

## Poster session c4

## POLLEN AND FUNGAL SPORE DISPERSAL / LONG DISTANCE TRANSPORT

Spread of *Ambrosia artemisiifolia* in Ticino (Switzerland)Köhler, B.<sup>1</sup>; Clotti, V.<sup>2</sup>; Maspoli, G.<sup>2</sup> & Gehrig, R.<sup>1</sup><sup>1</sup> MeteoSwiss, 8044 - Zurich (Switzerland).<sup>2</sup> The Cantonal Museum of Natural History, 6900 - Lugano (Switzerland).

In Switzerland the highest pollen concentration of *Ambrosia artemisiifolia* has always been measured in Ticino. For the last six years the seasonal pollen index (SPI) has varied between 196 and 432 for Lugano and between 128 and 260 for Locarno. As parts of northern Italy and especially the region Lombardy are invaded by *Ambrosia artemisiifolia*, it was assumed that most of the *Ambrosia* pollen measured in Ticino were transported by wind to Switzerland. Up to now it has been unclear to what extent *Ambrosia* has already invaded Ticino and whether the measured pollen perhaps also come from local *Ambrosia*-populations. To answer this question a joint project between MeteoSwiss and the Cantonal Museum of Natural History Lugano was started in summer 2003 to investigate the distribution of *Ambrosia* in Ticino.

The results of mapping (which is still in progress) showed that the occurrence of this species had been underestimated. A total of 76 locations with *Ambrosia* were found, 19 of these are populations with more than 100 plants, furthermore the borders of the highway between Chiasso and Mendrisio are strongly invaded.

Most affected was the Mendrisiotto region, which is the southernmost part of Ticino and near to the Italian border; but also in the Luganese (region about 15 km north of the Italian border) major locations were found, whereas in the Magadino plain (north Ticino) only single locations were detected.

In our study we found new agents of dispersal other than the birdseeds: The use of Italian sand (contaminated with *Ambrosia* seeds) for construction sites, dispersal by compost on fields and different agents along the highway.

Additionally to the two pollen traps of Lugano and Locarno (National Swiss pollen network) we installed traps in Mezzana and Cadenazzo in our field study of 2003. Corresponding with the mapping results the highest values were reached in Mezzana (Mendrisiotto) with an SPI of 1015; in Lugano the SPI reached 260 and in Locarno 148 whereas the *Ambrosia* pollen concentration in Cadenazzo (Magadino plain) with an SPI of 96 was lower. An analysis of the pollen data in correlation with the wind data will show whether an important part of the measured *Ambrosia* pollen in Ticino is local or not.

## Palynological study of air environment over the oceans

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The study of aerosol (mainly pollen and spores) over the oceans was conducted during expeditions of the Institute of Oceanology, Russian Acad. Of Sci. on board of scientific research vessels.

Aerosol matter was taken by the net method on route the vessels. The research included qualitative and quantitative composition of the eolian suspension, granulometric composition, organic composition (by spore and pollen analysis), mineralogical (by x-ray-diffractometric analysis - in different part of the ocean). Also highly sensitive atomic-fluorescent methods of analysis and atomic-absorption methods were used together with direct electrothermal atomisation of microsamples improved by us which allow to define traces of metals in microsamples at the levels of ultra-low natural concentrations.

Studies of aerosol are relevant to the problems of atmospheric pollution ecology, climatology and eolian transport of sedimentary material to the oceans. Oceanic aerosols are multi-component and include biogenic material of continental and marine origin pollen, spores and fragments of terrestrial plants, diatoms, products of

rock weathering and volcanic ash. Particles of industrial origin are specially abundant in the proximity of continents.

Using the results of the qualitative and quantitative analyses, data on wind direction vegetation type on the nearby land concentration of spores and pollen in aerosols, and type of anthropogenic components in samples, the route of the aerosol transportation can be established. We conclude that climatic and circumcontinental zonation regulates distribution of the eolian suspended material above the Indian, Atlantic and Pacific oceans.

