



Short communication

Aerobiological monitoring of *Alternaria* fungal spores: a comparison between surveys in 1992 and 1993 and local meteorological conditions

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Abstract

A study of airborne *Alternaria* spores was carried out over the period from April 1992 to October 1993, in the Rehabilitation Medical Centre of Montescano (PV), using an automatic volumetric spore trap (VPPS 2000 Lanzoni). The evaluation of the air concentration of these spores is becoming ever more important as it is this mycophyte which is the commonest cause of a positive allergy test. In 1993 the concentration of *Alternaria* spores was much higher than in the previous year and the period of highest sporulation was different, depending on the different rainfall pattern of the 2 years.

Keywords: *Alternaria*; Concentration; Allergy

1. Introduction

The aerobiological monitoring of mold spores is of great importance because of their possible effects on the population's health, as they are responsible for different diseases, particularly those affecting the respiratory system (O'Hollaren et al., 1991). It is important to evaluate not only the concentration of spores/m³ of air, but also variations in climatic-meteorologic parameters such as: humidity, temperature, wind velocity, sun irradiation together with rainfall, an important factor influencing the dispersion of particles. Most of the molds responsible for allergic sensitization belong to the Deuteromycotina subdivision (imperfect molds — their sexual reproduction is not known), which includes the Hyphomycetes class, to which *Alternaria* belongs. They take the form of a mycelium producing spores

directly on special branches called conidiophores (Caretta, 1989). The *Alternaria* air-borne spores were the most widespread mold spores found in aerobiological surveys (D'Amato, 1981) and those that produce the highest number of positives in patients undergoing allergy testing (PRICK e RAST). (Andri et al., 1986; Sorano et al., 1986). The onset of allergic symptoms in atopic subjects occurs most frequently when the concentration of *Alternaria* spores is equal to or greater than 100 spores/m³ (Ballero et al., 1984; Fadda et al., 1990; Peroni et al., 1988). The aim of our study was to supply useful guidelines to the physician for a prospective correlation between *Alternaria* aerodiffusion and the onset of symptoms in allergic patients. The outdoor aerobiologic monitoring of *Alternaria* was carried out using an automatic volumetric spore trap (VPPS 2000 Lanzoni) which was tested weekly and situated on a terrace of the Rehabilitation Medical Centre of Montescano (PV), over the period from April 1992 to October 1993.

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2. Results and discussion

Our 1992–1993 aerobiologic data showed a higher diffusion of *Alternaria* spores in 1993, particularly in August, compared to the previous year and different periods of maximum sporulation between the 2 years. *Alternaria* spores exceeded the 100 spores/m³ level towards the end of the spring and maximum sporulation in both years was from June to September. In April, May, October and during the rest of the year the 100/m³ was not reached due to local meteorological conditions. The figures show the data from the summer months of 1992 and 1993 when the concentration exceeded 100 spores/m³ and could cause allergic reactions. As for June 1992 and June 1993 (Fig. 1), in both periods we observed a sporulation peak towards the end of the month, with higher concentrations in the second year. The mean value in June 1992 was 130 spores/m³, while in 1993, 177 spores/m³ were recorded. On June

25th, 1992 the peak was 540 spores/m³, while on June 29th, 1993 it was 733 spores/m³, with a mean value of 633 spores/m³ between the 26th and the 29th. In July 1992 (Fig. 2), the maximum sporulation took place in the second 3rd of the month, with peaks of 500 and 560 spores/m³ and an average of 423 spores/m³ between the 13th and the 22nd. In July 1993 the maximum concentration occurred in the first week with a peak of 880 spores/m³ and an average of 434 spores/m³ between the 1st and the 9th. The monthly average was 226 spores/m³ in 1992 and 242 in 1993. The biggest difference between the 2 years was recorded in August (Fig. 3) due to low rainfall in 1993, compared with the previous year. In August 1992 the daily concentration was under 200 spores/m³, while in the same month in 1993 we observed 8 days with values over 500 spores/m³, 2 days with more than 800 spores/m³ and an average of 604 spores/m³ between the 10th and the 15th. The average concentration was 92 spores/m³ in August 1992,

