

Pollen allergy to mimosa (*Acacia floribunda*) in a Mediterranean area: an occupational disease

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We have described respiratory allergy to the pollens of mimosa (Acacia floribunda) in some Mediterranean areas of Italy and France. The incidence of sensitivity is only 1.2% in a population of atopics but 31% in an "at risk" population of floriculturists. It seems, therefore, that the pollen of Acacia floribunda, although heavy and amphiphilous, is potentially allergenic for subjects who are in close proximity.

INTRODUCTION

Respiratory allergy to the pollens of some species of Mimosaceae although rare has been described in India,^{1,2} the USA,³ California,⁴ Texas,^{5,6} Hawaii,⁷ Florida,⁸ France,⁹ Italy,¹⁰ and Australia.¹¹ Although this pollen is heavy and cannot be widely disseminated it can cause allergy in some patients living in close proximity to the plant (proximity allergy). One of us (Bordighera) has observed a large number of cases compared with the few cases observed in the South of France. This is because in the Province of Imperia, the so-called Riviera dei Fiori, many Mimosas are cultivated by floriculturists.

PATIENTS AND METHODS

During 1980 to 1989 we have found 45 cases of allergy to *Acacia floribunda*. In making a diagnosis we considered as relevant the following points:

1. The date of pollination, which generally starts in February or March, together with *Cupressus sempervirens* and ends in May.
2. The proximity of *Acacia floribunda* plants.
3. Positive skin tests (prick tests)

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and positive RAST. Prick testing was performed with the Dome Holister lancet. The extracts were kindly provided by Lofarma laboratory (Milan, Italy) and were used in a 1/20 solution (wt/vol). We have adopted the following scores: 3+ reaction corresponds to the wheal and erythema of the histamine prick test. A 4+ reaction corresponds to a greater reaction than that to histamine. A 2+ reaction is 75%, and a 1+ reaction is half the size of the histamine reaction.

We studied two groups of patients. (1) Patients having *Acacia floribunda* in their gardens or nearby. In this case the risk of sensitization is very low at 1.2% in a general population of atopics having pollinosis. (2) A group of 106 floriculturists who cultivate *Acacia floribunda*. The Riviera dei Fiori is an area of intense cultivation of *Acacia floribunda*. It is estimated that there are 250,000 plants in a small area of 1052 hectares (Department of Agriculture of Bordighera). This group was at higher risk than the former as confirmed by our results.

Clinically, the patients have the usual allergic oculorhinitis. We found only a few cases of asthma mostly among the monosensitized patients. Only one case of dermatologic allergy has been found in a patient having urticaria and allergic rhinitis.

We performed RAST with the same extract. We used the technique developed by Lofarma laboratories called "Allergosfere" which is a

slight modification of the usual Pharmacia RAST. Allergobeads [Allergobeads is a commercial product, part of a RIAT Kit (SferikitR, Lofarma, Milan) for the detection of specific IgE] are polystyrene beads 6.4 mm in diameter with rough surfaces to which the allergens are conveniently bound via glutaraldehyde by a Lofarma patented method.

RESULTS

The incidence of mimosa allergy among patients with pollinosis is very low (Table 1).

In general patients are allergic to other airborne allergens [grass pollens, *Parietaria officinalis*, *Cupressus sempervirens*, and *Dermatophagoides pteronyssinus* (Table 2)]. Sensitization to Mimosa pollen and to no other allergen source was found in only four subjects who were asthmatic. These four patients were floriculturists.

The RASTs were positive in all the cases with a good correlation although the scores of RAST positivity were rather low (Table 3).

Among 106 floriculturists we found 33 cases of allergy (31%), which is very high compared with the first group. Of the total of 45 cases observed, 33 were floriculturists (73%) and only 12 were nonfloriculturists (Table 4).

Hyposensitization using an extract made by Lofarma Laboratories was undertaken with six subjects with good results but the treatment was not performed double blind.

Table 1. Incidence of Mimosa Allergy Among Patients with Pollinosis

Country	Monosensitization, %	Polysensitization, %
France, 0.3%	0	100
Italy, 1.2%	8.8	91.2

Table 2. Incidence* of Other Airborne Allergens Among 45 Patients with Mimosa Allergy

Parietaria	Grass Pollens	Cupressus semp.	Olive Tree	Other Pollens	Molds
23	16	19	7	2	24

* RIA.