## Poster session c5

## APPLIED AEROBIOLOGY: AGRICULTURE

## Aerobiological techniques in the control of the olive grove productivity

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The olive grove in the county of Seville, is one of the main economic and social resources of the region, generating the manpower during the months of December to February. They are those of smaller labor activity in the rural means. Nowadays, the olive groves in Andalusia, in connection with the high competition of the seed oils, won't be able to subsist more than in the measure in that their production techniques are modernized. We expose the results of a method to analyze the control of the productivity of the olive grove where they are related the contained of pollen in the air with meteorological variables. During the years 1993 to 2003, an aerobiological sampling of the atmosphere in Seville using a volumetric sampler model Burkard, located 18 meters on the level of the sea in the Faculty of Pharmacy. They have been related the data obtained in front of meteorological data corresponding to the years 1993-2003 statistically. To be able to carry out statements analysis, it has been necessary the calculation of the MPP (period of main pollination) of the taxon *Olea europaea*. This calculation has been carried out of 90% of the annual quantity of obtained pollen. The data have been treated using linear regression analysis where we have used two types of variables, a dependent variable (Kg aceituna/ Ha) and an independent variable (grains of pollen and meteorological data). As a result, we obtain a predictive model of the annual production of the olive grove of the county of Seville it foresaw to their gathering, alternative to the traditional method.

*Aspergillus fumigatus* monitoring at a composting facility treating biosolidsSánchez-Monedero, M. A.<sup>1,2</sup>; Stentiford, E. I.<sup>1</sup>; Purcell, B.<sup>3</sup> & Roig, A.<sup>2</sup><sup>1</sup> School of Civil Engineering, The University of Leeds, LS2 9JT Leeds, UK.<sup>2</sup> CEBAS-CSIC, Campus Universitario de Espinardo, 30100 - Murcia, Spain.<sup>3</sup> WS Atkins Environment, Ltd, UK.

*Aspergillus fumigatus* (AF) is one of the fungal species of major concern in organic waste management due to its abundance and potential risks for humans. Air monitoring was carried out at a composting plant processing green wastes and sewage sludge using forced aeration in a static pile at the initial stage followed by windrowing in the open.

A six stage Andersen impactor was used to collect the airborne AF spores at three critical locations in the plant: inside the composting hall, on the open area next to the windrows and on top of the biofilter which took exhaust air from the forced aeration composting system. AF concentrations were recorded during normal

operational activities such as forced aeration and shredding of fresh wastes and these were compared to background levels.

Background levels, measured when no active operations were taking place, were lower than  $10^2$  cfu/m<sup>3</sup>. Levels inside the composting hall ranged between  $7 \times 10^3$  and  $9 \times 10^3$  cfu/m<sup>3</sup> during forced aeration whereas on the open area, measured 40 m downwind of the operation, they never exceeded  $3.9 \times 10^3$  cfu/m<sup>3</sup>. Levels of AF generated at the composting plant were mainly affected by the shredding process and the meteorological conditions rather than by the exhaust air coming from the composting hall. The biofilter, initially designed for odour treatment, succeeded in removing a large proportion of the AF spores generated inside the plant.

Mitigation measures such as enclosing all operational activities may be necessary to reduce the AF levels released at the composting plant below the threshold imposed by the current legislation ( $10^3$  cfu/m<sup>3</sup>, according to UK Environment Agency).

### Agropalynological wine forecast model for Vinhos Verdes demarcated region

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The previous knowledge of the wine production of a complete farming operation, for an entire region, can substantially contribute to the improvement of market management. So regulatory systems can be established in order to attenuate the effects of annual variations in production and, consequently, better reconcile supply and demand. This provision is very relevant in the case of a speculative market, such as wine, where the forecast volume of the awaited crop is a concern that motivates the operators related with the wine business, for economic and technical reasons.

The aim of this work was to demonstrate, in the main sub-regions of "Vinhos Verdes" wine demarcated region - Cávado and Lima valley - in Northern Portugal, the applicability of the forecast model for estimating the annual fluctuation wine production based on the airborne pollen concentration (APC), as well as on the meteorological and agrotechnical conditions that occur between flowering and harvest (agropalynological). In these sub-regions the vineyard, occupying 10% of the agricultural area, is the main permanent culture and is characterised by a high percentage of small scattered farms with a low degree of specialization, old vineyards, low productivity, and a great variety of vine-growing systems and crop-growing techniques.

