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REPORTS

Syrphids as visitors of the reputedly anemophilous *Rumex alpinus (Polygonaceae)*

L. KLIMEŠ
Department of Plant Ecology, Institute of Botany, Czech Academy of Sciences, Dukelská 145, 379 82 Třeboň , Czech Republic

Among reputedly anemophilous plant species a few groups were found which are to some extent insect-pollinated, namely by syrphid flies. In most cases syrphids have been observed on anemophilous monocotyledonous plants, such as grasses (Porsch 1956; Van der Goot and Grabandt 1970; Leereveld 1984), on *Sparganium erectum* (Leereveld 1984), Cyperaceae graminoids (Leereveld 1982), *Typha angustifolia* (Waitzbauer 1976) and *Scirpus maritimus* (Leereveld et al. 1981).

There are only few observations of syrphid flies pollination of dicotyledonous herbs: the role of entomophily was thorougly studied in *Plantago* species (Porsch 1956; Leereveld *et al.* 1981; Stelleman and Meeuse 1976; Meeuse 1984; Stelleman 1984b); syrphids were observed on *Urtica urens* flowers (Porsch 1956); Leereveld (1982) found 83% of *Rumex*-type pollen in crop and gut of a single specimen of *Platycheirus scambus* caught in Finland and in the same paper the author also mentioned his observation of syrphids on *Rumex acetosa*.

Among syrphids pollinating nominal anemophiles two genera, viz. *Platycheirus* and *Melanostoma*, are markedly prevailing (Porsch 1956; Leereveld 1982; Bastian 1986). A few other syrphids, such as *Episyrphus balteatus*, *Lejops vittata* and *Syrphus ribesii*, (Stelleman 1984a), *Syrphus arcuatus*, *Chrysotoxum festivum*, *Volucella pellucens*, *Myiatropa florea*, *Helophilus pendula* and *Rhingia rostrata* (Porsch 1956) were observed on reputedly anemophilous plants.

Syrphid flies were caught in stands of *R. alpinus* on June 25-26 in the Low Tatra Mountains (Štiavnica Valley, 1,250 m a.s.l.) and on July 1-2 in the Krkonoše Mountains (Klínova Bouda chalet, 1,200 m a.s.l.). Both *R. alpinus* stands were about 1 ha large and the localities were in forest clearings near the timberline. The locality in the Low Tatra Mts. is well isolated by an extensive coniferous forest from submontaneous meadows (about 15 km wide), whereas the clearing on the locality in the Krkonoše Mountains is connected with open landscape at lower altitudes. The flies were caught with a net in an area of about 10 x 10 m where I walked through, trying to collect as many flies as possible. The sampling took about 2 hours each day and started at 7'30 a.m. The samples collected in the afternoon were excluded from the analysis because only a few specimens were caught.

Ten + ten animals of two codominant species in the Krkonoše Mts., i.e. *Parasyrphus lineola* and *Syrphus torvus*, were subjected to the standard procedure of extracting and counting the pollen from crop and intestine (Leereveld 1982). Two pollen groups were discriminated, viz. 1) *Rumex* type and 2) other types; first 100 to 400 pollen were counted.

R. alpinus colonizes open habitats which are not shaded by shrubs and trees. It is a strong nitrophilous competitor which takes a dominant position in its stands and which prevents coexistence with most meadow plants by the shade of its broad leaves. *R. alpinus* offers an extremely large amount of pollen. The inflorescences are usually 1 to 1.5 m high, their density is 20 to 30 per m^2 and each of them bears about 3,000 flowers (Šmarda *et al.* 1963). There is an apparent sexual plasticity in individual flowers and inflorescences. Gynomonoecious, andromonoecious or even dioecious plants are rarely found. *R. alpinus* is a reputedly anemophilous species, similar to other