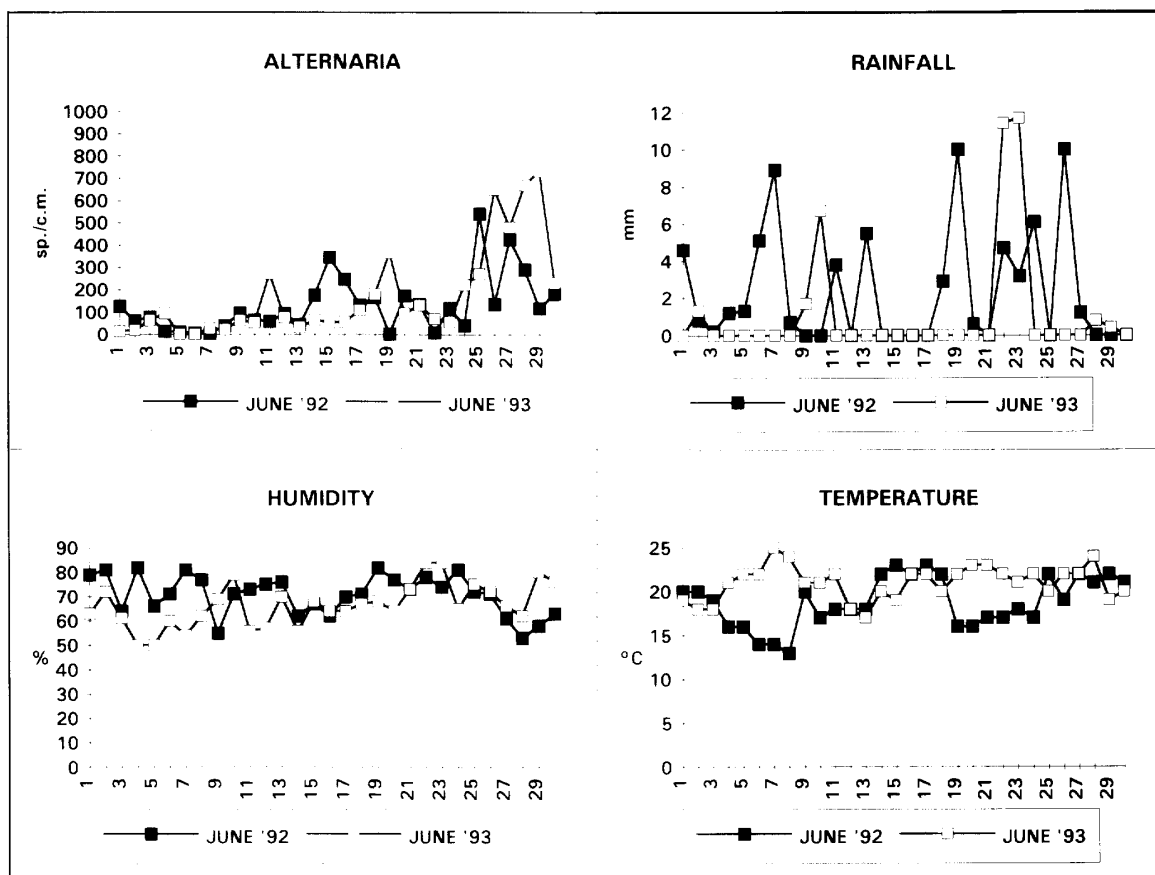


Fig. 1. Trends in the concentration of *Alternaria* spores, temperature, humidity and rainfall during June 1992 and June 1993.

