

Short communication

## Minor pollinosis from *Cryptomeria japonica* in Varese, northern Italy. Aerobiological monitoring and main clinical features

Giorgio Crosta, Franco Brunetta\*, Maria Luisa Ortellì, Antonio Cavallo, Roberto Bertolini

Pneumology Department, Regional Hospital and Macchi Foundation, Viale Borri 57, I-21100 Varese, Italy

Received 27 July 1995; revised 20 March 1996; accepted 19 April 1996

### Abstract

In the last 2 years, we have conducted an aerobiological monitoring program of *Cryptomeria japonica*, a plant belonging to the family of Taxodiaceae that sometimes causes pollinosis in the period from February to April. Throughout 1994, we checked the incidence of its sensitization and the clinical effects in 85 subjects with correlated seasonal symptoms, who gave a positive skin prick test (SPT) for Betulaceae and/or Corylaceae. Twenty-five patients (29.4%; 19 M; 6 F; mean age, 38.8 years) all with oculorhinitis, were SPT positive to an allergenic extract of *Cryptomeria*. RAST confirmed this positivity in 44% of the cases. No patients showed monosensitization for *Cryptomeria* to either SPT or RAST. Two subjects gave a positive result on specific nasal provocation. RAST inhibition showed no cross-reaction between *Cryptomeria* and birch pollen. During the pollen season each patient made a list, scoring symptoms and specifying any drugs used, so we could correlate these elements with aerobiological observations. The pollen concentration probably exceeded the allergizing threshold for *Cryptomeria* on 8 days during 3 months of recording. The intensity and duration of symptoms seemed to be mainly influenced by sensitization to Betulaceae and Corylaceae. It is thus possible that a combination of 'minor' pollinosis may produce seasonal symptoms in allergic patients.

**Keywords:** *Cryptomeria japonica*; Aerobiological monitoring; Minor pollinosis; Aerobiology

### 1. Introduction

Pollinosis is a seasonal disease, usually distinguished by conjunctival, nasal and bronchial mucosal discharge, occurring singly or altogether in patients sensitive to one or more families of pollens during the blossoming period.

In Italy the most frequent sensitivity to pollens, in over 50 000 patients, is to Graminaceae (64.6%), followed by *Parietaria* (36.7%), the olive tree (15.8%), Compositae (13.2%) and the association Betulaceae-Corylaceae (7%) (Negrini and Arobba, 1992). In northern Italy the Graminaceae effect is most important and,

in the Po Valley area, Betulaceae-Corylaceae, followed by *Parietaria* and olive tree.

Some pollinoses, previously considered as 'minor', particularly sensitization to Cupressaceae, appear to be increasing rapidly and have been reported in Italy since 1984–85 (Macchia et al., 1984; Rottoli et al., 1984; Ariano, 1985; Strada et al., 1989; Zerboni et al., 1991). In the last 2 years we have organized aerobiological monitoring of pollen from the tree, *Cryptomeria japonica*, together with a clinical survey of sensitive patients; though this is not yet a widespread problem in Italy, it produces large-scale pollinosis in other countries.

*Cryptomeria japonica* belongs to the family of Taxodiaceae, closely related to the Cupressaceae (Panzani et al., 1986). Yasueda isolated its main allergen, calling it SPB (Yasueda et al., 1980, 1983), and demonstrated cross-reactivity with *Chamaecyparis obtusa*, belonging to the Cupressaceae family.

\* Corresponding author. Tel.: +39 332 278238; fax: +39 332 278237.