	Krkonoše Mts.	Low Tatra Mts.
Brachypalpus chrysites Egger	0/2	-
Dasysyrphus lunulatus (Meigen)	2/19	2/8
Didea intermedia Loew	1/13	-
Episyrphus balteatus (De Geer)	0/2	-
Eriozona syrphoides (Fallen)	1/0	-
Megasyrphus annulipes (Zetterstedt)	0/1	-
Metasyrphus corollae (Fabricius)	0/1	-
Metasyrphus lapponicus (Zetterstedt)	1/4	-
Parasyrphus lineola (Zetterstedt)	1/42	1/11
Parasyrphus macularis (Zetterstedt)	0/4	-
Parasyrphus nigritarsis (Zetterstedt)	-	0/1
Parasyrphus vittiger (Zetterstedt)	1/15	3/1
Pipiza bimaculata Meigen	0/1	0/2
Platycheirus albimanus (Fabricius)	1/6	-
Sericomyia lappona (Linne)	0/1	0/2
Syrphus ribesii (Linne)	0/1	-
Syrphus torvus Osten Sacken	7/46	2/10
Syrphus vitripennis Meigen	1/3	2/11
Total	16/161	10/46

Table 1. Syrphid flies caught on *Rumex alpinus* inflorescences in the Krkonoše Mts. (July 1-2, 1992) and in the Low Tatra Mts. (June 25-26, 1992). M - males, F - females

Syrphus torvus		*Parasyrphus lineola*	
Rumex type	Other types	*Rumex* type	Other types
80.6	19.4	94.8	5.2
99.3	0.7	98.4	1.6
99.5	0.5	4.1	95.9
95.1	4.9	88.1	11.9
95.2	4.8	78.6	21.4
87.4	12.6	82.1	17.9
81.8	18.2	91.0	9.0
97.8	2.2	32.0	68.0
99.2	0.8	90.7	9.3
62.5	37.5	10.8	89.2
Means			
89.8	10.2	67.1	32.9

Table 2. Percentage of pollen in crop and gut of *Syrphus torvus* and *Parasyrphus lineola* (Krkonoše Mts, July 1, 1992).

Rumex species (Rothmaler *et al.* 1976). Selfing is possible but its role in the reproduction of *R. alpinus* is unknown. The flowers located near the inflorescence base flower the first, the flowers at the top are the latest. The frequency of male flowers is the highest at the top, whereas female flowers are more near the inflorescence base.

The nomenclature of syrphids follows Dušek and Láska 1987, that of plants Rothmaler *et al.* 1976.

Seventeen and eight species of syrphids were collected in the Krkonoše Mts. and in the Low Tatra Mts., respectively. On both localities Syrphinae species prevailed (Table 1). Species of the *Melanostoma-Platycheirus* group were represented by a single species in the sample from the Krkonoše Mts. and were completely missing on the other locality.

The number of females was much higher than the number of males, especially in the Krkonoše Mts. (Table 1). The results of analyses of the pollen in the crop and gut of the two codominant syrphid species are in Table 2. The mean percentage of *Rumex* type was nearly 90% in *Syrphus torvus* and 67% in *Parasyrphus lineola*.

Syrphid flies are well-known for their ability to bear pollen on hairs of their legs and body (Kendall and Solomon1973; Holloway 1976; Bastian 1986; Krannitz and Maun 1991). Their role in pollination of the reputedly anemophilous *Plantago lanceolata* was estimated by Meeuse (1984), who found that the degree of dependence on pollination by insects is about 85%. They are thus important pollen vectors promoting pollination of many plants having flowers without long corolla tubes (Bastian 1986).

The flowering period of *R. alpinus* takes several weeks. During that time a large amount of *Rumex* pollen is available. Anthophyllous insects are hardly adapted to collecting smooth pollen from overhanging stamens of *R. alpinus*. Extremely high pollen quantities can however outweigh these 'shortcomings'. This speculation is supported also by the fact that *Bombus terrestris* L., a bumblebee species pollinating usually plants with corolla tubes (but see Morse 1991), was repeatedly recorded to collect pollen from *R. alpinus*. The percentage of *Rumex* pollen in its pollen baskets ranged between 93 and 96 % (n=3; pers. observ.).