Table 3. Correlation Between Skin Tests and RAST

	Prick				RAST			
Score	1	2	3	4	I	II	III	IV
Number of Patients	12	24	8	1	34	9	2	0

Table 4. Incidence of Mimosa Allergy and Clinical Patterns Among a Group of Floriculturists

Number	Positive	Oculorhinitis	Asthma
106	33 (31%)	29 (78.5%)	4 (11.5%)

DISCUSSION

The Leguminosae or Fabiaceae¹²⁻¹⁵ are a family of Dicotyledonous plants that derive their name from their fruits in the form of a pod or legume. It is a very large family of herbs, shrubs, and trees with approximately 700 genera and 17,000 species. They are divided into three subfamilies: Mimosoideae, Caesalpinoideae, and Papilionoideae. Their distribution is cosmopolitan.

Mimosoideae Genera and Species

The Mimosaceae family has approximately 56 genera and 500 to 3000 species. The most common include *Acacia* t 19, *Inga*, *Pithecellobium*, *Calliandra*, *Mimosa*, *Entada*, *Neptunia*, *Prosopis* t 20, and *Albizia*.

The word *acacia* comes from the greek "ake" which means pointed and refers to the pointed form of the leaves. The word *mimosa* is derived from the latin *mimus* (mime) because the leaves are very sensitive to every contact especially to the wind.

In Australia they are called *wattles* because the aborigines used them to build their houses.

In some semidesert areas of Africa and South America they are often the only plants found growing.

In the USA two of these plants have been reported to cause allergy problems: mesquite (*Prosopis*) (in Texas, New Mexico, Southeastern California, and Hawaii), which pollinates from May through July (allergy to *Prosopis juliflora* has also been found in India), and sweet acacia (*Acacia farnesiana*), which is widely planted as an ornamental and blooms from January through October in California.

Acacia (*Acacia floribunda*) grows to a height of 4 to 10 m. Each leaf has 10 to 14 pairs of leaflets arranged along both sides of a common stem. The flowers are regular with the petals valvating in bud and with ten or more stamens. The creamy yellow flowers look like a miniature shaving brush. Single seed pods are borne along the upper portion of the stem.

The Pollen

The grain compound (polyad) is composed of 16 cells, eight forming a cube-shaped central block of two fours one above the other, and eight

in a ring encircling the cube symmetrically above and below the plane lying between the two fours of the central block (Fig 1). Central cells are cubical with interstices between the cells at their corners. Peripheral cells are square on the outside, tapering inward to fit into the ring. The whole grain is flattened and lens shaped, its outline in all planes is rounded "oblate" or "peroblate" (45 to 50 μ).⁴ Mesquite pollen is an exception. It is usually unicellular and spheroidal with three long tapering furrows equidistant and with a slight bulge at the middle of each furrow indicating the germinal pore. The exine is of medium thickness on external walls of the cells, much thinner on the internal walls and slightly thickened at the protruding corners of the cubical cells. A groove cut into the external wall (face) of each cell forms a rectangular figure (10 $\times$ 9 μ) with its sides parallel to the sides of the face. It is 1 μ wide and much wider at the corners. The intine is rather thin, but thicker at the corners of cubical cells as seen in surface view.¹⁶

Pollen Counts

The heavy pollens, which are not wind dispersed (anemophilous) and not in the strictest sense entomophilous, can be classed as amphiphilous, ie, having, "only a minority of their grains windborne probably often dislodged by vigorously foraging insects."¹⁷ This means that it is difficult in a given area to obtain a reliable pollen count since the pollen grains are rarely observed on slides.

Economic Uses

Leguminosae constitute an important agricultural crop. The more important food members include lentils, many varieties of beans, and soybean. These may constitute a hazard when handled in large quantities. Peas and peanuts are also members of Leguminosae and are responsible for some cases of food allergy.

Acacia retinodes (*Acacia flori-*

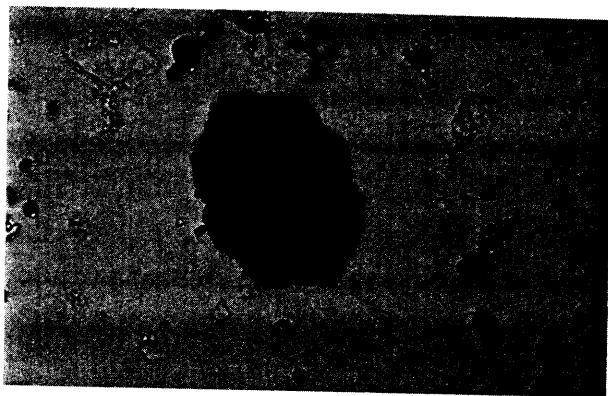


Figure 1. Acacia pollen grain showing its 16-cell composition.

bunda) is used as an ornamental flower. *Acacia dealbata* is cultivated in Spain, Portugal, France, and Italy and is used for the production of tannin and perfumes. Others are used as a source of timber or gum arabic.

