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PHENOECOLOGY STUDIES ON SOME ANEMOPHILE LIGNEOUS MAGNOLIATAE FROM TIMIŞOARA

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ABSTRACT (online version)

Evidence show that weather changes in the recent years manifested through warming-up conditions in the spring months in many European regions. Our researches focussed on the blooming phenophasic comparison in eight species of anemophile ligneous Magnoliatae (Acer, Alnus, Corylus, Fraxinus, Juglans, Morus, Tilia, Ulmus) between years 1950-1959 and 2000-2002. Studies show that data of season start in ligneous Magnoliatae pollen progressively became more early in the last 50 years as a response to climate changes.

KEY WORDS: *pollen grains (PG), anemophile ligneous Magnoliatae, phenoecology*

INTRODUCTION

■ Wind pollination (anemogamy or anemophilia) implies the existence of a great pollen amount to be spread, so that the pollen grains shed quickly and as uniformly as possible, floating in the air, and stigmas, the bigger they are the more sufficient the pollination is.

Anemophile plants are characterized besides the great amount of light PG production, by tiny PG, dry with even exine, with great capacity to float in the air. Anemophile flowers are generally small and less striking, having no means for appealing insects. Usually, they are unisexuated, male flowers or stamina being in a greater number than ovules number, ensuring the massive pollen production. Thus, in *Corylus*, 2.5 millions of PG form for an ovule. Pollen shaking is facilitated by stamina filaments' mobility *(Poaceae*), of the floral pedunculi (*Cannabis*) or of the inflorescence axes (e.g. male aments from *Corylus, Alnus, Quercus*). In other plants, like *Urtica*, male flowers "explode"due to their tensioned elastic filaments.

Styles and stigmas of the female flowers are markedly enlarged and often covered with prolonged papillas to facilitate pollen capture. Anemophile plants'flowers are usually without smell and nectar.. Frequent unisexuality of the flowers favors free transmission of the pollen, and it is in connection with its general reduction and autopollination hindering. Blooming before leaving facilitates pollination.

There is approx. 20% of anemophile species in the European flora, but there are more actually, especially in the drier climate countries (semiarid countries) or more exposed to winds (littoral or insular vegetation).

In most of the anemophile *Angiospermae* group there are rudiments of an anciant bisexuality and a blooming related to insects.

Some plants (*Tilia*) are at the limit between entomophily and anemophily because much of the pollen is shed by the wind. In the older related groups and anemogamic (*Amentiferae, Salicaceae, Euphorbiaceae, Chenopodiaceae, Juncales, Poales*) due to their smell and hermafroditism, there is no doubt regarding their secondary anemophily. Ocasionally, secondary anemophile species come back to entomophily (*Salix).*

■ Phenology studies the periodical phenomena in plant and animal lives and these phenomena connections between genuses and climatological factors, variable in time and space, it can be noticed that phenophases are too very varied.

Growing phases studied in wooden plants are gemmation, leaving, blooming and fruit ripening. Phenological data do not resume only to observations, growing phenomena can be measured (phenometry). There is as well an ecological interpretation of the phenological maps (phenoecology).

MATERIAL AND METHOD

Comparison was done on eight species of anemophile ligneous Magnoliatae.

In the 1950-1959 years, the area researches were carried out on was restricted to Timişoara and determinations were only qualitative, throught phonologic observations.

For the 2000-2002 years'researches, VPPS Lanzoni 2000 pollen trap was used. It collects the pollen grains existent in the air from a distance of 80-100 km, results being significant for the field area from the W and SW of Romania. This is the volumetric method. Determinations are both qualitative and quantitative.

RESULTS AND DISCUSSIONS

Blooming starts at different dates from year to year, for every analyzed genus, especially according to temperature (tab.1).

Numerous genuses with early blooming have a greater amplitude regarding data for the beginning of this phenophase, but the species with late blooming manifest greater amplitude regarding the ending of the blooming.

This phenomenon may be due to the the fact that, generally, there are greater variations from year to year in February-March, evidenced more powerfully in the biologic processes of plants with early blooming and attenuates gradually in April, especially towards the end of this month.

Great temperature variations may influence the late blooming species in May, species frequent in our region, right when these are in bloom or started to bloom (fig.1, tab.2).

Using the collected data from Timişoara, regarding the blooming phenophases, most of the processes observed and cited in literature were verified.

Tables are alphabetically ordered. Every genus has medium data regarding the beginning, middle and ending of blooming, showing the period this phenomen takes place on; minimum, medium and maximum blooming period in days, mentioning the years with minimum and maximum duration (Bujoreanu, 1960).

CONCLUSIONS

Variable disparty of the blooming period in the anemophile ligneous species was noticed. Species show the following variations:

- *Acer* and *Fraxinus* start their blooming period with one month earlier than the 1950-1959 period, blooming at the beginning of March. End of blooming is at the middle of April;
- *Alnus, Corylus* and *Ulmus* have two weeks disparty – one month earlier for blooming start and blooming end for both of the studies periods at the middle of March;
- *Juglans* blooms one month and 1/2 earlier and blooming end are close to each other;
- *Morus* blooms and ends its blooming two weeks earlier;
- *Tilia* starts to bloom three weeks earlier, but ends its blooming a month later.

