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PRELIMINARY OBSERVATIONS ON THE INSECT FAUNA
ASSOCIATED WITH TWO THREATENED PLANT SPECIES,
BASSIA SAXICOLA (GUSS.) A. J. SCOTT AND
CYTISUS AEOLICUS GUSS., ON THE AEOLIAN ISLANDS
(SOUTHERN TYRRHENIAN SEA)

SUMMARY

The results of the preliminary investigations on the insects associated to the threatened *Bassia saxicola* (Chenopodiaceae) and *Cytisus aeolicus* (Leguminosae) are presented. While only a low number of parasites was found on *B. saxicola* (partly due to an episodic infestation), the faunal assemblage of *C. aeolicus* is characterised by higher diversity and more stability. Two coleopterans, the Bruchidae *Bruchidius foveolatus* and *B. nudus*, develop in the pods with a rate of seed destruction of about 9%. Besides, two hymenopterans, the Apoidea *Bombus terrestris* and *Lophanthophora dispar*, represent the main pollinators of the species. Some considerations about the conservation management of the studied populations are given.

RIASSUNTO

Osservazioni preliminari sull'entomofauna associata a due specie di piante minacciate, Bassia saxicola (Guss.) A.J. Scott e Cytisus aeolicus Guss., nelle isole Eolie. Il presente contributo illustra i primi risultati delle indagini sull'entomofauna associata a *Bassia saxicola* (Chenopodiaceae) e a *Cytisus aeolicus* (Leguminosae), due specie vegetali prioritarie presenti nelle Isole Eolie. Per la prima non sono state documentate peculiari associazioni, a eccezione di un basso numero di parassiti (un fitofago e uno xilofago) e di un'infestazione afidica, probabilmente episodica, a opera di *Aphys craccivora* (Homoptera Aphididae). La fauna legata alla seconda presenta invece una maggiore diversità e un carattere apparentemente più costante: due Coleoptera Bruchidae, *Bruchidius foveolatus* e *B. nudus*, completano il loro sviluppo larvale nei legumi, con una percentuale di distruzione dei semi intorno al 9%; due Hymenoptera Apoidea, *Bombus terrestris* e *Lophanthophora dispar*, costituiscono i principali impollinatori della specie. Alla luce dei risultati ottenuti, sono stati infine discussi alcuni aspetti relativi alla conservazione delle popolazioni studiate.

Bassia saxicola (Guss.) A. J. Scott (Chenopodiaceae) and *Cytisus aeolicus* Guss. (Leguminosae) are two Italian endemics included in the Annex II of the Council Directive 92/43/EEC. Both species occur in the Sicilian area exclusively on some islands of the Aeolian Archipelago. In order to achieve goals related to their conservation, biological investigations have been carried out since 1999 in the framework of a Life-Natura project (LIFE99 NAT/IT/006217 "Eolife99") focused on these and other two threatened species of the Aeolian Islands (TROIA *et al.*, 2000; 2001). No data concerning their parasites and/or their eventual pollinators are given in literature, except an old record of the Homoptera Margarodidae *Icerya purchasi* Maskell, 1897 infesting *Cytisus aeolicus* on Vulcano Island (COSTANTINO, 1937). In this paper, a part of the results obtained from the entomological study carried out during the "Eolife99" project is presented.

NOTES ON THE STUDIED SPECIES

Bassia saxicola is a perennial, evergreen chamaephyte, which blooms in the late summer. Its present distribution is limited to rocky coastal habitats of Strombolicchio Islet (Aeolian Archipelago) and Capri Island (Central Tyrrhenian Sea), where the species occurs, respectively, with 35-40 and 100 individuals (PASTA, 1999; C. Ricciardi, pers. comm.). Instead, it seems to be extinct on Sant'Anna Rocks (Ischia Island), where it was discovered in middle 19th century by the botanist Giovanni Gussone (PIGNATTI, 1982). On the cliffs of Strombolicchio Islet this species characterises a chasmophytic formation referred to the association *Hyoseridetum taurinae* by BRULLO *et al.* (1997).