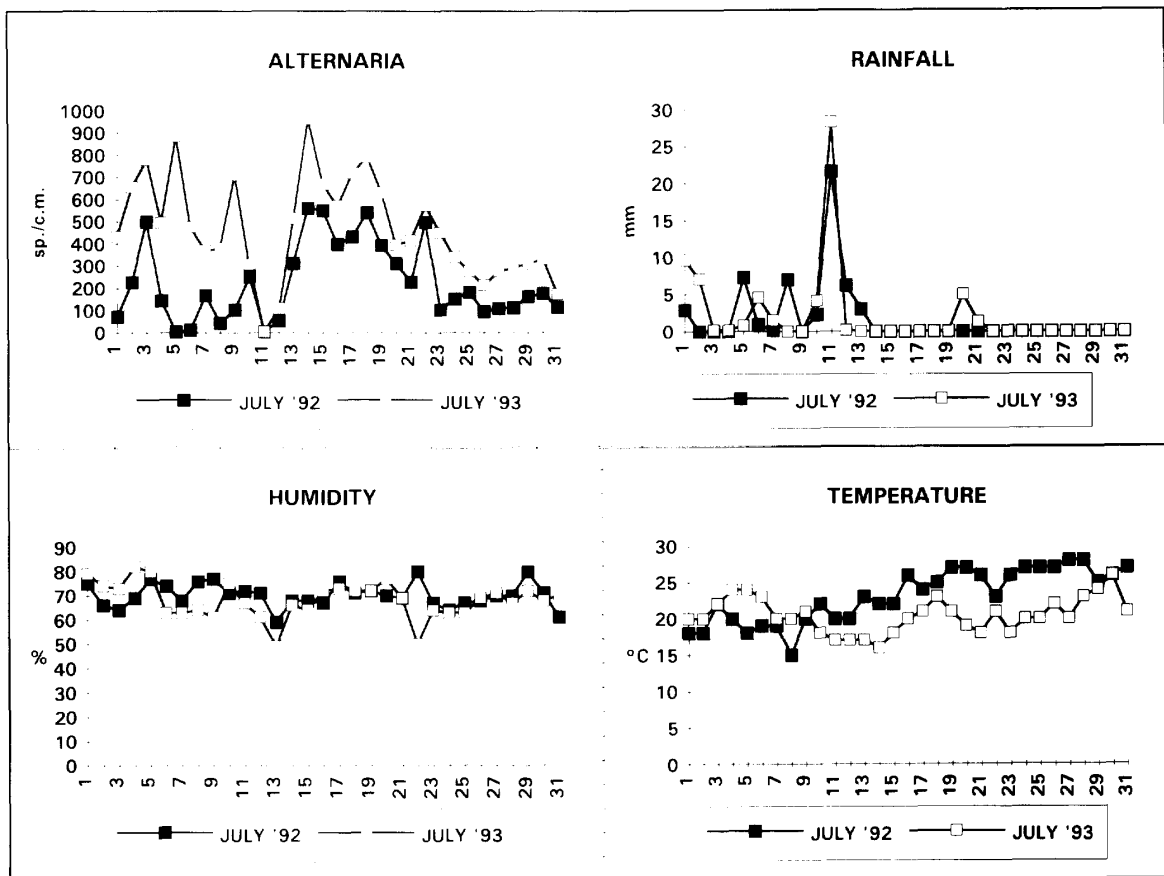


Fig. 2. Trends in the concentration of *Alternaria* spores, temperature, humidity and rainfall during July 1992 and July 1993.

while in August 1993 it was 383 spores/m³. In September 1992 there was an increase in the sporulation in the second third of the month with an average of 317 spores/m³ between the 11th and the 20th. In September 1993 on the other hand the concentration was higher in the first third of the month with an average of 327 spores/m³ from the 1st to the 8th. Due to the daily availability of climatic-meteorological data it was possible to observe how rainfall, in particular, influenced the presence of mold spores in the air (Fadda et al., 1990). Rainfall in the 1993 summer months, especially in August, was much lower than in the previous year and it certainly influenced the diffusion of air-borne *Alternaria* spores. By comparing aerobiological and meteorological data, we observed that only rainfall seems to actually influence the presence of the fungus'

spores in the air, while humidity, temperature and wind velocity values in the summer months do not sustain prospective sporologic variations. We rightly assume that the climatic-meteorologic trend of the months preceding the sampling, and the ease of finding an ideal growth substratum are responsible for the variations of mold concentration in the air, sampled in the months considered. On the days when the threshold value of 100 spores/m³ was passed, the concentration was monitored at four different times of the day and a higher concentration was observed during the warmest hours, decreasing to a variable degree at night (D'Amato, 1993). The recorded circadian rhythm is in agreement with data obtained by other sampling centres, confirming the importance of climatic parameters in the study of particle aerodiffusion.