Table 1  
Clinical data on 14 patients with negative RAST for *Cryptomeria*

| No. | Initials | Sex | Age (years) | SPT |     |     | RAST (class) |     |     | sNPT (I.U.) |     |    |    |
|-----|----------|-----|-------------|-----|-----|-----|--------------|-----|-----|-------------|-----|----|----|
|     |          |     |             | Cry | Bet | Cor | Cry          | Bet | Cor | Jun         | Cup | T0 | T1 |
| 01  | BS       | F   | 55          | 2+  | 4+  | 4+  | 0            | 3   | 3   | 0           | 0   | —  | —  |
| 02  | CL       | M   | 19          | 2+  | 3+  | 3+  | 0            | 2   | 1   | 0           | 1   | —  | —  |
| 03  | FR       | M   | 21          | 1+  | 2+  | 2+  | 0            | 0   | 0   | 0           | 0   | —  | —  |
| 04  | AP       | F   | 36          | 2+  | 4+  | 4+  | 0            | 2   | 2   | 0           | 0   | —  | —  |
| 05  | PR       | M   | 22          | 3+  | 2+  | 2+  | 0            | 0   | 0   | 0           | 0   | —  | —  |
| 06  | LT       | M   | 23          | 3+  | 3+  | 4+  | 0            | 3   | 2   | 0           | 0   | —  | —  |
| 07  | PF       | M   | 33          | 2+  | 3+  | 3+  | 0            | 0   | 0   | 0           | 0   | —  | —  |
| 08  | SA       | M   | 28          | 2+  | 3+  | 3+  | 0            | 2   | 0   | 0           | 0   | —  | —  |
| 09  | GL       | M   | 22          | 3+  | 3+  | 3+  | 0            | 2   | 0   | 0           | 0   | —  | —  |
| 10  | CS       | M   | 26          | 3+  | 3+  | 3+  | 0            | 0   | 0   | 0           | 0   | —  | —  |
| 11  | VG       | M   | 54          | 1+  | 3+  | 3+  | 0            | 2   | 2   | 0           | 0   | —  | —  |
| 12  | GV       | M   | 45          | 3+  | 4+  | 4+  | 0            | 2   | 0   | 0           | 0   | —  | —  |
| 13  | GR       | M   | 31          | 1+  | 3+  | 3+  | 0            | 2   | 2   | 0           | 0   | —  | —  |
| 14  | FG       | M   | 26          | 1+  | 3+  | 3+  | 0            | 3   | 3   | 0           | 0   | —  | —  |

In Italy this tree is still occasionally planted for ornamental purposes in gardens, or for reforestation. It is an evergreen, with spiral-shaped-needle leaves 5–20 cm long, growing well in humid sunny terrain, between sea level and 1200 m altitude. The pollen is spherical, 30–40  $\mu$ m in diameter, with a single opening and a single papilla. The esina is very thin. The pollination period is from February to April, as verified by our recordings. In an earlier report (Brunetta et al., 1994) we noted there were no patients sensitive only to *Cryptomeria* by the skin prick test and symptoms were only oculorhinitic.

This study assessed the incidence of pollinosis due to *Cryptomeria* and its clinical importance in patients with seasonal allergic symptoms with reference to the period of presence of this pollen in the atmosphere.

## 2. Materials and methods

Between January and December 1994, we carried out skin prick tests (SPT) for the most common allergenic extracts on 1005 patients at the Outpatient Department of Allergology and Respiratory Disorders of the Varese Regional Hospital. The SPT were performed on the upper side of the forearm, using the Histamine Equivalent Prick for detection, with extracts supplied by Lofarma, Milan, Italy. In 85 subjects suffering from seasonal oculorhinitis and/or asthma, reporting symptoms developing from February to April for at least 2 years, a positive SPT for Betulaceae and/or Corylaceae was recorded. These patients then did a SPT with an allergenic extract of *Cryptomeria japonica* (supplied by LOFARMA, Milan, Italy). All patients reported as SPT-positive for *Cryptomeria* suffered from oculorhinitis.

tis.

A blood sample was drawn out of the pollen season to determine the specific IgE (RAST) for five different allergens: *Cryptomeria japonica*, *Betula pendula*, *Corylus avellana*, *Cupressus sempervirens*, and *Juniperus saboides*.

To check the possible cross-sensitivity between birch and *Cryptomeria* pollen RAST inhibition was carried out, using the serum from four patients who showed at least 2nd class RAST positivity for *Cryptomeria*.

All the SPT-positive patients for *Cryptomeria* were examined by anterior rhinomanometry before (T0), during (T1) and after (T2) the subsequent pollen season. At times T0 and T2, the survey was completed with a specific nasal provocation test (sNPT) for *Cryptomeria*. An increase in resistance over 400% and/or a reduction of the flow of more than 50% was considered the threshold for a positive result.

From the beginning of February until the end of April 1995, patients were treated with oral ketotifene 2 mg/day and oral cetirizine 10 mg when necessary. They kept a clinical diary, recording the presence and intensity (from 0 to 3) of symptoms such as lachrymation, photophobia, ocular itching, rhinorrhea, sneezing, nasal obstruction, and the use of any additional symptomatic drugs. These records were successfully correlated with the pollen calendar worked out by our monitoring station.

The aerobiological monitoring was carried out by means of a 'Hirst type' volumetric sampler (model Lanzoni VPPS 2000) with weekly recording. The silicon tape was divided into strips 48 mm long, fixed and stained with basic fuchsin. Readings were taken with an optical microscope ( $\times 40$ ) carrying out four scans per slide.

