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From myth to knowledge: public perception of native and alien praying mantids in Italy and its implications for conservation (Insecta: Mantodea)

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Abstract
A sociological survey assessed public perception and knowledge of praying mantids in Italy (n = 222). Although mantids show higher popularity than most insects, persistent misconceptions rooted in cultural myths remain widespread. Increased awareness of invasive alien species reflects recent outreach efforts, yet significant gaps in understanding native species conservation persist. These findings highlight the importance of improving science communication and biodiversity awareness to support monitoring and management of native and alien mantid species.

Key words. Biodiversity conservation, invasive species, praying mantids, public perception, citizen science, Italy

Introduction

Praying mantises (Insecta: Mantodea) have long attracted particular attention in the European context and are often perceived as more evocative than many other insects due to their ability to stimulate imagination, curiosity, and superstition (Cattabiani 2000). While most insects have historically been relegated to functional roles; harmful or beneficial, pests or allies; mantises have occupied a singular position, suspended between naturalistic and symbolic dimensions (Schuetz-Miller 2022). Their morphology, characterized by raptorial forelegs folded forward in a gesture resembling prayer, and their rapid and lethal predatory behaviors, have contributed to shaping an ambivalent image: on the one hand, mantises have been interpreted as hieratic or sacred creatures, especially in religious contexts where their posture evokes prayer, guidance, or communication with the supernatural; on the other hand, in several traditions they have also been associated with misfortune, demonic figures, deceit, and female cruelty, largely because of their predatory behavior and the symbolic interpretation of sexual cannibalism (Prete and Wolfe 1992). Thus, the positive or negative perception of mantises is not fixed, but culturally mediated: they may be regarded as signs of luck, spirituality, or divine presence in some contexts, and as omens of danger, sin, or aggression in others. In European popular tradition, mantises have often been associated with magical-religious beliefs. In many rural areas, it was believed that they could indicate the way to lost travelers, guiding them in the right direction with the movement of their front legs (Cattabiani 2000; Battiston et al. 2010). This attribution of "supernatural" qualities reflects communities' tendency to interpret animal behaviors through anthropomorphic and spiritual lenses (Sarkhel 2024). Indeed, the common name in different European languages, such as "praying mantis", "mantide religiosa", "mante religieuse", "louva-a-Deus" directly expresses this cultural projection rather than objectively describing the insect's ethological traits (Cattabiani 2000). At the same time, in other popular traditions, particularly in Southern Europe (Caillois 1938), the mantis has been interpreted negatively. Its austere appearance and the sexual cannibalism observed in some cases have reinforced the idea of an insect associated with misfortune or dark forces. In local proverbs and sayings, the mantis has often symbolized hypocrisy: apparently devoted and harmless, yet actually

fierce and ruthless. Such representations reflect an ambivalent system of symbolic attribution in which the same animal could embody virtue and vice, sacred and profane, depending on the cultural context (Cattabiani 2000; Dodd 2013). With the advance of scientific knowledge, particularly from the Renaissance onwards, mantises began to be observed with scientific attitude by European naturalists. The systematic description of their forms and habits helped to reduce the weight of popular beliefs but did not erase their impact on the collective imagination.

The fascination mantises continued to exert is evident in the accounts of eighteenth and nineteenth-century naturalists, which alternated descriptive precision with astonishing, almost poetic observations (von Rosenhof 1749; Giachino 2022). In this sense, science did not completely replace myth but rather coexisted with it, creating a blend of empirical knowledge and cultural tradition that has persisted into the contemporary era. Throughout the twentieth century, with the spread of education and the development of entomology, knowledge of mantises in Europe became more consolidated, at least in specialized contexts. However, at the popular level, old beliefs did not disappear but evolved into new forms of urban legends or widespread convictions, often transmitted orally or through local folklore (Ulicsni et al. 2016). Even today, it is not uncommon to encounter individuals who attribute to mantises the ability to predict the weather, bring good or bad luck, or overestimate their danger to humans (Nomura 2006). Contemporary times have also introduced new perceptual challenges. The spread of alien mantis species in Europe, accidentally introduced through global trade, has stimulated scientific communication and awareness campaigns (Battiston et al. 2018). In countries like Italy, reports of non-native mantises have drawn public and media (Italian newspapers and news websites such as “La Repubblica”, “Corriere della Sera”, “Fanpage” etc.) attention, highlighting the need to distinguish between local and introduced species, between real ecological risks and unjustified fears. This process, however, has intersected with a cultural fabric already rich in symbols, stereotypes, and sometimes inaccurate information, resulting in a collective perception of mantises that remains ambivalent and complex. From a sociological perspective, studying representations of mantises in Europe offers the opportunity to explore the relationship between culture, knowledge, and nature. Mantises constitute a “liminal object”: unusual enough to capture the imagination, visible enough to enter the repertoire of popular knowledge, and rare enough to maintain an aura of mystery. Their figure allows observation of how traditional knowledge, symbolic narratives, and scientific understanding coexist and overlap in shaping public perception of an insect.