Cytisus aeolicus is an evergreen shrub, with an average height of 3-6 metres. Its flowerage starts in early February and could be prolonged until March-April, depending on the site exposition. The fruits consist of pods of 5-7 cm length, containing 4-10 seeds; they ripen during summer and are tardily dehiscent. *C. aeolicus* is an endemic species of the Aeolian Archipelago, whose present distribution is limited to the islands of Vulcano, Stromboli, and Alicudi. On this latter island, a small population of about 10 individuals is confined on the northern cliffs of Angona (about 400 m a.s.l.) (PASTA & LO CASCIO, 2002). On Stromboli, the species occurs in the eastern slope between 350 and 500 m a.s.l.; the greater population consists of about 300 individuals, distributed on the upper part of the sandy conoid of Forgia Vecchia and on the rocky cliffs of Schicciolo (PASTA, 1999). The whole population of Vulcano (about 100 individuals) occurs mainly on gardens and cultivated fields in the area of Piano and Cardo (FERRO & FURNARI, 1970; PASTA, 1999). The restricted distribution of this species, which probably had been widespread in the orig-

inal Aeolian scrublands, seems to be imputable to the deforestations that have strongly modified the vegetal landscape of the archipelago during the last centuries. That could explain the recent extinction on Lipari Island, where *C. aeolicus* occurred about 100,000 yrs B.P. in the peri-lacustrine vegetation of Timpone Pataso (LO CASCIO *et al.*, 2002), and where it was observed until the middle 19th century (PRESTANDREA & CALCARA, 1853; TODARO, 1858), but not found during the further botanical explorations of the island (LOJACONO-POJERO, 1878; ZODDA, 1904).

Both species, extremely isolated among their genus and characterised by a clear relict distribution, are considered as macro-endemics (CONTE *et al.*, 1998; CRISTOFOLINI, 2002; PASTA, 1999).

MATERIAL AND METHODS

Samplings and observations on field were carried out regularly during the two years of "Eolife99" project work (from September 1999 to September 2001); furthermore, other surveys and data collections have been realised during the last years. The studied sites are: Piano (Vulcano Island, UTM coordinates VC9489) and Forgia Vecchia (Stromboli Island, UTM coordinates WC1993), for *Cytisus aeolicus*; Strombolicchio Islet (UTM coordinates WC2916), for *Bassia saxicola*. In this latter, the most part of the population is localised on inaccessible cliffs. Hence, it has constituted a considerable limit to monitor an adequate sample-size, and only two reachable individuals (situated 15 m a.s.l. on the north-western slope) were investigated in the present study. Instead, 11 and 16 individuals of *C. aeolicus*, respectively, on Vulcano and Stromboli islands were chosen to carry out regular examinations and samplings during the present research.

Several methods were used during the investigations, following the main techniques summarised by AUSDEN (1996). Direct searching and beating in foliage were carried out on both studied species. While it was impossible for the chasmophytic *Bassia saxicola*, which lives in the rock crevices, soil and litter were sampled from the base of mature plants of *Cytisus aeolicus*, aiming to find rhizophagous and others hypogaecic phytophagous. Dead twigs (from *B. saxicola*), branches, seedpods and other plant samples (from *C. aeolicus*), where xylophagous and other phytophagous species spend their larval stages, were collected and stored in clear plastic bags at the laboratory, grouped per site and date of collection. Finally, accurate field-surveys of the flower-visitors of *Cytisus aeolicus* were carried out during four days in March 2000, February 2001 and 2003 (Vulcano), and March 2003 (Stromboli). Pollinator visitation was quantified monitoring 5 selected inflorescences for set time intervals (30

minutes every 1-1.5 h) through the day, following the methods indicated by STONE *et al.* (1998). The inflorescences were chosen randomly with respect to aspect and height above ground. Flower-visitors were collected using a sweep-net or identified by watching at the lowest taxonomic rank possible. Also, Moericke's traps were placed in the surrounding of the plants of Vulcano, aiming to verify richness and faunal diversity of the flying insect assemblages during and later the blooming time of *C. aeolicus*. The traps, placed above the level of the basal branches, consist of yellow bowls filled with water and 2-3% of detergent to reduce its surface tension.