Table 2  
Clinical data on 11 patients with positive RAST for *Cryptomeria*

| No. | Initials | Sex | Age (years) | SPT |     |     | RAST (class) |     |     | sNPT (I.U.) |     |    |    |
|-----|----------|-----|-------------|-----|-----|-----|--------------|-----|-----|-------------|-----|----|----|
|     |          |     |             | Cry | Bet | Cor | Cry          | Bet | Cor | Jun         | Cup | T0 | T1 |
| 01  | DM       | M   | 33          | 2+  | 1+  | 3+  | 1            | 0   | 0   | 1           | 0   | —  | —  |
| 02  | DF       | M   | 20          | 3+  | 3+  | 3+  | 1            | 3   | 3   | 0           | 2   | —  | —  |
| 03  | FS       | F   | 21          | 1+  | 1+  | 1+  | 1            | 1   | 1   | 1           | 0   | —  | —  |
| 04  | AF       | M   | 34          | 2+  | 3+  | 3+  | 2            | 3   | 2   | 1           | 1   | —  | —  |
| 05  | DC       | M   | 21          | 3+  | 3+  | 3+  | 1            | 2   | 1   | 1           | 0   | —  | —  |
| 06  | MF       | F   | 28          | 2+  | 3+  | 3+  | 1            | 3   | 3   | 1           | 0   | —  | —  |
| 07  | LA       | M   | 20          | 2+  | 3+  | 3+  | 3            | 3   | 2   | 1           | 0   | —  | —  |
| 08  | ZP       | M   | 24          | 2+  | 4+  | 4+  | 2            | 4   | 3   | 2           | 2   | 5  | 5  |
| 09  | SE       | F   | 51          | 3+  | 2+  | 2+  | 2            | 2   | 1   | 1           | 1   | —  | —  |
| 10  | MA       | F   | 50          | 2+  | 4+  | 4+  | 2            | 2   | 2   | 2           | 0   | 80 | 5  |
| 11  | BR       | M   | 28          | 3+  | 4+  | 4+  | 1            | 3   | 2   | 2           | 0   | —  | —  |

### 3. Results

Eighty-five patients (37 M, 43.5%; 48 F, 56.5%; mean age,  $29.2 \pm 11.2$  years) suffering from oculorhinitis and/or asthma, gave positive SPT for Betulaceae and/or Corylaceae. In 25 cases (29.4%), 19 males (76%) and six females (24%), all suffering from oculorhinitis, the SPT was positive for *Cryptomeria japonica*. The mean age of this subgroup was  $30.8 \pm 11.2$  years. In 36% of these patients, the diameter of the wheal for *Cryptomeria* was equal to or more than the largest diameter of the histamine wheal. The wheals for Betulaceae and Corylaceae equal to or greater than the largest diameter of the histamine wheal were respectively 80% and 84%. Fourteen of the SPT-positive patients (56%) had a RAST for *Cryptomeria* class 0 (Group A). Except for two, these subjects all had a class 2–3 positive RAST for birch and hazel; only one very weak positive RAST was recorded for *Juniperus* and *Cupressus* (Table 1).

Table 2 summarizes the data concerning 11 patients (44%) with a positive RAST for *Cryptomeria* (Group B). Except in one case, positivity for birch and *Corylus*

was also present, mostly of a high level (class 2–3–4). A weak and almost steady positivity for *Juniperus* was also recorded (91% of the cases) with less frequent positive results (45.5%) for *Cupressus*.

No patients had a SPT or a RAST showing monosensitization for *Cryptomeria*.

The results of RAST inhibition, using the sera of four subjects (SE, LA, ZP, MA), showed that the positivity for birch was not changed to negative by the *Cryptomeria* pollen extract or vice-versa; therefore it can be assumed that the two pollens do not cross-react.

No patients with positive SPT to *Cryptomeria* but with negative RAST had a positive basal sNPT. On the other hand, two subjects (18.2%) with positive RAST showed a significant increase in nasal resistance after insufflation of 5 and 80 I.U. of *Cryptomeria* allergenic extract (Table 2).

Nasal resistances recorded during the pollen season were increased in nearly all 25 patients, with a more sensitive increase, though not statistically meaningful, in Group B (Table 3). After the end of the pollen season, no other positivities for sNPT were recorded. Flow was reduced and nasal resistances increased with a smaller amount of allergenic extract for patient MA. The mean number of days with symptoms was similar for patients in groups A and B, and so was the mean intensity of the symptoms. The two groups used similar amounts of symptomatic drugs (Table 3).

