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DOES THE AFRICAN GOLDEN WOLF, *Canis anthus*, PLAY THE ROLE OF REGULATOR OF NATURAL MICROMAMMAL POPULATIONS IN THE EDOUGH MOUNTAIN RANGE (NORTHEASTERN ALGERIA)?

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The objective of this study is to analyse the share of small mammals in the diet of the African Golden Wolf (*Canis anthus*), to deduce its functional role as regulator of densities of this food category.
Methods: Sampling campaign was carried out during the winter period 2020, when trophic resources are least abundant, and when the small mammals are most abundant. We choosed two different ecological conditions to conduct the scats sampling in the Edough Mountain Range, once in the natural environment of Berouaga and the second in Ain Barbar landfill. 30 droppings were collected in the field and at each site, then sterilized, washed, sorted and identified in the laboratory.
Results: We were able to identify rodents, wild boar's carcass, arthropods, birds, plants and wastes (plastic bag, papers, aluminium foils..). Occurrence frequencies analysis of item preys stand shows that the African golden wolf consumes micromammals less frequently in the natural environment, to avoid interspecific competition pressure with other predators like common genets, and does not consume them at all in the anthropized environment, since the anthropogenic resources are abundant, easily accessible and requiring no energy loss.
Conclusion: By its opportunistic behavior, the African Golden Wolf turns away from its role as regulator of natural populations of small mammals, in the presence of anthropogenic resources.

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Keywords: *Canis anthus*; feeding behaviour; regulator; small mammals populations; Edough mountain.

1. INTRODUCTION

The African Golden Wolf (*Canis anthus*), is a meso mammal that is an integral part of top predators across its range [1-4]. Previously known as the Golden Jackal (*Canis aureus*), recent etho-ecological studies, combined with genetic analysis conducted between 2012 and 2015, have evolved its taxonomy [5,6,7]. In Algeria, the African golden wolf remains poorly studied, and the few existing studies are on the presence indices of the predator in southern Tassili n'Ajjer [8] and its food ecology in Djurdjura National Park in Kabylia [1,2], in Tlemcen hunting reserve [4], in National Park of El Kala [9], and in the Edough mountain range [10]. These pioneering works has focused on the trophic opportunism of the species, which has a wide food spectrum and which according to the trophic conditions of the environments in which it evolves. In this study, we tried to find out if the African golden wolf *Canis anthus* is one of the regulators of natural populations of micromammals. Thus, we analysed the share of small mammalian preys in the diet of the predator, in winter period and in two different environments, to deduce its functional role towards this food category.

2. MATERIALS AND METHODS

2.1 Study Area and Sampling

The study was carried out during the winter period of 2020 (from the end of November to the end of February), on the northern side of the Edough forest massif, between 500 m and 900 m altitude. Sampling was carried out in two sites: Berouaga, (36°54' N and 7°37' E; Northeast Algeria), located at 700 m of altitude in the northeast of Algeria, is a natural environment, dominated by cork oak (*Quercus suber*) and zeen oak (*Quercus faginea*), and Bouzizi landfill (36°54'16.6 "N 7 °38'23.0 "E) at the extreme east of the Edough forest massif (Fig. 1).

In each sampling site, we selected two transects given more uniform nature, and we walked 2 kms once per week on each transect. At the end of winter period, 60 scat samples were collected (30 in each site). For African golden wolf, the scat's differentiation from those of other carnivores such as wild cat (*Felis lybica*), red fox (*Vulpes vulpes*), Egyptian mongoose (*Herpestes ichneumon*), and especially domestic dogs (*Canis lupus familiaris*) is based on specific characteristics such as the smell, size, shape and place of deposits [11,12]. The identification was helped by the fact that droppings were away from farms and residential areas, in natural environments, and by the indications of the residents, the presence of footprints, direct direct observation of the species near its burrow in the Ain Barbar landfill.