The specimens collected during the fieldwork were stored and identified at the Zoological Section "La Specola" of the Natural History Museum of the University of Florence, except the Homoptera Aphididae and the Hymenoptera Apidae and Anthophoridae, which were kindly identified by Prof. Sebastiano Barbagallo and Dr. Giuseppe Fabrizio Turrisi (University of Catania). The studied specimens are kept in the author's collection.

Statistical analyses were done by using SPSS for Windows PC package (version 11.5); the evaluations of diversity indices were undertaken using MVSP package (version 3.1).

RESULTS

Bassia saxicola

During the first visit (IX.1999), one individual of *B. saxicola* was found largely infested by virginoparae and immatures of *Aphys craccivora* Koch, 1854 (Homoptera Aphididae). At the same time, some individuals of *Camponotus (Tanaemyrmex) nylanderi* Emery, 1921 (Hymenoptera Formicidae) were observed on the plant, probably attracted by the presence of the aphids. However, a large number of ants were observed at the base of both plants, foraging in the litter. One larva of Lepidoptera Geometridae was also observed feeding on a young stem; unfortunately, during the rear at the laboratory it did not complete the larval cycle, then the species remains unidentified. In the two following visits (XII.1999 and IV.2000), some dead twigs were collected on both plants; 6 adults of *Gastrallus corsicus* Schilsky, 1898 (Coleoptera Anobiidae) were reared from this material in May 2000. No other insects were found on *Bassia saxicola* during the further surveys.

Cytisus aeolicus

The field observation of selected inflorescences, carried out in Vulcano and Stromboli (hereafter indicated as sites A and B, respectively), has made

possible to 1) identify the flower-visitor taxa, 2) clarify their role as effective, probable or potential pollinator, and 3) evaluate their visitation rates (VR). In the present study, visitation is quantified in terms of the number of inflorescence visits made by each taxon. This measure seems the more appropriate to estimate the value of the visitor to the plant (see HORVITZ & SCHERNSKE, 1990). VR (in %) for each taxon observed during three days in site A ($N = 337 \pm 31.01$ counted visits per day) are given in Fig. 2. About 80% of the whole visits were made by two species of Hymenoptera Apoidea, the Anthophoridae *Lophanthophora dispar* (Lepeletier, 1841) and the Apidae *Bombus terrestris* (Linnaeus, 1758); in particular, this latter constitutes the main flower-visitor of *C. aeolicus*, with VR ranging between 48 and 59.3, while a range between 21.9 and 31.4 resulted for *Lophanthophora dispar*. The other taxa are: Diptera Syrphidae (one species, not identified), VR range 8.5-13.8; Diptera Calliphoridae (probably belonging to 4 different species, not identified), VR range 0-10.1; Diptera Muscidae (several unidentified species), VR range 1.4-3.4; *Dasytes nigroaeneus* Küster, 1850 (Coleoptera Melyridae), VR range 0-5.7. On the contrary, more than 97% of observed visitations in site B (one day) resulted made by *Bombus terrestris* (158/162), whereas only a low number was done by unidentified flies (probably Muscidae). Using Shan-