Aerobiological observation indicated there were 8 days when the pollen concentration of *Cryptomeria* was probably higher than the allergizing threshold. The curves of concentrations for pollen of *Cryptomeria*, Betulaceae and Corylaceae followed the same pattern though there was always much less *Cryptomeria* pollen than that of the other plants. There was a good correlation between the behaviour of the symptoms score and the pollen concentration for these three plants (Fig. 1).

Table 3  
Mean nasal resistance, score of symptoms and drug's use for 25 patients with negative (Group A) or positive (Group B) RAST for *Cryptomeria japonica*

|                                                 | Group A | Group B |
|-------------------------------------------------|---------|---------|
| Mean nasal resistance (Pa cm <sup>3</sup> s)    |         |         |
| T0                                              | 0.11    | 0.14    |
| T1                                              | 0.31    | 0.45    |
| T2                                              | 0.20    | 0.32    |
| Mean days with symptoms                         | 25.2    | 26.5    |
| Mean intensity of symptoms                      | 1.58    | 1.61    |
| Mean use of symptomatic drugs (tablets patient) | 19.1    | 19.2    |

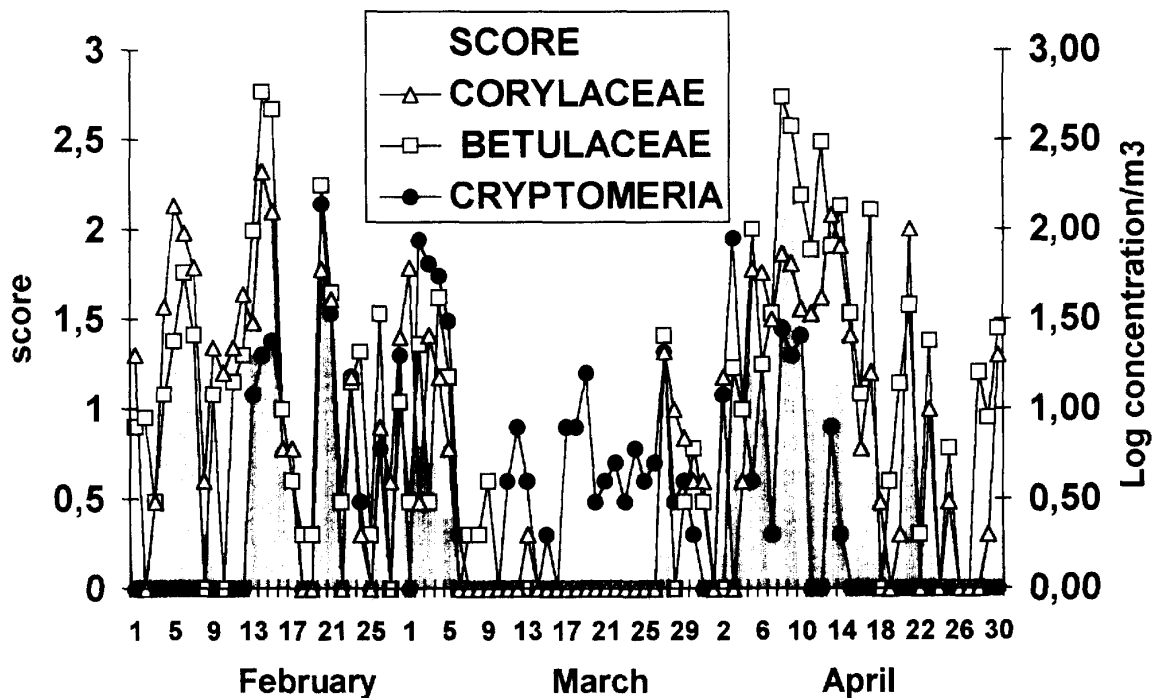


Fig. 1. Daily pollen concentrations for *Cryptomeria japonica*, Betulaceae and Corylaceae from February to April 1995 in Varese (Italy). Correlation with daily mean symptoms score in 25 patients with skin prick tests positive for these three pollens.

#### 4. Discussion

In our experience, about one-third of subjects with seasonal symptoms due to sensitivity for Betulaceae and/or Corylaceae also have a positive SPT for *Cryptomeria japonica*, with a greater prevalence in males, although this needs to be verified. The main age range involved is young, although in our studies there are no patients less than 8 years old. As reported in our previous paper, no subject with a positive skin prick test for *Cryptomeria* shows asthmatic type symptoms.