2.2 Samples Treatement

We analysed the samples for prey identification according the protocole of Hamdine et al. [13]. Scats was dried (80° C in an oven for 24 hours), weighed and then dilacerated in an aqueous medium. After that, scats were washed with hot water and detergent over a 0.25 mm diameter mesh screen. Prey remains were dried for 24 to 36 hours at 50° C. The item preys were classified into six categories: (Small mammals, Large Mammals, Arthropods, Birds, Plants and anthropogenic waste). Each category was identify according to identification keys: for small mammals [14,15,16], large mammals such as Wild boar *Sus scrofa* [16], Birds [14], Arthropods [17], Plants and seeds compared with our reference collection.

Fig. 1. Study area

2.3 Data Analysis

The analysis of the diet was carried out by calculating the occurrence frequency or the presence index (Pi) expressed by the number of appearances of a food category on the total number of scats. This parameter was then converted to a percentage for a better reading of results. The graphical representation of the data was achieved using Microsoft Office Excel 2007.

3. RESULTS

3.1 Taxonomic Identification of *Canis anthus* Diet

Five food categories: Arthropods, particularly Coleoptera, Large Mammals and especially Wild Boar, Small Mammals, and more specifically Rodents, birds and plants were identified in the natural environment, while four food categories: arthropods, birds, plants and anthropogenic wastes (plastic bags, papers, aluminium foil…) were identified in the anthropogenic environment (Table 1).

3.2 Occurrence Frequencies Analysis

Overall, the results show that the African Golden Wolf consumes the Mammal preys (large and small Mammals) only in the natural site. The frequency of consumption of arthropods, birds and fruits is higher in the natural environment compared to the anthropized environment. However, waste, are frequently consumed by the predator in the anthropized environment, even if this category is found in the natural environment (Fig. 2).

Table 1. Diet of *Canis anthus* in natural and anthropized sites

Food item	Natural site	Anthropized site
Small Mammals: Rodents	X	-
Large Mammals: *Sus scrofa*	X	-
Arthropods : Coleoptera	X	X
Birds	X	X
Plants	X	*X*
Anthropogenic wastes	-	X

In the natural environment, a hunting behaviour is observed, and animal preys are found in the predator's diet (8% of micromammals, 5% of large mammals, 21% of arthropods and 6% of birds). Plants (17% digestive plants such as *Ampelodesma mauritanica* and 33% of fruit seeds), and 10% of anthropogenic wastes were also found (plastic bag, aluminium foil, papers). On the other hand, 3 times more wastes are present in the anthropogenic environment, and few animal preys are found (11% Arthropods, 7% birds and absence of Mammalian preys), which reflects the opportunistic behaviour of the predator (Fig. 3).