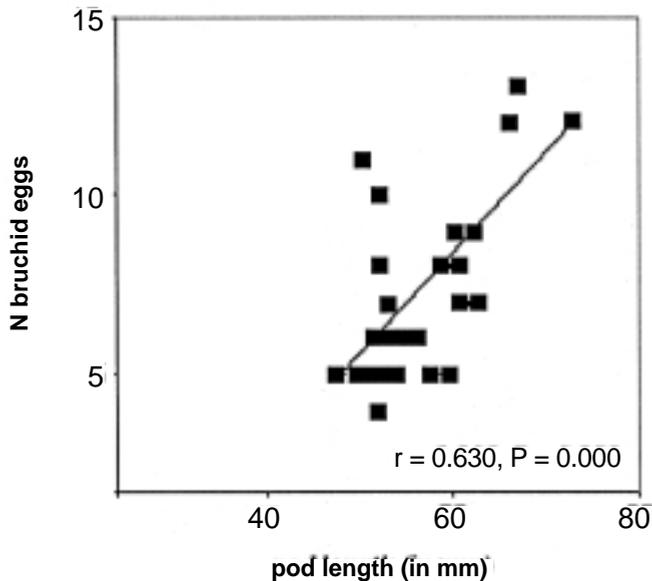


Fig. 1 — Correlation between the numbers of *Bruchidium nudus* eggs laid on the seedpods and the length of the pod.

non's index to compare both flower-visitor assemblages, diversity results higher in site A ($H' = 1.240$, evenness = 0.692) than in site B ($H' = 0.116$, evenness = 0.167). Hence, Hymenoptera Apoidea could be considered the most important pollen vectors of *C. aeolicus*. They resulted one of the main groups among the flying insect assemblage of site A during the blooming time, while they decrease in the following months (Fig. 3). In February, *Bombus terrestris* and *Lophanthophora dispar* were found in Moericke's traps with a percentage equal to about 7% and 4%, respectively, of the whole collected specimens, while in May their percentages are equal to 0.8% and 0.3%. However, this difference seems due to the insect surplus occurring in late spring than to a real decrease of these hymenopterans. The other flower-visitors observed in site A represent also more or less efficient pollen vectors of *C. aeolicus*, according to their ethological and morphological features (see e.g. MAWDSLEY, 2003). Detailed examinations at the laboratory revealed the occurrence of pollen grains trapped in the setae and the pubescence, particularly on specimens of *Dasytes nigroaeneus*. Despite of this, the role of these insects in pollination mechanisms of *C. aeolicus* should be considered insubstantial, because of their low rate of visitation on the inflorescences (Fig. 2).

A low number of parasites resulted associated to *C. aeolicus* (see Table 1). Adults of *Meligetbes (Meligetbes) immundus* (Kraatz, 1858) (Coleoptera Nitidulidae) were found abundant on flowers during the anthesis (site A: III.2000, II-III.2001, 35 exx.), but no specimens of this and/or other species

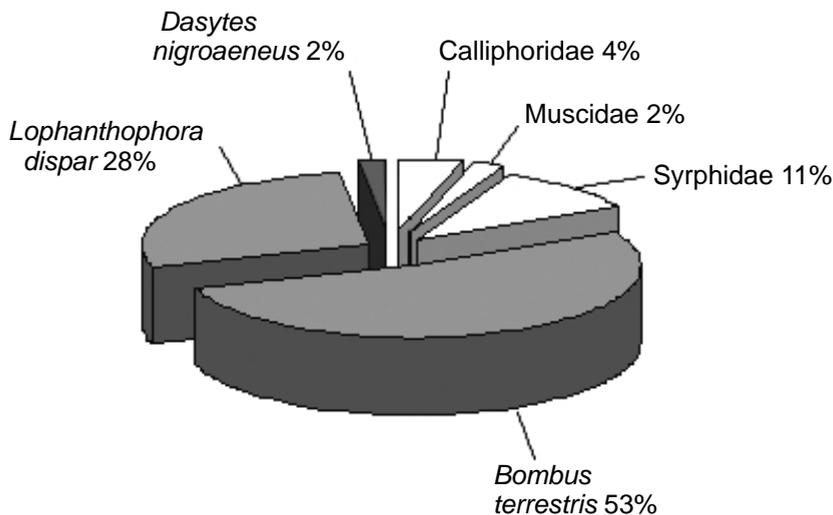


Fig. 2 — Visitation rate among flower-visitors on *Cytisus aeolicus* in site A.