The study presented here fits within this framework. Through a sociological questionnaire administered to a sample of 222 Italian participants with different demographic, educational, and geographical profiles from and with varying levels of general and naturalistic education, the research aims to explore contemporary perceptions of praying mantises. The investigation focuses on several key aspects: general awareness of their presence, actual biological knowledge, persistence of stereotypes and beliefs, and sensitivity to issues related to alien species. The objective is not only to collect descriptive data but also to understand the extent to which popular culture continues to influence collective perception and how it intertwines with the dissemination of scientific knowledge. This exploratory study aims to lay the groundwork for future research capable of further investigating the links between imagination, education, and attitudes toward biodiversity.

Materials and methods

The present study was based on a sociological survey proposed to a sample of 222 Italian people, recruited through social media channels and direct sharing of the project with random individuals. The socio-demographic variables collected were used descriptively to characterize the sample, rather than to perform inferential comparisons between social groups. The social media campaign promoting the survey reached numerous Facebook groups and online communities, not only those of nature enthusiasts and naturalists but also communities not primarily related to the natural world or insects. This approach was adopted to obtain a more heterogeneous and representative sample of public perceptions and knowledge, avoiding biases linked to specific interest groups.

The questionnaire was distributed through multiple online channels, including both naturalistic and non-naturalistic communities, in order to reduce the overrepresentation of respondents with a prior specific interest in insects or biodiversity. It was proposed via the online platform Google Forms, configured to allow each participant to complete the survey only once. The collection of responses and the analysis of the results were carried out using the platform’s built-in tools, which also provided automatic graphs to visualize the distribution of responses effectively. The questionnaire was specifically designed with sociological questions aimed at in-depth analysis of participants’ perceptions of praying mantises. Most questions were multiple-choice, with the option in some cases to select an additional “other” response, allowing participants to provide answers not included in the predefined options.

The survey was divided into five main sections (Table 1):

1. Personal Information: This section collected basic demographic data, including gender, age group, geographical area of origin or residence (North, Central, South Italy, or abroad), and educational level. This information allows for the description of the sample and

Table 1. Questionnaire Structure: Sections, Questions, and Response Options.

Section	Question	Response Options
Section 1: Demographic Information	Age	< 18; 18–29; 30–44; 45–59; 60+
	Gender	Male; Female; Prefer not to say
	Educational level	Compulsory education; High school diploma; Bachelor's degree; Master's degree or higher; Other: (please specify)
	Geographical area of residence	Northern Italy; Central Italy; Southern Italy and islands; Abroad
Section 2: Direct Experiences and Knowledge	Have you ever seen a praying mantis in real life?	Yes; No; Not sure
	If you answered "yes," where did you see one for the first time?	Countryside or natural environments; City, gardens, or urban parks; Zoos/museums; Online or on social media; Other: (please specify)
	How often do you encounter them in a year?	Never; 1–2 times; 3–5 times; More than 5 times
	Do you know that multiple mantis species exist in Italy?	Yes; No, I thought there was only one; I suspected it
	How would you rate your level of knowledge about mantises?	Very poor or none; Low; Medium; Higher than average
	Where do you get most of your information about insects in general and about mantises?	Conversations with family and/or friends; TV documentaries or magazines; Social media or other online sources; Other: (please specify)
	Which of the following definitions best describes a praying mantis?	A – A kind of predatory grasshopper capable of changing color depending on the substrate, living mainly in grassy areas, and using the forelegs to catch prey. B – A green or brown predatory insect of considerable size, known for females that eat the male after mating. C – A predatory insect with spiny forelegs used to capture prey, known for a posture reminiscent of prayer. D – A mostly herbivorous insect that uses its forelegs to cling to plants and is capable of jumping like a grasshopper.
Section 3: Cultural and Symbolic Representations	Which adjectives would you spontaneously associate with praying mantises?	(Open answer)
	Do you tend to associate these insects with religious, esoteric, or cultural symbols?	Yes; A little; No
	Do you think mantises are portrayed positively or negatively in the media?	Positively; Negatively; Neutrally; Not sure
	Do you believe your opinions about mantises come more from personal experience or from collective imagery?	Personal experiences; Culturally shared symbols and ideas; Both
	In your opinion, to what extent do popular beliefs influence perceptions of mantises (e.g., "they are venomous," "they bring good luck," etc.)?	A lot; Quite a bit; A little; Not at all