The large amount of pollen produced by *R. alpinus* attracts anthophyllous insects such as syrphids which eat large amounts of pollen and presumably take part in the gene flow in *R. alpinus* populations. Insect pollination in nominally anemophilous species as well as insect feeding by pollen from reputedly anemophilous plants should be studied in detail to understand their role in nature.

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References

Bastian, O. 1986: Schwebfliegen *(Syrphidae). Die Neue Brehm Bücherei*. Vol. **576**. A. Ziemsen Verlag, Wittenberg Lutherstadt.

Dušek, J. and Láska, P. 1987: Syrphidae. *Acta Faunist. Entomol. Mus. Nat. Pragae*, **18**: 151-159.

Holloway, B.A., 1976: Pollen feeding in hover flies *(Diptera, Syrphidae). N.Z.J. Zool.*, **3**: 339-350.

Kendall, D.A. and Solomon, M.E. 1973: Quantities of pollen on the bodies of insects visiting apple blossom. *J. Appl. Ecol.*, **10**: 627-634.

Krannitz, P.G. and Maun, M.A. 1991: Insect visitors to the guelder rose *Viburnum opulus* var. *opulus (Caprifoliaceae)* in London, Ontario, Canada. *Can. Field. Nat.*, **105**: 13-17.

Leereveld, H. 1982: Anthecological relations between reputedly anemophilous flowers and Syrphid flies. III. World wide survey of crop and intestine contents of certain anthophilous Syrphid flies. *Tijdschr. Ent.*, **125**: 25-35.

Leereveld, H. 1984: Anthecological relations between reputedly anemophilous flowers and syrphid flies. VI. Aspects of the anthecology of *Cyperaceae* and *Sparganium erectum* L. *Acta Bot. Neerl.*, **33**: 475- 482.

Leereveld, H., Meeuse, A. D. J. and Stelleman, P. 1981: Anthecological relations between reputedly anemophilous flowers and syrphid flies. II. *Plantago media* L. *Acta Bot. Neerl.*, **25**: 205-211.

Leereveld, H., Meeuse, A. D. J. and Stelleman, P. 1981: Anthecological relations between reputedly anemophilous flowers and syrphid flies. IV. A note on the anthecology of *Scirpus maritimus* L. *Acta Bot. Neerl.*, **30**: 465-473.

Meeuse, A.D.J. 1984: Rate of dependence of *Plantago media* L. on entomophilous reproduction - Preliminary report. *Acta Bot. Neerl.*, **33**: 129-130.

Morse, D. H. 1981: Interactions among Syrphid flies and bumblebees on flowers. *Ecology*, **62**: 81-88.

Porsch, O. 1956: Windpollen und Blumeninsekt. Eine Anregung. *Österr. Bot. Z.*, **103**: 1-18.

Rothmaler, W, Schubert, R. and Vent, W 1976: Exkursionsflora für die Gebiete der DDR und der BRD. Kritischer Band. Volk und Wissen Volkseigener Verlag, Berlin.

Šmarda, J., *et al.* 1963: Secondary plant communities in the High Tatra National Park. Správa TNP, Bratislava.

Stelleman, P. 1984a: Reflections on the transition from wind pollination to ambophily. *Acta Bot. Neerl.*, **33**: 497-508.

Stelleman, P. 1984b: The significance of biotic pollination in a nominally anemophilous plant: *Plantago lanceolata*. *Proceed. Kon. Ned. Akad. Wetensch. C.*, **87**: 95-119.

Stelleman, P. and Meeuse, A.D.J. 1976: Anthecological relations between reputedly anemophilous flowers and syrphid flies. I. The possible role of syrphid flies as pollinators of *Plantago*. *Tijdschr. Ent.*, **119**: 15-31.

Van der Goot, V.S. and Grabandt, R.A.J. 1970: Some species of the genera *Melanostoma*, *Platycheirus* and *Pyrophaena* *(Diptera, Syrphidae)* and their relation to flowers. *Entomol. Ber.*, **30**: 135-143.

Waitzbauer, W. 1976: Die Insektenfauna männlicher Blütenstände von *Typha angustifolia*. *Zool. Anz.*, **196**: 9-15.

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