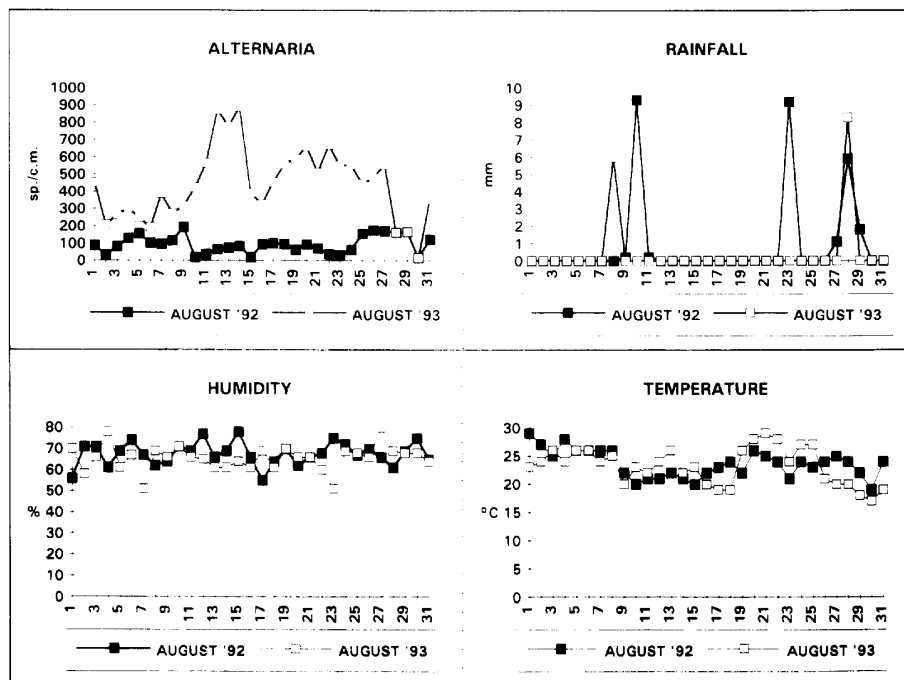


Fig. 3. Trends in the concentration of *Alternaria* spores, temperature, humidity and rainfall during the months of August 1992 and August 1993.

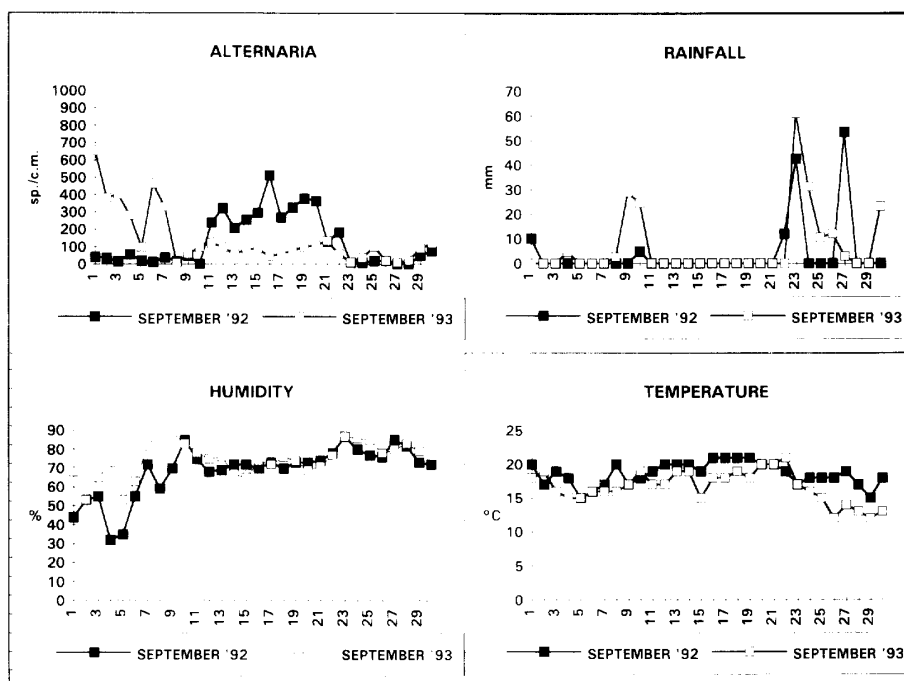


Fig. 4. Trends in the concentration of *Alternaria* spores, temperature, humidity and rainfall during the months of September 1992 and 1993.

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