Section	Question	Response Options
Section 4: Emotions and Attitudes	How do you feel when you look at or encounter a praying mantis?	Fear; Disgust; Indifference; Curiosity; Fascination; Other: (please specify)
	Would you show one of these insects to a child as an example of fascinating nature?	Yes; No; It depends
	Do you think praying mantises are dangerous or capable of harming humans?	Yes; No; Not sure
	In your opinion, are praying mantises "useful" or "harmful" insects for agriculture and gardening?	Harmful; Useful; Their presence causes neither harm nor benefit
	If you found a mantis inside your home, what would you do?	Observe it; Move it outdoors; Ignore it; Eliminate it; Other: (please specify)
	Have you ever photographed or shared images of mantises on social media?	Yes, at least once; No, never
Section 5: Nature, Environment, and Scientific Engagement	In your opinion, mantises are:	Useful to the environment; Harmful to the environment; Neutral for natural ecosystems
	Do you know that alien mantis species introduced by humans exist in Italy?	Yes; No
	Do you think praying mantis species need protection and conservation?	Yes, all of them; Yes, only the rarer species; No; Maybe
	How much do you trust scientific sources about insects?	A lot; Quite a bit; A little; Not at all
	Would you be interested in participating in citizen-science projects dedicated to praying mantises?	Yes; No; Not sure

the analysis of potential differences in mantis perception according to socio-demographic variables.

2. Direct Experiences and Knowledge: The purpose of this section was to assess participants' familiarity with praying mantises, distinguishing between personal observations, scientific knowledge, and ideas derived from common knowledge. Questions investigated whether participants had direct experiences with these insects and how much they knew about their biology and behavior.
3. Cultural and Symbolic Representations: This section explored perceptions of mantises beyond their biological dimension. Questions investigated whether the insect is perceived as a symbol of mystery, a protagonist of legends or popular beliefs, or as an artistic metaphor. The goal was to understand the collective imagination surrounding mantises, including fascination, fear, and cultural curiosity.
4. Emotions and Attitudes: This section analyzed participants' emotional responses and personal attitudes towards praying mantises, investigating feelings such as attraction, curiosity, fear, or indifference. The aim was to understand how the emotional dimension influences perception and people's relationship with these insects.
5. Nature, Environment, and Scientific Engagement: The final section aimed to investigate the link between the perception of praying mantises and broader views of nature, the environment, and science. Questions evaluated whether participants considered these insects as part of an ecosystem to be protected, as biological curiosities, or as tools for scientific knowledge. The responses provided insight into the role attributed to mantises in the relationship between humans, biodiversity, and scientific research.

This structure allowed for the collection of both quantitative and qualitative data, providing a comprehensive overview of social perceptions, scientific knowledge, and cultural narratives regarding praying mantises in Italy.

Results

A total of 222 complete responses were collected. The sample included respondents from different age classes, genders, educational levels, and geographical areas. The most represented age class was 18–29 years, followed by

the 45–59 and 30–44 age classes, whereas participants younger than 18 years and those aged 60 years or older were less represented. Women were slightly more represented than men, and the educational profile of the sample was varied, with secondary school and higher education being the most frequent levels. Geographically, respondents were mainly from northern Italy, followed by central Italy, southern Italy and the islands, while a smaller proportion resided abroad (Fig. 1).

