



Short Communication

Ambrosia sp. pollen in Switzerland

Annie Gérard Peeters

Swiss Meteorological Institute, Zürich, Switzerland

(e-mail: agp@sma.ch)

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Abstract

The presence of *Ambrosia* sp. pollen is very irregular in Switzerland. South to the Alps (Ticino), the yearly mean quantities (1993 to 1997) reach 535 pollen grains in Lugano and 114 in Locarno. To the West, 205 pollen grains of *Ambrosia* sp. are observed as yearly mean total in Geneva. In La Chaux-de-Fonds (100 a.s.l.), a yearly mean of 86 pollen is reached, 66 in Neuchâtel, 59 in Payerne and 74 in Basel. In the Swiss Rhone Valley, in Visp, this yearly mean reaches 30 pollen of *Ambrosia* sp. A little more into the center of the country, in Bern, 31 pollen are monitored as yearly mean quantity. In the rest of the helvetic territory, in the North and in the East, the yearly mean is below 15 pollen grains. Since 1991–1992, an increase has been observed essentially in Ticino, in Geneva, Neuchâtel and La Chaux-de-Fonds. The presence of *Ambrosia* sp. pollen is often noticed in case of strong west or south-west wind flowing, probably coming from the Rhône Valley and the Bresse in France and the Po Valley in Italy.

Introduction

The Allergic problems posed by *Ambrosia* sp. pollen are well known in the United States of America. Since many years, the situation is serious in the Rhône Valley in France and in North Italy (Déchamp, 1997).

In 1970, R.M. Leuschner (1974, 1978) observed the first *Ambrosia* sp. pollen in Basel, after investigations in the city, the author found one plant two meters high close to the port.

To evaluate the present situation, three questions have been considered:

- What is the evolution of the situation?
- What is the present situation (1993–1997)?
- Which is the origin of the *Ambrosia* sp. pollen?

Materials and methods

In Switzerland Hirst type (Burkard Ltd) pollen samplers are utilized. The daily quantities of pollen are expressed as numbers of pollen grains per cubic meter of air per day.

Results and discussion

The evolution of the situation in Basel, Neuchâtel, Zurich and Lugano

Basel

Thanks to the contributions of R.M. Leuschner (1974, 1985; Leuschner, Boehm and Mari, 1990), we are in possession of a long succession of data (29 years).

The yearly mean sum, from 1969 to 1997, is 79 pollen of *Ambrosia* sp. monitored in July, August and September. From year to year, the total pollen count is very variable: no pollen of *Ambrosia* sp. were detected in 1969 and 1984, and a maximum total of 270 pollen was counted in 1990.

From 1969 to 1987, the yearly sum was about 56 pollen, twice, in 1979 and in 1980 it was respectively of 119 and of 120 pollen of *Ambrosia* sp.

From 1988 to 1992, the total pollen count ranged between 160 and 270, out of 1991 where only 80 pollen were noticed.

From 1993 to 1997, the annual total was between 32 and 100.

The daily maxima are rarely above 30 pollen/m³/day only in 1992, 60 pollen of *Ambrosia* sp. were trapped on the 30th of August.

A true increase is not observed.

Neuchâtel

From 1979 to 1990, the yearly mean count was never above 40 pollen grains: the annual mean sum reached 17 pollen. The daily maximum was of 10 pollen.

From 1991 to 1997, the yearly mean is 77 pollen, the sums are all above 50 pollen a year with the exception of 1996 when 42 pollen were detected (Clot, 1994, 1996). The highest annual total was 155 pollen in 1992. In 1992 and 1993, two peaks of 60 and 50 pollen/m³/day respectively were found.

The *Ambrosia* sp. pollen were present in August and September.

A slight increasing trend is noticed in the air of Neuchâtel.

Zurich

Over the 17 years of observations in Zurich (1981 to 1997), a yearly mean of 21 pollen of *Ambrosia* sp. is calculated.

