspergillus fumigatus*, *Cladosporium herbarum*, and dog and cat dander) and pollen profilin (Pho d2 Roxall Lab.). The results were positive for pollens from grass (3x3 mm) and *Lolium perenne* (3x3mm). A Prick-Prick Test (PPT) was also performed to the plants present in the patient’s home (*Ficus benjamina*, *S.trifasciata*, *Pilea peperomioides*, *Monstera deliciosa*, *Aloe vera*, kentia, potato, and bamboo). The results were positive only for *S. trifasciata* (4x5 mm). APPT with *S.*

*trifasciata* was also performed in 4 non-allergic subjects with a negative result in all cases.

An SPT was performed for some edible foods from the *Asparagales* order like onion, garlic and asparagus, finding a slight sensitization to asparagus (2x3 mm). The patient had never experienced problems with these foods.

An *in vitro* study was performed to determine total serum IgE (39.9kU/L) and specific IgE (ImmunoCAP; kUA/L) to rBet v1, r Bet v2, r Phl p12, r Pru p3, and extracts from garlic, onion, asparagus, and latex. The results were positive for garlic (0.88), onion (0.74), asparagus (0.69) and latex (0.67).

Finally, a protein extract from *S. trifasciata* leaf was prepared by homogenization in phosphate buffer saline (20% W/V), and subsequent dialyzation and lyophilization. An SDS-PAGE immunoblotting assay with *S. trifasciata* leaf extract under standard conditions (2-mercaptoethanol) was carried out as described by Laemmli[4]. The assay was performed using 3 different polyvinylidene difluoride (PVDF) membrane blockers (skimmed milk, egg white and fish collagen) and the same results were obtained: an IgE-reactive area between 100-37 kDa and two IgE-binding bands of 17.5 and 18.5 kDa. (Figure 1; result with skimmed milk).

The patient was instructed to avoid exposure to *S. trifasciata*. Subsequently, he reported important clinical improvement after removing the plant.

Allergy to ornamental plants is unusual, although some studies, such as that of Goldberg *et al* [5], have reported that the incidence of sensitization to 11 species of ornamental plants was 17-23% among the general population and 52% in flower growers. In the latter group, 45% had nasal, ocular and respiratory symptoms associated with exposure to the plants tested. In other studies, the importance of the degree of exposure has been demonstrated, since high degrees of exposure are associated with a

greater frequency of sensitization. Moreover, Axelsson *et al* [6] studied the plant *Ficus benjamina* and found no evidence of sensitization in office workers exposed only at work, unlike those who had the plant at home and who were mostly sensitized. This is consistent with the findings of our study, where the patient also had the plant at home.

Patients often relate their symptoms to exposure to the plant, as in the study by Herrera-Lasso *et al* [7], who reported a case of hypersensitivity to another houseplant, *Spathiphyllum wallisii*, where the patient presented bronchospasm and severe rhinoconjunctivitis on exposure to the plant she had at home.

Atopic patients are more vulnerable to sensitization, although some cases of allergy to ornamental plants in non-atopic patients have been reported [8]. Aydin *et al* [9] showed that among individuals who owned ornamental plants, atopic individuals were more sensitized to ornamental plants than non-atopic individuals (74.6% versus 31.9%). In the present case the patient had a history of atopy, atopic dermatitis and rhinitis due to sensitization to grass pollen. Axelsson *et al* [8] analyzed the allergenic source of ornamental plants in the case of *F.benjamina* and concluded that the allergen in this case emanated from the milky sap of the plant. Water diffuses through the leaf and brings out the allergen by osmosis on the upper surface of the leaf, where the dust sucks up the water. Once the water evaporates, the allergens mix the dust and become airborne and, therefore, be inhaled. In the present case, sensitization to *S. trifasciata* may have occurred by a similar mechanism, although we were unable to prove this. However, the novelty of our study was that we used immunoblotting to demonstrate the presence of IgE-reactive proteins from *S. trifasciata*, explaining the IgE-mediated response of the patient to the plant.

The sensitization to latex detected in the patient is striking. However, he had sporadic contact with latex utensils without any kind of problem and therefore we do not

consider it clinically relevant. Furthermore there is no taxonomic relationship with *S. trifasciata* that could cause cross-reactivity.

Significantly the patient was sensitized to asparagus, garlic and onion (foods from the *Asparagales* order as *S. trifasciata*) probably due to cross-reactivity. However, in the present case, this finding has no clinical relevance since the patient tolerated all these foods.

Once the most common causes have been ruled out, we conclude that indoor plants should be taken into consideration in the study of persistent and/or perennial allergy symptoms.

To the best of our knowledge, this is the first reported case of a patient with symptoms of allergic rhinitis associated with exposure to *S. trifasciata*. Sensitization was demonstrated by PPT and SDS-PAGE immunoblotting, which was able to detect serum specific IgEs that recognize plant leaf proteins.

#### **Financial sources**

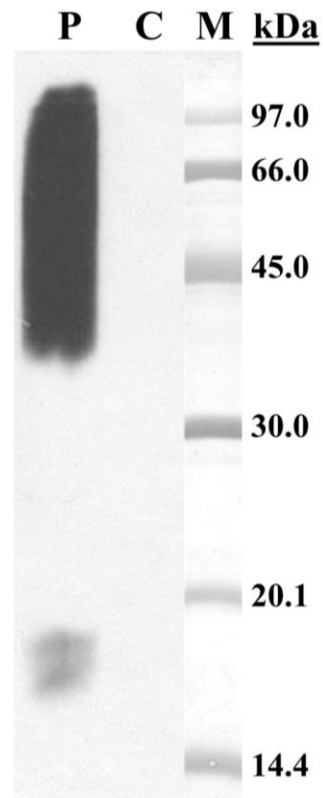
Specific financial sources have not been received or used for this study.

#### **Conflicts of interest**

The authors declare that they have no conflicts of interest.

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**Figure Legend****Figure 1.** SDS-PAGE Immunoblotting with *Sansevieria trifasciata* leaf extract.

Lane P: Patient serum; Lane C: Control serum (pool of sera from non-atopic subjects); M: Molecular mass standard.