Direct experience with mantises was widespread among respondents, with almost all participants reporting that they had seen at least one mantis. Encounters were mainly occasional or regular, and only a small minority reported never encountering mantises. Knowledge of mantis diversity in Italy was more uneven: slightly more than half of the sample was aware that multiple mantis species occur in the country, while the remaining participants were not. Self-reported knowledge was mostly moderate, with fewer respondents indicating low familiarity or high knowledge. Most participants were also able to identify the scientifically correct definition of a mantis, although a non-negligible proportion selected other options (Fig. 2). Perceptions of mantises were predominantly positive. Most respondents attributed positive descriptors to mantises, such as elegance, curiosity, or fascination, whereas explicitly negative descriptors were much less frequent. Symbolic or religious associations were reported by a minority of participants, while most respondents did not associate mantises with such meanings. Media representation was generally perceived as neutral or positive, and personal experience emerged as the main factor shaping individual opinions, although collective imagery also played an important role. Popular beliefs were considered influential or moderately relevant by a large proportion of the sample. Emotional responses were mainly characterized by curiosity or interest, while fear or discomfort were less common. Mantises were widely regarded as not dangerous to humans and were generally perceived as useful, especially in agriculture or gardening (Fig. 3). Attitudes toward mantises were generally favorable. In the hypothetical scenario of finding a mantis inside the home, the most frequent response was to relocate it outdoors, followed by simple observation. More than half of respondents reported having shared photographs of mantises on social media, suggesting that these insects can stimulate public engagement and visual communication.

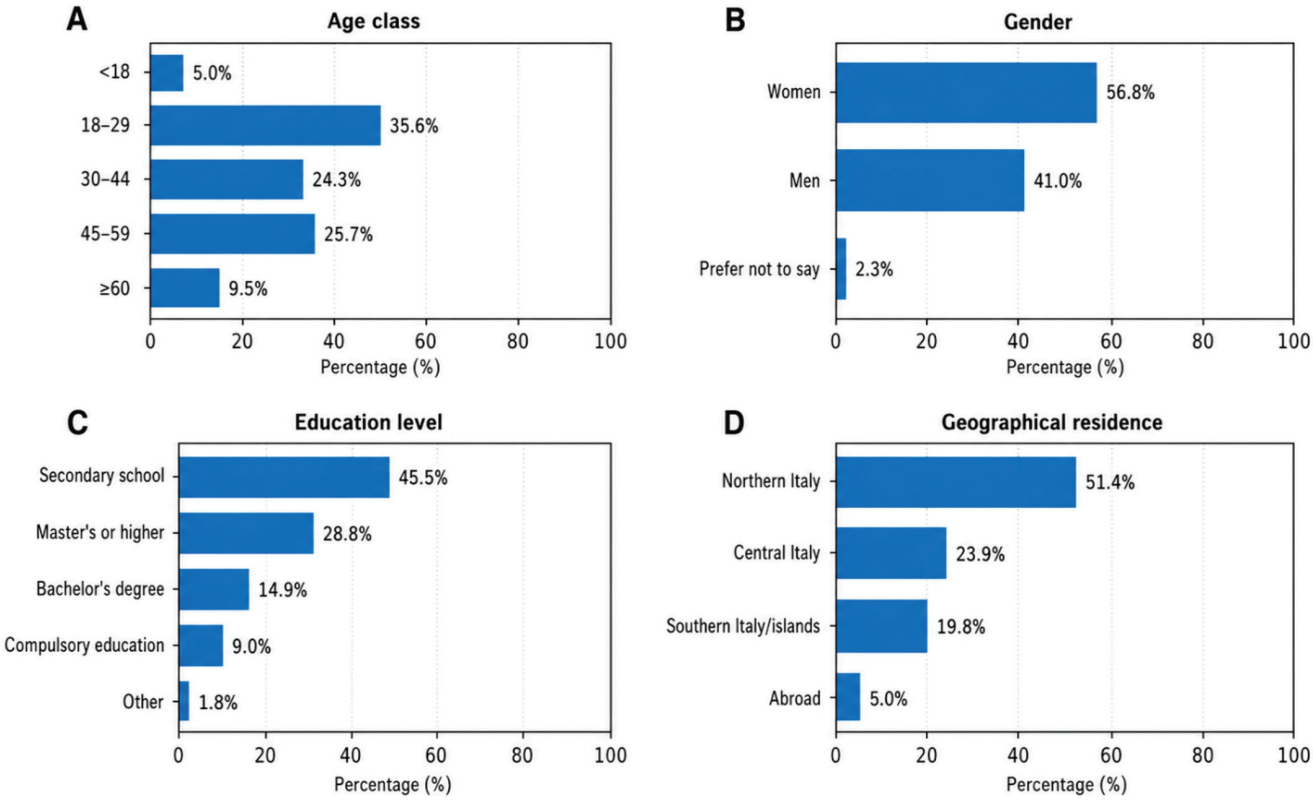

Figure 1. Socio-demographic profile of respondents (n = 222). Distribution of respondents according to (A) age class, (B) gender, (C) education level, and (D) geographical residence. Values are expressed as percentages of the total sample.