In 1990 and 1992 the yearly sums were respectively 50 pollen and 45 pollen. The daily maximum was 15 pollen in 1984 and 1990.

Expect for 1990, when 5 pollen of *Ambrosia* sp. were trapped in July, all the pollen was present in August and September.

Lugano

The case of Lugano is interesting: from 1985 to 1988, a yearly mean of 325 pollen was observed with a yearly maximum of 475 pollen of *Ambrosia* sp. in 1986. The highest daily value is recorded in 1986 with 100 pollen/m³/day (Peeters, Wüthrich and Meri, 1988).

No records are available for 1989 and 1990. Monitoring was resumed in 1991. From 1991 to 1997, the yearly mean was of 572 pollen grains of *Ambrosia* with a yearly maximum of 932 pollen in 1994. A daily maximum of 188 pollen was observed the 24th of August 1997.

All the pollen of *Ambrosia* sp. were observed in August and September.

A true increase is noticed in Lugano.

The situation in Switzerland from 1993 to 1997

Since 1993 (Figure 1), 14 stations have been operating under the guidance of the section of Agrobiometeorology and human biometeorology of the Swiss Meteorological Institute.

South to the Alps (Ticino)

The yearly mean totals are at their highest in **Lugano** (273 m a.s.l.) with 535 pollen trapped in August and September. In 1994 a maximum total of 932 pollen of *Ambrosia* sp. was observed, whereas the peak was only 108 in 1995.

Locarno (370 m a.s.l.), is situated North to Lugano. The yearly mean total is only 114 pollen of *Ambrosia* sp. with a maximum sum of 228 pollen in 1994. The minimum was of 8 pollen in 1995.

The Swiss Rhone Valley

At **Vis** (650 m a.s.l.), a yearly sum of 30 pollen was recorded, with a maximum of 72 pollen in 1997.

West Switzerland: The area including Basel, Geneva and Bern

The highest yearly mean sum was recorded in **Geneva** (380 m a.s.l.), with 205 pollen and a peak of 326 pollen was observed in 1997. **La Chaux-de-Fonds** (1040 m a.s.l.) ranks second with 86 pollen followed by **Basel** (273 m a.s.l.) with 74 pollen. In **Neuchâtel** (490 m a.s.l.) and in **Payerne** (490 m a.s.l.) (Payerne: only from 1993 to 1996) the yearly mean totals are 66 and 59 pollen of *Ambrosia* sp. respectively. The yearly mean at **Bern** (570 m a.s.l.) was only of 31 pollen.

North-east Switzerland

On the Constance Lake, in **Münsterlingen** (410 m a.s.l.), in **Luzern** (460 m a.s.l.) and in **Zurich** (556 m a.s.l.) the yearly mean sums of 8, 9 and 12 pollen of *Ambrosia* sp. respectively. In this territory, the highest yearly sums were observed in 1994: 28 pollen in Luzern, 26 in Zurich and 14 in Münsterlingen (remark: in Münsterlingen, 18 pollen were also monitored in 1996).

Very low are the yearly mean total in **Buchs** (445 m a.s.l.) with 5 pollen and in **Davos** (1600 m a.s.l.) with just 1 pollen. The highest sums were noticed in Buchs SG (16 pollen) and Davos (4 pollen) in 1994.

