

Estação Agronómica Nacional, Sacavém, Portugal.

THE INCIDENCE OF *OLEA* POLLEN IN PORTUGAL IN FIVE CONSECUTIVE YEARS

By

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INTRODUCTION

Cyclic variations in pollen production of several trees have been observed by *Hyde* (1950, 1952, 1955) and by *Sarvas* (1952), among others, who correlated these variations with those in the seed crops obtained from the forest trees. *Hyde* (1955) has even suggested that "if the close relation between pollen output and seed crop could be substantiated, foresters would have at hand a method of predicting probable seed crops".

Previous results obtained by the writer during the study of atmospheric pollen at Sacavém (1952) and at Lisbon (1955) demonstrated the occurrence of a cyclic variation regarding olive tree. It was then observed that pollen catches in two consecutive years showed marked differences. On the other hand, the productions of olive-oil in the District of Lisbon show corresponding differences, good and poor crops alternating on consecutive years. The physiological basis of this variation, known in Portugal as "safra" (the good crop) and "contra-safra" (the poor crop), was studied in 1940 by *Almeida*. It is in the Central part of Portugal that these cyclic variations are most accentuated, chiefly from 1926 onwards.

That pollen of *Olea* is, undoubtedly, a cause of allergy has been demonstrated by several authors. *Wodehouse* (1945) indicates it as a cause of hay-fever in California and Arizona where the olive-tree is extensively cultivated. Olive pollen has

been recorded as allergenic also in Spain (*Jiménez Diaz*, 1932, *Surinyach*, 1950, *Muñoz Medina*, 1949) and in Israel (*Gutmann*, 1950, and *Kessler*, 1953). In Portugal it seems to be responsible for the sensitization of many patients, chiefly those living in countries where olive-tree occupies large areas (*Piedade Guerreiro*, 1955).

MATERIAL AND METHODS

The present contribution is based on a daily census of *Olea* pollen in five successive years.

The gravity slide method was used, but only in the last two years of observations the standard collector and the techniques approved by the *American Academy of Allergy* (*Durham et al.*, 1946-47) were used¹.

A fresh slide was placed on the collector every morning and left there for 24 hours. All types of pollen under the area of 15×15 millimetres cover-slip were later on examined and counted. All the counts given here are referred to 1 sq.cm.

For the first three years (1949 to 1951) the surveys were carried out at Sacavém (District of Lisbon), a small village seven miles from the center of Lisbon. The collector was placed on a terrace of the *Estação Agronómica Nacional*, surrounded by an old olive-grove.

In 1952 and 1953 the observations were made in Lisbon, where the collector was placed on the roof of a high building in the city, in a commercial quarter.

RESULTS

Pollen incidence in the years 1949-1951 (Sacavém).

1949—Pollen of *Olea* was recorded from April 23 to June 10 with a maximum of incidence on 2nd of May. The total catch (*Olea* plus non-*Olea* pollen) during April, May and June was 21.713.3 grains.

¹ For the technique and apparatus used during the first three years of the observations, see *Quitéria G. Pinto da Silva* (1952).

Unfortunately separate counts of the *Olea* pollen were not made during this season. However, if the mean incidence value of non-*Olea* pollen in the same period in the two following years (1,370.3) is deducted from the total catch of the season, the value of 20,343 is obtained, which may be taken as the value for that year's catch of *Olea* pollen. This makes up 93.6 % of the total pollen catch during the period April-June. As this number does not show large discrepancy from the result obtained in 1951, it is accepted, although having in mind that it means only an approximate value.

1950—In this year pollen of *Olea* appeared on April 12, presented a maximum of 17.8 on May 13, and disappeared on June 15.

The number of pollen grains of *Olea* during that season was very low, 194.5, representing only 13.1 % of the total pollen catch (1,477) for the period April-June.

1951—Pollen production of *Olea* in this year was again very high. It started later, on April 26, had a maximum of 3,974.6 on May 18, and disappeared on June 28.

The number of pollen grains of *Olea* for the whole season was of 15,801.6 or 91.5 % of the total pollen catch (17,259.7) in the same period.

Pollen incidence in the years 1952 and 1953 (Lisbon).

1952—Pollen grains of *Olea* were caught from April 20 to May 30, with a maximum of 19.6 on May 15. The number of pollen grains for the whole season was very low (132.2). This made up only 13.8 % of the total pollen catch of the period April-June (955).

1953—In this year there was another season of high incidence of this pollen. It appeared from April 16 to June 28 with a maximum of 160 grains on May 26.

In spite the position of the pollen collector, in the center of the city, considerable amounts of *Olea* pollen were caught during the season (961.3 grains). This made up 56.5 % of the total pollen catch of the trimester (1,699.5).

All the above mentioned data are summarized in Table 1.

TABLE 1
Phenological data and pollen amounts during the period April-June.

Years	1949	1950	1951	1952	1953
Total pollen catch	21,713.3	1,477.0	17,259.7	955.0	1,699.5
<i>Olea</i> pollen catch	(20,343.0)	194.5	15,801.6	132.2	961.3
<i>Olea</i> pollen per cent	(93.6)	13.1	91.5	13.8	56.5
Date of first catch	April 23	April 12	April 26	April 20	April 16
Date of highest daily catch	(May 2)	May 13	May 18	May 15	May 26
Date of last catch	June 10	June 15	June 28	May 30	June 28
Highest daily catch	—	17.8	3,974.6	19.6	160.0

DISCUSSION AND CONCLUSIONS

From the analysis of the results obtained it is evident, for the years in study, that there is a marked cyclic variation of the *Olea* pollen. This variation closely follows the oscillations of the olive-oil production in the same period 1949-1953 in the District of Lisbon, as shown in Table 2.

TABLE 2
*Olea pollen catches and olive-oil productions (in hectolitres)
 in the District of Lisbon.*

Years	1949	1950	1951	1952	1953
Olive-oil production	31,239	1,315	32,709	6,824	41,158
<i>Olea</i> pollen catch	20,343.0	194.5	15,801.6	132.2	961.3

Thence it appears that, as *Hyde* (1955) has suggested, agronomists may also, through the atmospheric pollen analysis, have a method of predicting probable olive-oil production.

From the point of view of allergy this cyclic variations may also be of importance. *Piedade Guerreiro* (*l.c.*) refers that a greater number of patients present positive skin-tests to this pollen in the season following a "safra"-year.

The high incidence of *Olea* pollen and the fact that even in the center of a city it was caught in considerable amounts are

in accordance with the observations of the Italian authors who have studied the floral morphology of the olive-tree and consider it at least as "participating both to the anemogamy and entomogamy" (Morettini, 1940, Ruggieri, 1950, Calvino, 1952).

If, as it has often been said, "the present is the key to the past", the knowledge of the amount of pollen shed by the olive-tree, and the knowledge of its possible pollen cycles may be of interest, as Erdtman suggested in the International Botanical Congress held at Paris in 1954 (*8ème Congrès Intern. Botanique*, 1956), for "tracing the history of *Olea* in the Mediterranean regions by means of pollen statistical investigations", as well as the changes in vegetation and in climate in countries where *Olea europaea* occurs as a wild species and has been, for a very long time, an important cultivated tree.

SUMMARY

From 1949 to 1953 the incidence of pollen of *Oleaceae* was daily observed during the months of April, May and June.

In the three first years the observations were carried out at Sacavém, about 7 miles from Lisbon, and in the two last years in Lisbon, in the central part of the city.

This pollen was caught in great quantities but with very marked differences in the consecutive years. These differences correspond to the alternating cycles of heavy and light flowering presented by the olive-tree in that part of the country.

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