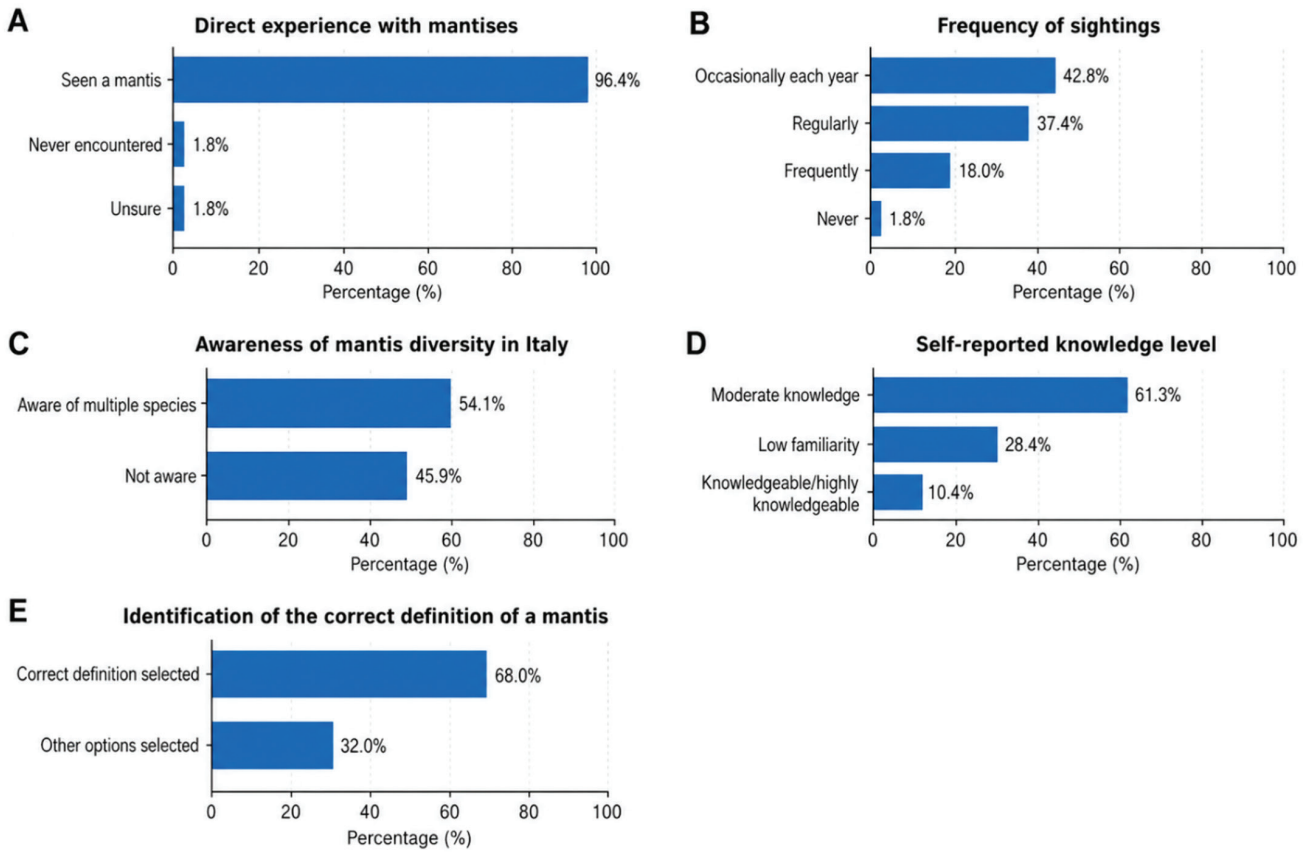

Figure 2. Experience with mantises and knowledge-related responses. Summary of respondents' previous experience with mantises and their level of knowledge, including (A) direct experience with mantises, (B) frequency of sightings, (C) awareness of mantis diversity in Italy, (D) self-reported knowledge level, and (E) identification of the correct definition of a mantis. Values are expressed as percentages of the total sample.