Yearly mean ragweed pollen sum (1993 - 1997) in Switzerland

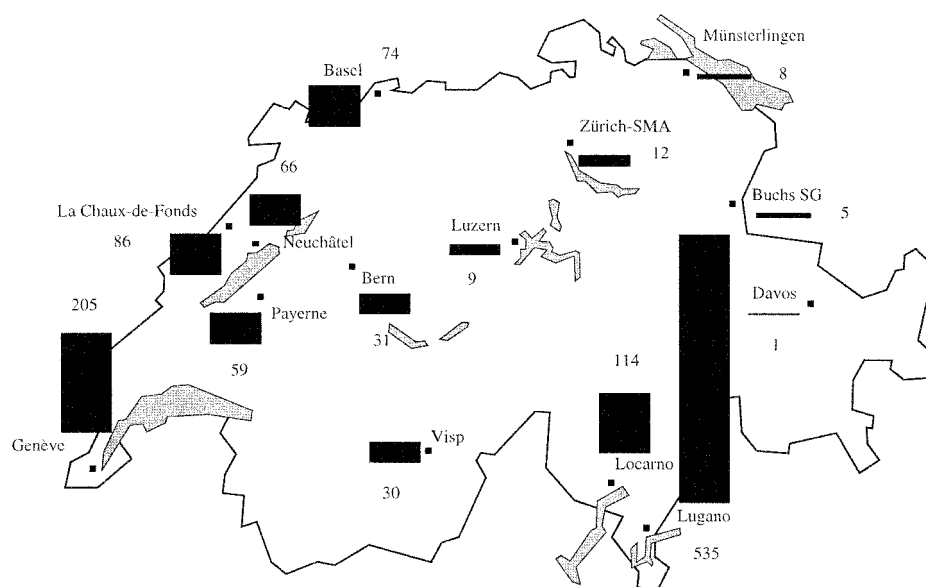


Figure 1. 1993–1997 average sums of *Ambrosia* sp. pollen in different monitoring stations in Switzerland.

Origin of the *Ambrosia* sp. pollen in South and West Switzerland

As R.M. Leuschner has suggested, most pollen monitored in Basel is transported from the Rhine Valley from Basel and the Bresse (France). There are two reasons for this: on one side, small amounts of *Ambrosia* sp. plants can not be responsible for the presence of great quantities of pollen in the air of Basel and on the other side, the presence of *Ambrosia* pollen is monitored whenever there are strong South-west winds. In La Chaux-de-Fonds, Neuchâtel and Geneva the same observations can be made.

On the south of the Alps, high daily concentrations are observed when the wind coming from the south is strong. It is possible that some *Ambrosia* sp. plants are present in Ticino, but on a low scale as compared to France and Italy.

Conclusions

The presence of *Ambrosia* sp. pollen is important in Lugano (Ticino) and with a lower impact in Geneva and in the western areas of Switzerland.

An increase is noticed in those regions during the last five years.

The presence of this pollen is probably due to transport events from the South and the South-west of France and the North-west of Italy because only few plants have been detected in Switzerland.

References

- Clot B.: 1994, Analyse aéropalynologique à Neuchâtel et à La Chaux-de-Fonds en 1993. *Bul. Soc. neuchâteloise des Sc. Nat.* **117**, 111–116.
- Clot B.: 1996, Analyse aéropalynologique à Neuchâtel et à La Chaux-de-Fonds en 1993. *Bul. Soc. neuchâteloise des Sc. Nat.* **119**, 163–165.
- Déchamp Ch.: 1997, Climats et continents de l'Ambroisie. *Climat et Santé*, 43–56.
- Leuschner R.M.: 1974, Luftpollenbestimmung in Basel während der Jahre 1969 und 1970. *Verhandl. Naturf. Ges. Basel* **84**, 521–626.
- Leuschner R.M.: 1978, Registrierte Luftpollen von *Ambrosia* L. als Hinweis auf ein Vorkommen dieser Adventivpflanzen. *Bauhinia*, 265–271.
- Leuschner R.M.: 1985, L'Ambrosia en Suisse. *Allergie et Immunologie* **17**, 431–433.
- Leuschner R.M., Boehm G. and Mari R.: 1990, L'ambroisie progresse-t-elle? *Bull. Soc. Bot. Fr.* (Actual. bot.) **137**, 144–145.
- Peeters A.-G., Wüthrich B. and Somazzi S.: 1988, Studio del pollini dell'aria a Lugano dal 1985 al 1987. *Tribuna Medica Ticinese* **53**, 316–323.