Table 1
Insects associated to *Bassia saxicola* and *Cytisus aeolicus*.

<i>Bassia saxicola</i>	Homoptera		
		<i>Aphys craccivora</i>	phytophagous
	Coleoptera		
		<i>Gastrallus corsicus</i>	xylophagous
	Lepidoptera		
		Geometridae sp.	phytophagous
	Hymenoptera		
		<i>Camponotus nylanderi</i>	attracted by aphids
<i>Cytisus aeolicus</i>	Coleoptera	<i>Agrilus elegans</i>	xylophagous
		<i>Denops albofasciatus</i>	? predator of xylophagous
		<i>Dasytes nigroaeneus</i>	probable pollinator
		<i>Meligethes immundus</i>	probable phytophagous
		<i>Berginus tamarisci</i>	uncertain
		<i>Chrysolina viridana</i>	irregular phytophagous
		<i>Bruchidius foveolatus</i>	seeds feeder
		<i>Bruchidius nudus</i>	seeds feeder
	Diptera	Calliphoridae spp.	probable pollinator
		Muscidae spp.	pollen feeder / ? pollinator
		Syrphidae sp.	probable pollinator
	Hymenoptera	<i>Bombus terrestris</i>	pollinator
		<i>Lophanthophora dispar</i>	pollinator
		Eurytomidae sp.	parasitoid of seed feeder
		Pteromalidae spp.	parasitoid of seed feeder

were obtained from the rear of dead branches and wood collected on site A. On the contrary, 5 adults of *Agrilus* (*Agrilus*) *elegans* ssp. *elegans* Mulsant & Rey, 1863 (Coleoptera Buprestidae) were reared in the late May 2003 from dead twigs sampled on site B (III.2003). It was also found a dead specimen of *Denops albofasciatus* (Charpentier, 1825) (Coleoptera Cleridae), probably dead at the end of the nymphal stage in a trophic gallery. This species generally preys on small coleopteran larvae (CECCHI & LO CASCIO, 1999; GOBBI, 1984) and then could be considered a potential predator of the xylophagous.

Instead, the occurrence of coleopteran larvae developing in pods of *C. aeolicus* results more significant. Two species of Coleoptera Bruchidae, *Bruchidius foveolatus* (Gyllenhal, 1833) and *Bruchidius nudus* (Allard, 1868) were reared from seedpods sampled, respectively, in site A and in both sites (N = 390). Bruchid females lay eggs on the seedpods and the larvae develop in and destroy the seeds. To calculate the incidence of bruchid infestation,

after the end of the larval stage, seedpods were opened to allow the remained seeds to be counted. The overall seed destruction, calculated in terms of intact/parasitized seeds ratio, can be evaluated equal to 9.60% (site A) and 9.30% (site B) of the collected seedpods. Using ANOVA to test the rates, it was found a significant difference among the seed destruction per year ($F_{6,7} = 11.65$, $P = 0.014$). The number of bruchids (and their parasitoids) obtained from the samples per each site and year is given in Table 2. While in site B only *B. nudus* occurs, in site A density level resulted to be considerably greater for *B. foveolatus* (reared adults: $N = 109$) than for *B. nudus* (reared adults: $N = 35$). It is interesting to remark that, even if occurring on the same plant, the two species have never been found coexisting on the same seedpod. While the flowering of *C. aeolicus* normally occurs during February and March, adult activity in field was observed to begin in late March and can last until August-September, with a peak in late May-June (Fig. 3), when the new generation of weevils emerging; during this period, mating and foraging are accomplished mainly on flowers of *Daucus* sp. and several Asteraceae, which are abundant in the surroundings of the studied plants. It should be noted that the majority of the adults reared at the laboratory (161/193) emerged