Ecological awareness was more variable: most respondents considered mantises native Italian insects, whereas a smaller proportion recognized the presence of alien species or expressed uncertainty. Awareness of alien mantis species introduced in Italy was nevertheless present in a substantial part of the sample. Interest in mantis conservation was generally high, as was trust in scientific sources about insects. More than half of the respondents also declared an interest in participating in citizen science projects focused on mantises, although uncertainty remained common among the rest of the sample (Fig. 4).

Discussion

The results of this survey outline a complex and coherent picture of how the public perceives praying mantises, highlighting a remarkably high level of familiarity. They suggest that mantises occupy a distinctive perceptual space in the public imagination, being frequently associated with curiosity, fascination, elegance, and, for a substantial minority of respondents, symbolic or religious meanings. Mantises are visually distinctive, culturally recognizable and deeply embedded in the collective imagination. This visibility explains why many respondents reported moderate or high levels of knowledge, even though such confidence does not always correspond to an accurate understanding of mantis biology (Battiston et al. 2010). The survey showed that a portion of participants fall into predictable cognitive biases (Fig. 5), especially concerning the ecological role of mantises. Many respondents considered mantises useful for agriculture or gardening. This perception is understandable, since mantises are conspicuous predators and may occasionally consume herbivorous insects. However, their role should not be confused with that of effective biological control agents. Mantises are generalist and non-selective predators, feeding on a broad range of arthropods rather than targeting specific pest species, and their deliberate use for pest control has historically produced limited or unreliable results (Prete 1999; Anderson 2019; Wilson Rankin et al. 2023). For this reason, the widespread belief that mantises are broadly useful in agriculture reflects a simplified interpretation of their ecological role rather than a fully supported biological control concept. This mismatch between public perception and scientific evidence emerges clearly from the data: mantises

are well known, yet often known inaccurately, with people frequently overestimating their own level of expertise.

At the same time, another meaningful aspect emerges. A portion of respondents intuitively recognize a link between mantises and the ecological quality of natural environments. This perception aligns with scientific studies that identify mantises as potential bioindicators in structured and heterogeneous habitats (Battiston et al. 2020). The fact that many participants associated mantises with environmental health may reflect less a direct awareness of scientific studies than a broader symbolic association between mantises and nature, wilderness, or relatively undisturbed environments. In this sense, mantises appear to function as recognizable indicators of 'naturalness' in the public imagination, even when this perception is not necessarily grounded in formal ecological knowledge. This stands in contrast with the agricultural domain, where the absence of clear information facilitates the persistence of misconceptions and simplified narratives.

A third relevant point concerns the persistence of traditional beliefs. Although greatly reduced compared with the past, symbolic associations have not completely disappeared. A notable minority of respondents still attribute religious, esoteric or superstitious meanings to mantises (Brown 1986; Prete and Wolfe 1992; Sarkhel 2024). These beliefs are marginal within the sample, yet remain socially significant because highly conspicuous insects are especially vulnerable