Allergy to Mimosa

We presented here clinical and immunologic evidence that mimosa (*Acacia floribunda*) pollens can cause respiratory allergy in patients living in close proximity to the plants. There is, in general, a good correlation between skin tests and RAST although the RAST is less sensitive as observed in other allergic conditions (Table 3).

We cannot completely exclude the possibility of some irritating factors in the pollens of *Acacia floribunda* which, when in contact with the nasal mucosa, can liberate on one hand the antigenic proteins responsible for the allergic reaction and on the other hand some volatile products such as oils. This point has been recently stressed by Eriksson et al¹⁸ for flowers in general. Some of our patients from the Nice area fall into this category with clinical pseudoallergic symptoms and with negative skin test and RAST. One of us has observed 20 patients in France in whom skin tests and RAST were negative and who complained of respiratory symptoms during the acacia season. These subjects believed they were allergic to *Acacia floribunda* and were skin

tested with *Acacia floribunda* and *Acacia dealbata*.

We also cannot rule out the possibility that in some cases it is the additive effects of the two pollens *Cupressus sempervirens* and *Acacia floribunda* that cause the symptoms since skin test positive reactions to *Cupressus sempervirens* were found in 22 patients and since the season of *Acacia floribunda* coincides roughly with the somewhat shorter season for *Cupressus sempervirens*. The possibility that the clinical symptoms are mostly related to *Cupressus sempervirens* has to be considered in the 19 patients (out of 45) who were skin test positive to this pollen.

It seems to us that we have two separate allergies but that *Acacia floribunda* is the primary allergen source. One patient who was allergic to both pollens and who received specific immunotherapy to *Acacia floribunda* only, improved.

Finally, we found a moderate skin test reactivity to the pollens of *Parietaria officinalis* in 23 cases. But with the blooming of *Parietaria officinalis* starting in our area in March when the blooming of *Acacia floribunda* ends, we can assume that *Parietaria officinalis* has clinical relevance only in two cases, since we had two patients who continued to have respiratory symptoms from March to September.

Mimosa allergy, which may be underestimated in other countries

where members of the Mimosae family occur, has now been defined as a clinical entity. We must now try to define the allergens of this species and purify the important ones.

Since an "at risk" population has developed respiratory allergy in a larger number of cases than in farmers growing amenophilous plants, we can suppose that there is probably no difference between amenophilous and entemophilous pollens as far as their allergenicity is concerned.

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SUPPRESSION OF ADRENAL FUNCTION IN ASTHMA

In order to investigate adrenal function in children with asthma the authors studied 48 children with chronic asthma. Twenty-three children, 5-14 years of age (median 8.7 years), had never received inhaled corticosteroids. Twenty-five children (4-14 years of age, median 9.9 years) had been receiving inhaled beclomethasone dipropionate, 200-900 μg daily (median 400 μg), or 140-930 $\mu\text{g}/\text{m}^2$ body surface area (median 420 $\mu\text{g}/\text{m}^2$). They had inhaled beclomethasone from "conventional inhalation devices" for 1 to 8 years (median 3 years). None had received systemic steroids during the previous 3 months and none had received systemic steroids for more than ten days continuously during the previous 2 years. A 24-hour urine sample was collected from each child for measurement of cortisol and androgen metabolites.

There were substantial differences in total cortisol metabolite excretion among patients irrespective of whether they had been receiving inhaled beclomethasone, but excretion was within the range considered normal by the authors for all children who had received no inhaled steroid therapy and below normal for 8 of the 25 treated with inhaled beclomethasone. There was a significant negative correlation between cortisol metabolite excretion and the dose of inhaled beclomethasone. The authors inferred suppression of daily cortisol excretion in 8 of 15 who had been receiving doses that exceeded 400 $\mu\text{g}/\text{m}^2/\text{day}$.

Androgen metabolite excretion was low in many children 8-13 years of age irrespective of whether they had received inhaled beclomethasone.

These data confirm other reports of dose-related adrenal suppression by inhaled beclomethasone although the authors did not supply data to substantiate their definition of the normal range. Decreased excretion of androgen metabolites, which was unrelated to treatment with inhaled steroids, suggests decreased production of androgens may account for delays in growth of some children with asthma.

—RMS

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