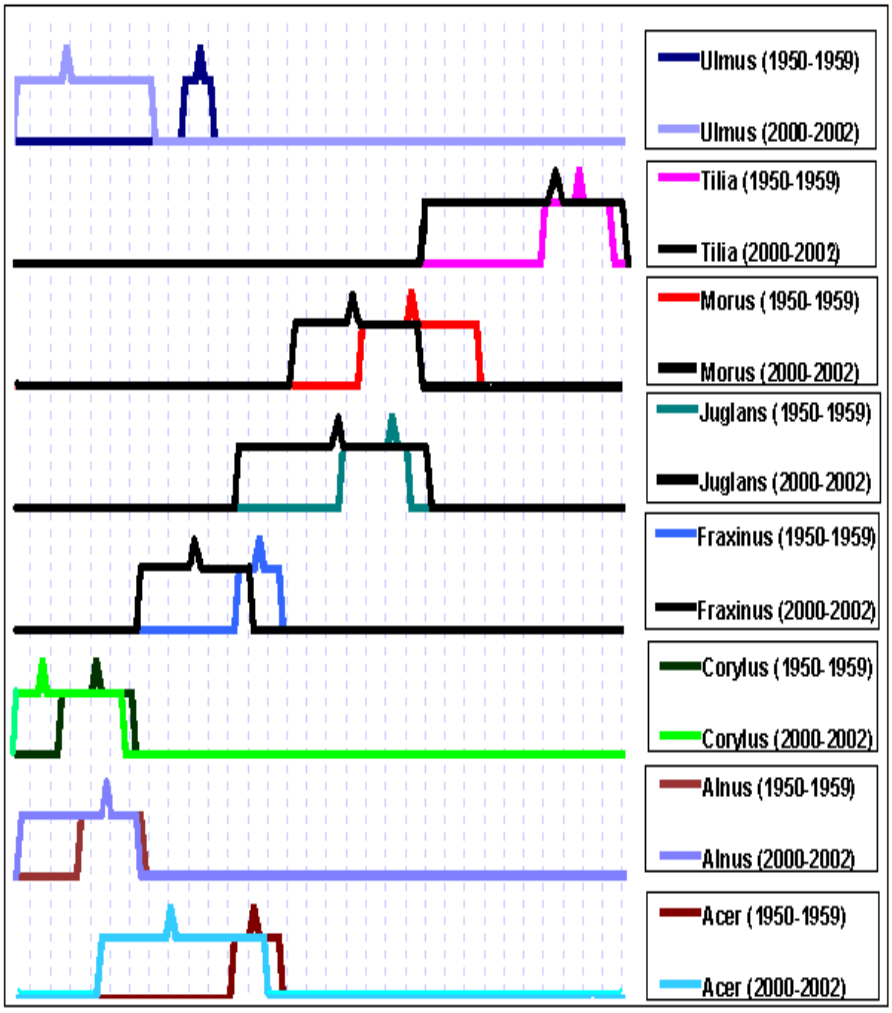

FIG.1. Comparison the blooming period on eight species of anemophile ligneous Magnoliatae

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Species	Medium data			Amplitude in days		Duration in days		
	beginning	middle	ending	middle	ending	minimum	medium	maximum
Acer	5IV	9.1IV	14IV	25 (23III-17IV)	25 (1-26IV)	5 (1953)	8.7	13 (1956)
Alnus	5.5III	10.3III	17.1III	48 (10II-30III)	39 (28II-8IV)	6 (1959)	15	13 (1954)
Corylus	0.4III	8.4III	15III	36 (11II-19III)	30 (1-31III)	5 (1959)	12.8	19 (1953)
Fraxinus	6.6IV	10.IV	14.6IV	33 (18III-26IV)	32 (22III-3V)	4 (1957)	7	12 (1952)
Juglans	27.1IV	7.1V	10.8V	28 (13.IV-11V)	33 (22IV-25V)	9 (1956,1959)	13.7	28 (1953)
Morus	1.6V	11.6V	24.2V	13 (26IV-13V)	20 (14V-3VI)	19 (1955,1957)	22.8	27 (1953)
Tilia	7.2VI	14.4VI	20.8VI	16 (1-17VI)	13 (14-27VI)	10 (1955)	13.6	22 (1953)
Ulmus	26.6III	29.5III	31.3III	25 (16III-10IV)	23 (22 II-14IV)	3 (1953)	4.7	6 (1956)

TABLE 1. Blooming of species (1950-1959)

Species	Medium data			Amplitude in days		Duration in days		
	beginning	middle	ending	middle	beginning	minimum	medium	maximum
Acer	9.3III	23.3III	11.6IV	42 (18II-1IV)	22 (1-22IV)	21 (2000)	31.6	42 (2002)
Alnus	19.6II	10III	16.3III	18 (11-29II)	5 (13-18III)	18 (2000)	25	30 (2002)
Corylus	19.3II	25.6II	13III	17 (11-28II)	8 (10-18III)	12 (2000)	22	27 (2001,2000)
Fraxinus	17.6III	28.6III	8IV	11 (11-28III)	13 (5-18IV)	19 (2000)	24.3	29 (2001)
Juglans	6.6III	26.6IV	14.6VI	15 (28III-12IV)	5 (12-17V)	31 (2001)	31.1	50 (2002)
Morus	17.3IV	29IV	12V	1 (17-18IV)	9 (9-18V)	23 (2000, 2001)	25.3	30 (2001)
Tilia	14.5V	9.5VI	15.5VII	7 (11-8V)	15 (8-23VII)	31 (2001)	61	71 (2000)
Ulmus	20.3II	2.6III	19.3III	17 (12II-1III)	36 (4III-9IV)	23 (2001)	27.3	39 (2000)

TABLE 2. Blooming of species (2000-2002)