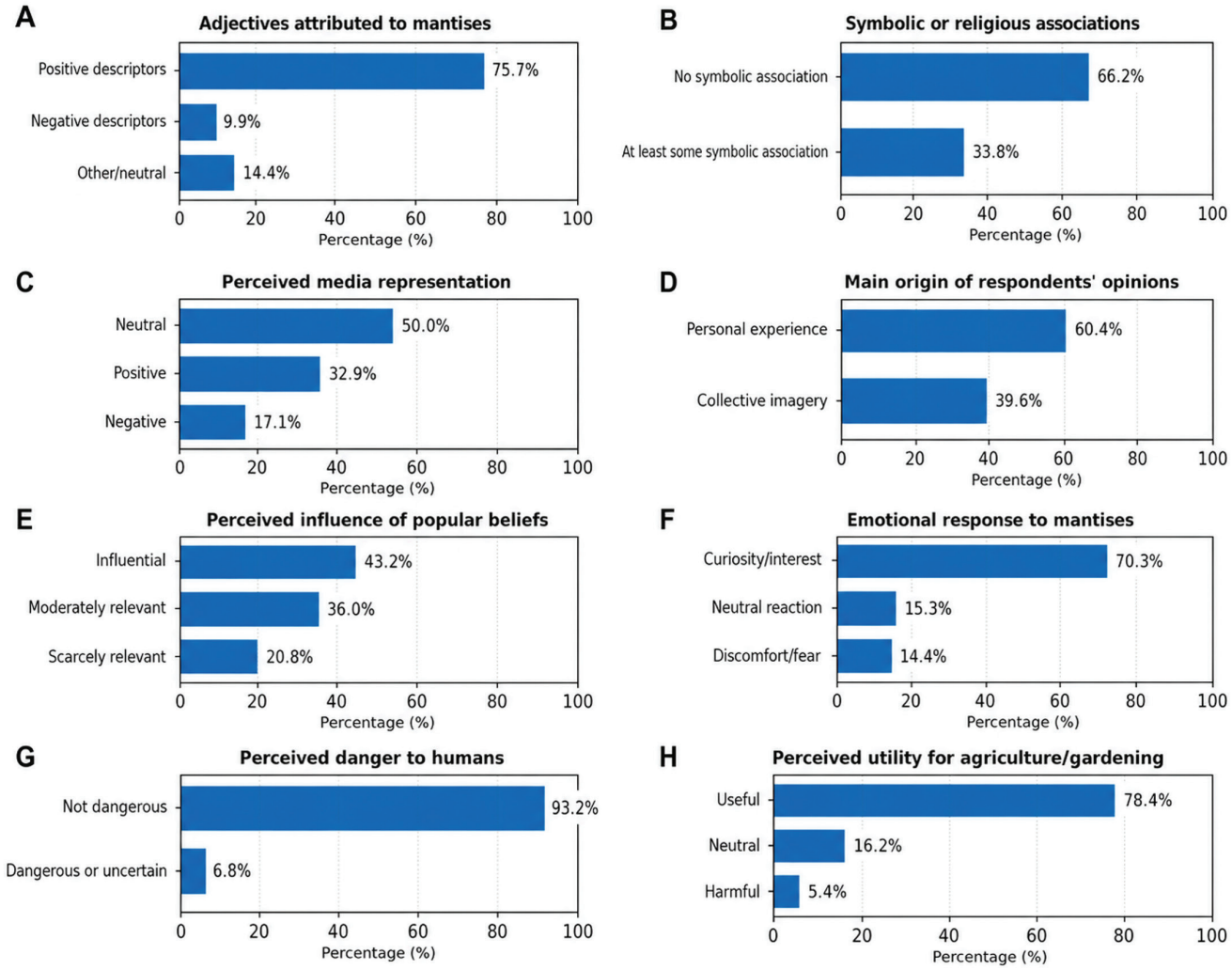

Figure 3. Perceptions and cultural representations of mantises. Overview of respondents' perceptions and symbolic interpretations of mantises, including (A) adjectives attributed to mantises, (B) symbolic or religious associations, (C) perceived media representation, (D) main origin of respondents' opinions, (E) perceived influence of popular beliefs, (F) emotional response to mantises, (G) perceived danger to humans, and (H) perceived utility for agriculture or gardening. Values are expressed as percentages of the total sample.

to perception driven behaviors (Dodd 2013; Schuetz-Miller 2022). Even a small proportion of incorrect beliefs, when amplified across large populations or through social media, may translate into harmful interactions, such as unwarranted fear, persecution or misguided attempts to remove mantises from their habitat. The data confirms that fragments of past narratives continue to circulate, shaping attitudes and reactions even when the underlying claims are scientifically unfounded (Battiston et al. 2024).

Media representation constitutes another structural factor. Many participants perceive the portrayal of mantises as neutral or positive, likely due to the strong presence of high-quality photographs and short educational content on social networks and citizen science platforms. The finding that more than half of the respondents have photographed or shared images of mantises indicates that these insects have entered the sphere of everyday wildlife observation, becoming familiar subjects for public documentation. This trend creates a concrete opportunity for participatory monitoring programs, which are especially relevant in the context of expanding alien mantis species. Although awareness of alien mantises is already relatively widespread, substantial room remains for improving public understanding of their identification and ecological implications.