The proportion of subjects with a clear positivity of SPT is about one-third for *Cryptomeria*, while it is greater for Betulaceae and Corylaceae. RAST confirmed the SPT result in almost half the cases, showing the presence of a larger number of sensitizing pollens in Group B. Therefore subjects particularly predisposed to allergic type manifestations belong to this group.

Once again we found no monosensitization for *Cryptomeria* in either the SPT or RAST. In future it would be desirable to check patients for this feature.

The RAST inhibition test showed that the pollen of *Cryptomeria* and birch do not cross-react; presumably, therefore, both contribute independently, though not necessarily to the same extent, to the manifestation of the symptoms.

The sNPT confirmed the importance of *Cryptomeria* pollen in producing the clinical symptoms in two patients of Group B. The clinical score and the use of additional drugs did not differ in the two groups, probably because of the preponderant presence in both of sensitivity to Betulaceae and/or Corylaceae. However we must stress the intensity and the time of the symptoms, even with preventive basic treatment.

Aerobiological monitoring confirmed the presence of pollen from *Cryptomeria* in our area. During the 3 months of the survey, pollen concentrations greater than the threshold usually considered as allergizing were recorded on 8 days. It is interesting to observe that on two out of these 8 days, allergizing concentrations due to Betulaceae and/or Corylaceae pollen did not occur at the same time. The curves for the pollen concentrations of these three plants are virtually superimposable, which is highly confusing since if it is easy to suspect allergy to Betulaceae and to Corylaceae, we must therefore pay more attention to checking for 'minor' pollinoses, such as sensitization to *Cryptomeria*.

#### References

- Ariano, R. (1985) Allergia al polline di cipresso in Liguria. Proceedings del 17° Congresso Nazionale della Società Italiana di Allergologia e Immunologia Clinica, Milan, p. 138.

- Brunetta, F., Crosta, G., Beghè, B. and Ortellì, M.L. (1994) Allergia alla *Cryptomeria japonica*: una nuova pollinosi nella nostra osservazione personale. Proceedings Congresso di Fondazione della Società Italiana di Medicina Respiratoria, Belgirate, 21–23 April, 1994, p. 19.
- Macchia, L., Strada, S., Carbonara, A.M., Caiaffa, M.F. and Tursi, A. (1984) The pollen calendar of Bari. Proceedings International Symposium 'Recent advances in Allergology' L'Aquila, 7–8 September 1984, p. 265.
- Negrini, A.C. and Arobba, D. (1992) Allergenic pollens and pollinosis in Italy: recent advances. *Allergy* 47, 371–375.
- Panzani, R., Yasueda, H., Shimizu, T. and Shida, T. (1986) Cross-reactivity between the pollens of *Cupressus sempervirens* (common cypress) and of *Cryptomeria japonica* (Japanese cedar). *Ann. Allergy* 57, 26–30.
- Rottoli, P., Rottoli, R., Beltrami, V., Refini, R.M., Zerboni, R., Campi, P. and Manfredi, M. (1984) Allergy to cypress pollen in Tuscany. Proceedings International Symposium 'Prevention of Allergic Disease', Florence, 24–27 June 1984, p. 102.
- Strada, S., Bariletto, G., Caiaffa, M.F., Calogiuri, G., Carbonara, A.M., De Michele, G., Graziani, A., Macchia, L., Pietrafesa, M., Pino, M., Scarlato, M. and Tursi, A. (1989) Rilievi epidemiologici sulla pollinosi da Cupressaceae nell'area di Bari. Proceedings 19° Congresso Nazionale della Società Italiana di Allergologia e Immunologia Clinica, Bari, 12–16 December 1989, p. 78.
- Yasueda, H., Yui, Y. and Shimizu, T. (1980) Isolation studies of allergens from Sugi pollen. *Jpn. J. Allergol.* 29, 763–768.
- Yasueda, H., Yui, Y. and Shimizu, T. (1983) Isolation and partial characterization of the major allergen from Japanese cedar (*Cryptomeria japonica*) pollen. *J. Allergy Clin. Immunol.* 34, 87–93.
- Zerboni, R., Ariano, R., Manfredi, M. and Panzani, R. (1991) Allergia ai pollini della famiglia delle Cupressaceae in alcune aree del Mediterraneo. *G. Ital. Allergol. Immunol. Clin.* 1, 479–484.