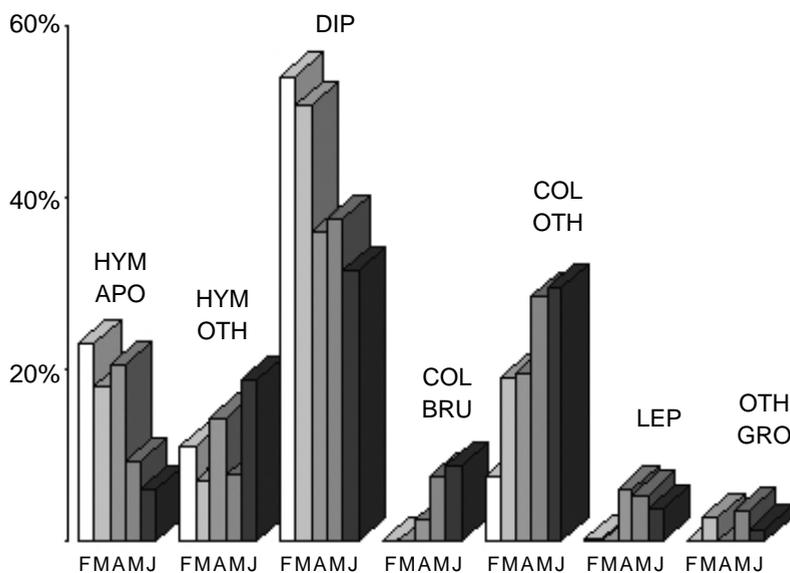


Fig. 3 — Monthly variations of flying insect assemblages in site A (in % of collected specimens in the Moericke's traps). Abbreviations as following: Hymenoptera Apoidea (HYM APO), other Hymenoptera (HYM OTH), Diptera (DIP), Coleoptera Bruchidae (COL BRU), other Coleoptera (COL OTH), Lepidoptera (LEP), and other insect groups (OTH GRO).

only in late June. This fact suggests that the Bruchidae observed in field during spring are almost exclusively represented by over-wintering individuals. In late April 2003, several young (green) seedpods on site B plants were inspected using a magnifying glass; 28 of these, on which bruchid eggs occurred, were collected, preserved in small pipes filled with alcohol (to avoid loss of eggs during the transfer), and examined at the laboratory. Using a regression analysis, the eggs number was correlated to the pod length (average length = 56.18 ± 1.14 mm), while this latter was correlated to the number of contained seeds ($N = 4.71 \pm 0.29$). As expected, the number of seeds per pod increased highly significantly with the length of the seedpods ($r = 0.954$, $P = 0.000$); a highly significant correlation was also found between the number of bruchid eggs laid on the pods and the pod length ($r = 0.630$, $P = 0.000$), with more eggs being laid on longer pods (Fig. 1). Beetles also laid more eggs on pods with more seeds ($r = 0.562$, $P = 0.002$), although the seed number seems a less reliable indicator of clutch size than the pod length. Parasitism on Bruchidae occurs in both sites (see Table 2) with average rates equal to 23.42% on site A and rather low on site B (10.60%). The parasitoids belong to Hymenoptera Eurytomidae (1 sp.) and Pteromalidae (2 spp.); while all the species were reared from seedpods collected on site A, only a species of Pteromalidae had been obtained from the samples of site B. Their identification at specific level is still in progress.

No insects were found in the soil samples, which have been carried out exclusively in site B, characterised by incoherent sand that seems to be unsuitable to hypogaecic species. Hence, further investigations are needed to clarify if rhizophagous and/or other hypogaecic phytophagous could be associated to *C. aeolicus* rhizosphere. Finally, some coleopterans observed only sporadically on plants could be considered as occasional visitors, such as the Mycetophagidae *Berginus tamarisci* Wollaston, 1854, or irregular phytophagous, such as the Chrysomelidae *Chrysolina viridana* ssp. *chloris* (Lucas, 1849).