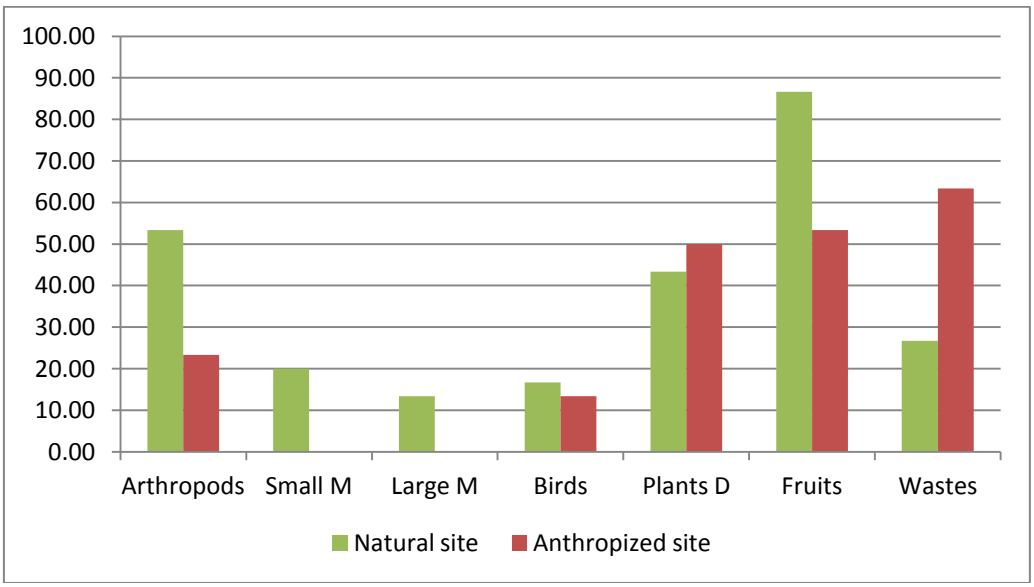

Fig. 2. Occurrence frequencies of items – preys in natural and anthropized sites

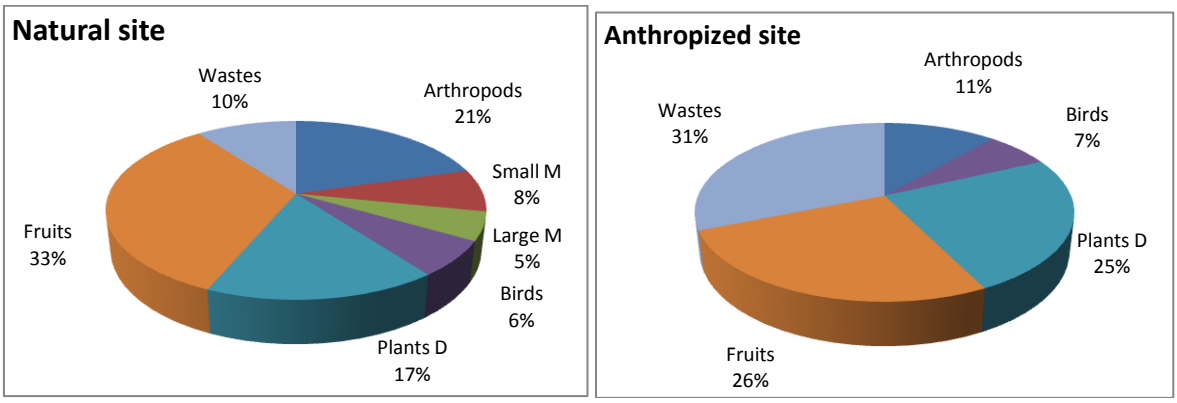

Fig. 3. Percentage of items – preys in each site

4. DISCUSSION

The African Golden Wolf is a predator that exploits trophic resources according to their local availability and seasonality [18,2,4,8]. In this study, we looked at the trophic opportunism of this predator, through its consumption of small mammals in natural environments and in environments where artificial trophic resources are abundant. The results obtained in the wild are comparable to those described by Boukheroufa et al. [10]. They identified rodents in the species' diet and found a partial overlap of the trophic niche with another predator, the common genet, which is more selective towards micromammals. Thus, the wolf adjusts its diet by relying on the carcasses of wild boars, particularly abundant during the prescribed hunting period, to reduce the interspecific competition that could be exercised on small mammals populations [4,19,20]. Also, wild boar carcasses are an easily accessible prey for *Canis anthus* that does not require energetic efforts for hunting, unlike micromammals. On the other hand, it is found that the predator does not hunt the small mammals that swarm in the landfill, but rather consumes the organic waste, thus allowing the animal to save its energy and allocate it to other vital functions. According to Khidas [21], two methods of food research are used by the African Golden Wolf: first the consumption of resources that are not hunted, but rather found by chance or by knowledge of the places (in our case, the wild boar carcasses, fruit, garbage, etc.), and the second way is the active hunting. The African Golden Wolf hunts singly, in groups or in packs, prey of various sizes [22]. Some authors report that small mammals makes up the largest portion of its food spectrum [1,23], while others report a trend towards larger prey sizes, mainly wild boar and sheep [2,4,10]. Concerning the occurrence of anthropogenic wastes in the predator‘s diet, Yirga and al [24] showed a positive relationship between African golden wolf, human abundance and density of prey depleted anthropogenic landscapes. But this trophic behaviour is not without consequences on the state of health of the predator [24]. Wildlife disturbance is one of these impacts and could ultimately lead to significant physiological disturbances and affect the health and survival of species [25].

5. CONCLUSION

Due to its opportunistic behaviour, the African golden wolf will adopt two trophic behaviours towards small mammals. In the natural environments, it will partially regulate their natural populations in order to avoid, as much as possible, competitive pressure with other sympatric predators such as the common genet. In anthropogenic environments, it will completely turn away from this regulatory role, where resources are easily accessible and require no loss of energy, which could affect the health of this predator and the whole food chain at the top.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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