Pollen grains were sampled continuously since 1998 using one Cour trap for each sub-region. For the establishment of crop-size forecasting model, two different approaches have been considered. In the first one, the potential level of crops was determined based on the knowledge of APC acquired during flowering. The second one, updates the early forecasts by taking into account, the meteorological conditions during the flowering to fruit-set period, effects of diseases and wine yield data after processing which occurred between flowering and harvest. As independent variables in the forecast models, we tested the regional wine production as well as the regional wine production corrected by wine yield data after processing. So, for each region, the influence of the pre- and post-flowering periods upon the annual crop can be evaluated. Pollen Emission Model was used to define the beginning and the ending of the main pollen period, the duration of *Vitis* pollen emission season and the flowering to fruit-set period. In this way the effective value of the regional pollen index would be taken into account but without its recirculation due to the wind.

The results represent a very clear improvement in prediction accuracy, as compared with the classical methods used. The APC is a valuable instrument for vintage forecast because of the simultaneous integration at once several factors which influence the crop production process such as the pre-flowering conditions and the strength of the plants (influenced by conditions in previous years), the easy sampling of the biological production components, the effects of diseases on production levels and the development of the vineyard areas in production.

Keywords: pollen, *Vitis*, wine, yield forecast.

Work supported by the Project AGRO 53.

### Principal pathogenic evolution during potato postharvest

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The typical culture to define the region of La Limia is the potato. It is where this culture reaches its bigger development, both in surface and in production. La Limia together with the rest of Galicia, País Vasco, La Rioja etc... are included in the North Zone of potatoes production, and that includes the campaign of compilation, conservation and storage in winter.

Given the surface and average yields, Galicia is very surplus in potatoes. The surpluses have two principal exit channels, when the prices are low, the consumption of the cattle, and when they are high the exportation to other communities.

Nowadays they are nine warehousemen those who operate fundamentally in the La Limia zone. The store where this work was carried out is received to Geographical Protected Indication "Pataca de Galicia". This quality stamp is recognized in the whole territory of the European Union. Potatoes protected by the I.G.P., to be commercialized as such they have to undergo a strict control system, beginning this one in the own plot of production, during the storage and up to the expedition to the market.

The aim of this work is to know which are the principal fungi spores presents in the store during the storage and manipulation conditions that somehow can affect the conservation and later marketing of the potatoes. The store environmental conditions change from the first weeks to the end of the storage period. During the first stages the relative humidity values were close to 100%, whereas during the last weeks the values obtained was 60%. The temperature registers an increase during the final stage, from values lower than the 10° C registered to the beginning.

The total counted spores are increasing during the storage. The change of storage conditions influences decisively to facilitate the spores' dispersion due to the minor relative humidity values registered in the last two months. The Spearman's correlation coefficient is negative in this case. This relation is mentioned by numerous authors in works in and outdoor environments.

The most abundant spore type is *Penicillium/Aspergillus*, which represents percentages up to 90% of the total spores counted. The great importance of the species included in this type during the postharvest is mentioned by diverse authors, Smith et al. (1992), Namesny (1996). *Basidio*, and *Cladosporium* types reach important percentages, both types are abundant in outdoors environments (Aira et al. 2003). *Fusarium*, important potato pathogenic, represents about 2%, and the rest of the identified types represent percentages minor to 1%.

*Helminthosporium*, causer of the silver scurf, is considered the pathogenic that produce the major economic losses during the potato postharvest (Hervieux et al., 2002). The increases observed for this spore type during the storage period can be related with the activity developed inside the store. On the other hand, relative humidity high values and temperatures close to them 15° C favour the *Helminthosporium* development, these conditions are frequent during the studied period, increasing the effect of this disease in the store (Errampelli et al., 2001).

*Fusarium* is a common soil fungus and can be transported adhered to the tubers, when the potato epidermis is damaged; the fungi can provoke rotteness (Smith, 1992). The values for this spore type can be important at the storage beginning. Temperatures close to 15-20° C facilitate the *Fusarium* development, and the highest concentrations are registered with relative humidity close to saturation. These conditions influence positively the atmospheric concentration of this spore type. Some works affirms the existence of a clear linear and positive influence between the relative humidity and the rainfall in the dispersion of these spores in outdoor conditions.

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