Table 2
Number of intact seeds (b), bruchid adults (c) and their parasitoids (d) from the sampled seedpods (a) of *Cytisus aeolicus* in both studied sites.

Site	a	b	c	d	
A	1998	55	338	22	7
	1999	65	416	34	11
	2000	65	361	20	5
	2002	100	540	68	23
B	2000	20	114	9	–
	2002	65	397	28	6
	2003	20	95	12	2

DISCUSSION

Bassia saxicola

The investigations have been extended on a small sample of plants, therefore only few data are available for *Bassia saxicola*. However, this species does not seem to be characterised by a significant association with insects. The xylophagous *Gastrallus corsicus*, widely distributed in the Mediterranean area (ESPAÑOL, 1992), is a polyphagous species, common on the Aeolian Islands, where it develops in several host plants (P. Lo Cascio, unpublished data). Apart from twigs of *B. saxicola*, it was also reared from dead branches of *Euphorbia dendroides* L. and *Olea europaea* L. collected on Strombolicchio Islet. On the other hand, the aphidian infestation found during the first visit could represent an episodic occurrence. *Aphys craccivora* is an anholocyclic Aphididae with cosmopolitan distribution; it is considered one of the most important pests of herbaceous Leguminosae (BLACKMAN & EASTOP, 1984; 1994). Although this aphid is known to transmit a number of plant viruses (MURANT, 1990; RABOUDI *et al.*, 2002), the plant did not appear to be damaged by the infestation. No potential pollinators have been found during the investigations; however, it is probable that the wind constitutes the main pollen vector for this species, similarly to a great number of Chenopodiaceae (see MULUGETA *et al.*, 1994). On the contrary, is still unclear the occurrence of a relationship between *B. saxicola* and ants, which were observed foraging on the litter of the plants. Even though the ants could indirectly concur to the seeds dispersal, no evidences in this direction came out from the present study.

Cytisus aeolicus

An outstanding feature in the Mediterranean flora is that most entomogamous plant species are generalist and can be pollinated by many insect species (BLONDEL & ARONSON, 1999; PETANIDOU & ELLIS, 1993). Apparently, it does not seem the case of *Cytisus aeolicus*, for which only two species (*Bombus terrestris* and *Lophanthophora dispar*) have resulted as its main pollinators, with rates of about 80% (on Vulcano) and 97% (on Stromboli) of the whole observed flower-visits. However, since the beginning of the present research it was straightforward that *C. aeolicus* blooms when the flower-visitors are mostly inactive. February is the rainiest and coldest month of the year, and flying insect activity is generally limited to the sunny days; furthermore, the majority of the insects active in the following months (see Fig. 3) are still wintering, or do not have concluded their larval stages. Then, blooming time occurs when the availability of pollen vectors is substantially

reduced. Among the insect species that are coincidentally active, solitary bees are well known as pollinators of a wide number of plant species, in both disrupted and non-disrupted habitats (KEVAN & BAKER, 1983; 1984; LINSLEY, 1958; POTTS *et al.*, 2001); also, bumblebee is considered the main pollinator of other species of the genus *Cytisus* (STOUT, 2000; SUZUKI, 2003). Undoubtedly, several eco-physiological and behavioural features have contributed to establish this plant-pollinator relationship: 1) these hymenopterans remain active at low temperature and able to fly in the cooler season (GOULSON, 2003; STONE, 1994); 2) they prefer to visit the largest flowers available (GALEN & NEWPORT, 1987; OHASHI & YAHARA, 1994; STOUT, 2000); 3) they show higher rates of movement between and/or within the inflorescences (PYKE, 1979; WILLMER *et al.*, 1994).

