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Diet of the asp viper *Vipera aspis* in woodland habitats of the Po plain (NW Italy)

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Abstract. The diet of Asp viper *Vipera aspis* was studied in forested habitat of Northern Italy The species feeds on a low number of preys, possibly reflecting the reduction of small mammal richness in woodland habitats.

Keywords. *Vipera aspis*, diet, prey list, northern Italy.

The diet of the Asp viper *Vipera aspis* has been extensively studied all over its distribution range (Duguy, 1972; Monney, 1990, 1993, 1995). In Italy several studies focused on feeding ecology of populations inhabiting mountain and Mediterranean habitat (Capula and Luiselli, 1990; Luiselli and Agrimi, 1991; Capizzi and Luiselli, 1996; Saviozzi and Zuffi, 1997) whereas data from temperate plain areas are scanty or anedoctal (Morisi and Molinaro, 1980; Bruno, 1985). This paucity of information is ultimately due to the 1) strong fragmentation of woodland habitat, 2) a very low population density and 3) a scarce success in ingesta collection (usually less than 30% of captured individuals regurgitate or defecate (Gentilli, unpubl. and present study). Aim of this note is thereby to improve current knowledge of diet and feeding strategies of Asp viper in residual plain populations, as well as to compare diet spectrum and prey availability.

Our study was carried out from April to September 2006 in two residual woodland areas of Po plain (North-Western Italy). The first area was the Bosco Fontana Nature Reserve (45° 12' 11"N; 10° 44' 41"E), an ancient and mature woodland of 230 ha (hereafter BF). The protected area is uniformly covered by *Quercus robur* and *Carpinus betulus* and a wide prairie is located in the central part of the woodland. The second study area was the Baraggia di Piano Rosa (45° 38' 47"N; 8° 28' 23"E), a wide protected area characterized by woodlot, hedgerows and cultivated field growing on a acid and dilavated soils (hereafter B). Arboreal vegetation is dominated by *Robinia pseudoacacia*, *Betula pendula* and *Quercus robur*; grassy vegetation is mainly constituted by *Calluna vulgaris* and *Molinia arundinacea*.

We captured 82 Asp viper and 24 meal samples were collected by 24 individuals (13 male, 11 female). Vipers were captured by hand along the ecotone woodland-prairie; after capture, vipers were measured, sexed and stored inside cotton bag. Prey samples were obtained by forced regurgitation (ingesta) or collected after few hours of captivity (ingesta and faeces). All samples were conserved in ethanole until examination.

Preys were determined by microscopical analyses of ingesta and faeces contents. Methods proposed by Debrot et al. (1982), Demarinis and Agnelli (1993) were adopted for this study; a references collection of mammals hairs was prepared and Teerink (1991) was adopted as the identification guide.

Food availability was estimated on two soil level; firstly we checked for preys availability above ground by disposal of 52 live traps on a standard transect 450 m long (BF) and 36 live traps on a transect 280 m long (B). Traps were baited with sunflower seeds and checked at sunset and dawn; trapped individuals were sexed, weighted, marked by toe-clipping and released. We tried to estimate prey availability underground by disposing traps under litter, but this method provided a very poor trap success; data from Canova (1992) and Nadali (2001), collected in the same habitat or similar wooded habitat, were then adopted to compare diet with underground food availability.

On 24 samples only three mammals and one reptilian species were indeed recognized. Diet from the two study areas are significantly different (χ^2 Fisher = 10.4, df = 3, $P = 0.004$), with *Microtus savii* being the principal prey in Bosco Fontana and *Crocidura suaveolens* in the Baraggia area; *Rattus* sp. and *Anguis fragilis* were occasional preys in our samples (Table 1). Diet among sexes are not significantly different (χ^2 Fisher = 4.5, df = 3, $P = 0.163$) while diet item frequency is significantly different from availability ($\chi^2 = 29.7$, d.f. = 5, $P < 0.001$) and availability differed among sites (χ^2 Fisher = 8.7, df = 3, $P < 0.01$). Comparison between frequency of mammal preys and available ones showed that *Apodems agrarius* and *Apodemus sylvaticus* are not represented in Asp viper diet; only *C. suaveolens* is preyed in proportion to its availability while *M. savii* proportion in diet largely overrun its availability (Fig. 1).

Results suggested a diet pattern remarkably restricted, confirming the data reported by Capizzi and Luiselli (1996) woodland habitats of central Italy; on the other hand these data contrast with Capula and Luiselli 1990 (14 preyed species), Luiselli and Agrimi (1991) (20 preyed species) and Saviozzi and Zuffi (1997) (10 preyed species) where diet was considerably wider.

The observed differences can reflect the reduction in small mammal richness in mature woodland habitat, as described by Gurnell (1985), as well as the effect of a higher

Table 1. Diet of asp viper in the two study areas.

	Bosco Fontana		Baraggia		Total
	n	%	n	%	n
Microtus savii	12	75	1	12.5	13
Crocidura suaveolens	3	18.75	6	75	9
Anguis fragilis	0	0	1	12.5	1
Rattus sp.	1	6.25	0	0	1

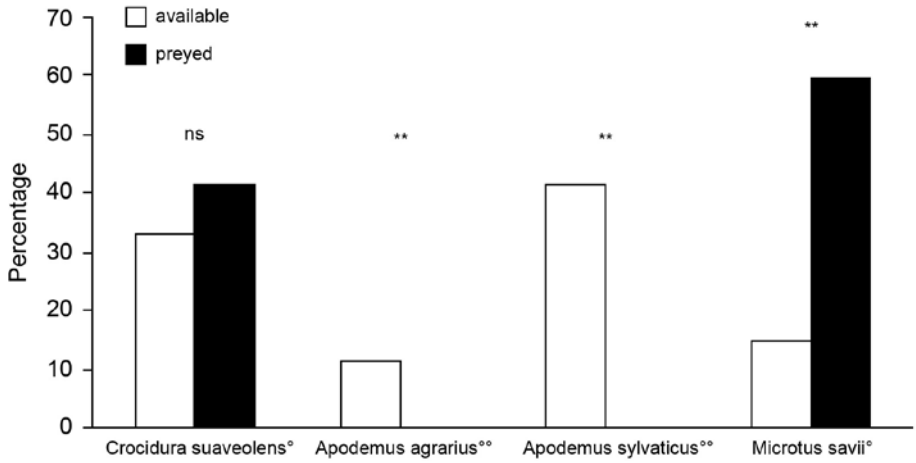

Fig. 1. Frequency of mammal preys in diet compared with availability. Legend: °° data from present study, ° Canova (1992). Differences were tested on original frequency by chi-square test and Bonferroni confidence intervals: ns=not significant, * $P < 0.01$, ** $P < 0.001$.

habitat heterogeneity in the other study areas. Out of general conclusion two additional informations appeared to be of some interest from our study: 1) Asp viper diet do not include both the diurnal *A. agrarius* than the nocturnal *A. sylvaticus*, two rodents very abundant in our study areas; 2) Asp viper feeds on *C. suaveolens* and largely preferred *M. savii*, two smaller and less abundant species in forest habitat (Canova and Fasola, 1991; Canova, 1992).

More detailed study are clearly needed in order to separate effect of habitat on prey spectrum width and to investigate possible feeding adaptation in local, fragmented populations.

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