On the other hand, *Bombus terrestris* has flexible floral preferences and generally visits a range of flowers of different plant species, according to the availability: during spring, it was observed in Vulcano foraging on about 15-20 other shrub and/or tree species. As other bumblebees, it is markedly less constant than other Hymenoptera Apoidea (FREE, 1970; WADDINGTON, 1983). Floral constancy of pollinators (*sensu* PLATEAU, 1901; see also WASER, 1986) is of crucial importance to plant reproductive biology, since it minimizes pollen deterioration and stigma clogging with pollen from other species. From this point of view, it should be noted that the blooming time results an important trait of the reproductive strategies and, probably, of the whole evolutionary history of *C. aeolicus*. It represents an exception among the Leguminosae of the tribe Genisteae occurring in the Aeolian Archipelago (S. Pasta, comm. pers.) and in the whole Central Mediterranean area (PIGNATTI, 1982), which generally bloom between April and June. Separation of flowering seasons remains one of the possible resources to guarantee a sufficient partition among potential pollinator in plant communities (POOLE & RATHCKE, 1979); although the present level of knowledge is still insufficient to interpret this pattern as follow, it should be also noted that early blooming generally characterises species with low competitive ability (see EISIKOWICH *et al.*, 1992). In any way, conservation management of this threatened species should hold in due consideration the risk that could arise in case of introduction of allochthonous plant species with coincident flowerage (e.g. *Acacia* sp. pl.) in the surrounding of its populations. This occurrence did not seem improbable in Vulcano, where most part of the individuals of *C. aeolicus* are confined within private gardens and fields, which are excluded from the boundaries of the local protected area (R.N.O. "Isola di Vulcano") and, then, where no limits hamper the introduction of exotic flora.

Concerning the parasites, the present research revealed on the whole

a low number of insect species associated to *Cytisus aeolicus*. The coleopteran *Meligethes immundus* is known to spend its larval stages on shrubby Leguminosae (AUDISIO, 1993). Even if it is probable that *C. aeolicus* could to represent its host plant, the incidence of this coleopteran should be considered quite limited. In fact, no specimens belonging to this species have been obtained from the dead branches collected in the site A. Up to now, the only xylophagous reared from dead wood of *C. aeolicus* is the buprestid *Agrilus elegans*, a W-mediterranean species (CURRETTI, 1985) whose main host plants are Cistaceae and Ericaceae (CURRETTI, 1994; GOBBI, 1986).

Seed destruction occurs in both studied populations (with significant differences in rates between years), due to the larval development of the Coleoptera Bruchidae *Bruchidius foveolatus* and *Bruchidius nudus*. These coleopterans are distributed, respectively, in southern Europe and in the Mediterranean area (BOROWIEC & ANTON, 1993; YUS RAMOS, 1977); several Asteraceae and Leguminosae are known as their host plants (CAMPOBASSO *et al.*, 1999; HOFFMANN, 1945; YUS RAMOS, 1977), including the congeneric *Cytisus villosus* Pourret, which has been indicated for *B. nudus* in France (HOFFMANN, 1945). While this latter is the unique species that has been found on Stromboli, both coexist on Vulcano, but the rear at the laboratory showed that they do not lay eggs in the same seedpod. This fact suggests the absence of intra-specific competition. Also, females seem to lay their eggs in an ideal manner to reduce competition between their larvae, as revealed by the positive correlations found between the number of eggs per seedpod, the number of seeds in the pods and the pod size. Average rates of parasitized seeds (about 9% in both populations) result significantly lower than the percentages known for the other species of *Cytisus* in Italy (G. Cristofolini, pers. comm.) or in other geographical areas (MEMMOTT *et al.*, 2000; REDMON *et al.*, 2000; WALOFF & RICHARDS, 1977). A natural control of the bruchids is moderately performed by parasitoids belonging to Hymenoptera Eurytomidae and Pteromalidae, so far unidentified. Several species of these hymenopteran families have been previously indicated as parasites of Bruchidae (BOROWIEC, 1988; PARNELL, 1964; REDMON *et al.*, 2000; SOUTHGATE, 1979).

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