An encouraging aspect of the survey is the substantial interest in mantis conservation. Many respondents believed that these insects should be protected, and an even larger proportion expressed willingness to participate in citizen science initiatives. This combination of high trust in scientific sources, aesthetic curiosity and readiness for active engagement provides a promising foundation for targeted educational and conservation efforts (Greyvenstein et al. 2020). Enhancing

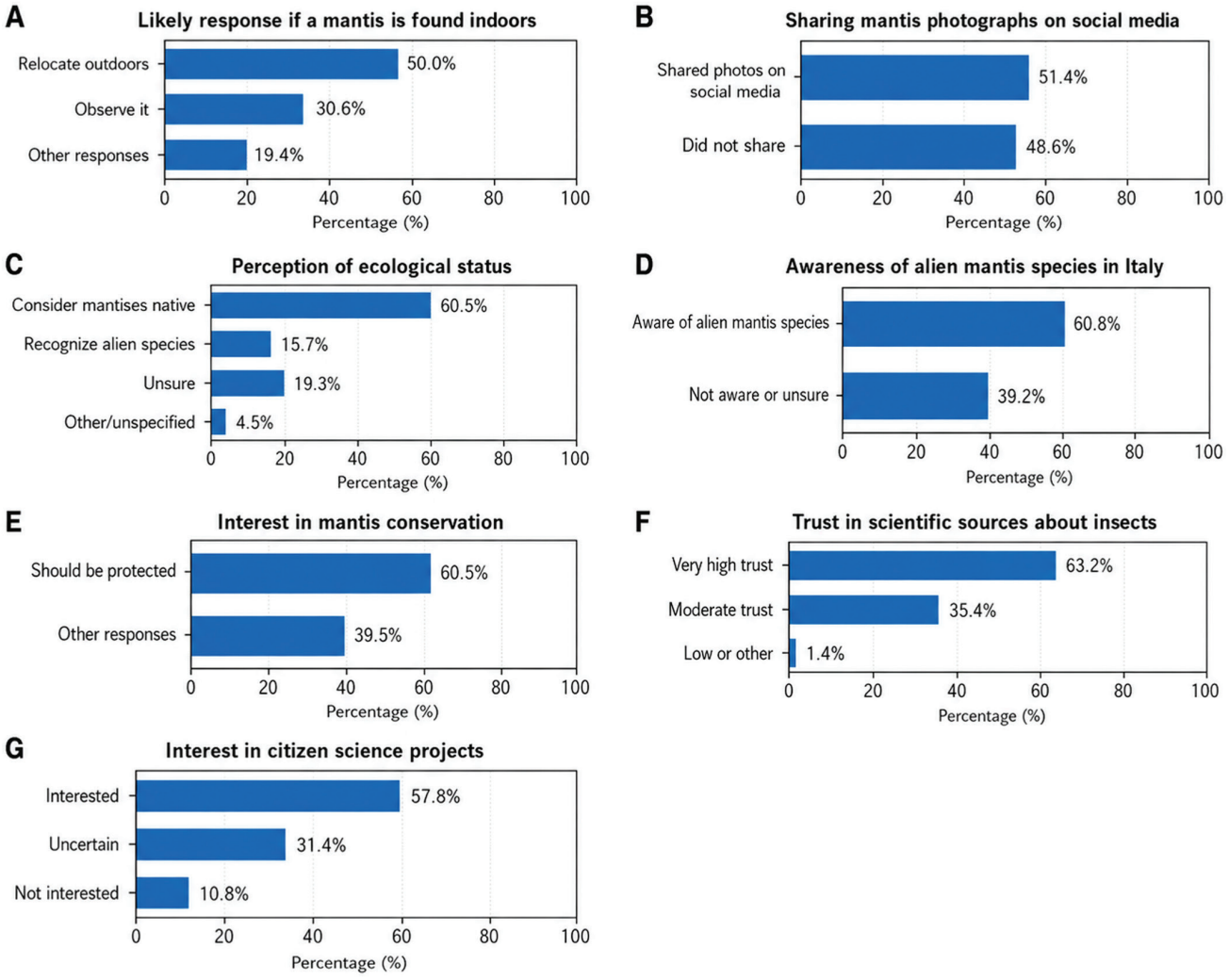

Figure 4. Attitudes, ecological awareness, and conservation-related responses. Summary of respondents' attitudes and ecological awareness concerning mantises, including (A) likely response if a mantis is found indoors, (B) sharing mantis photographs on social media, (C) perception of ecological status, (D) awareness of alien mantis species in Italy, (E) interest in mantis conservation, (F) trust in scientific sources about insects, and (G) interest in citizen science projects. Values are expressed as percentages of the total sample; minor response categories were grouped where appropriate.

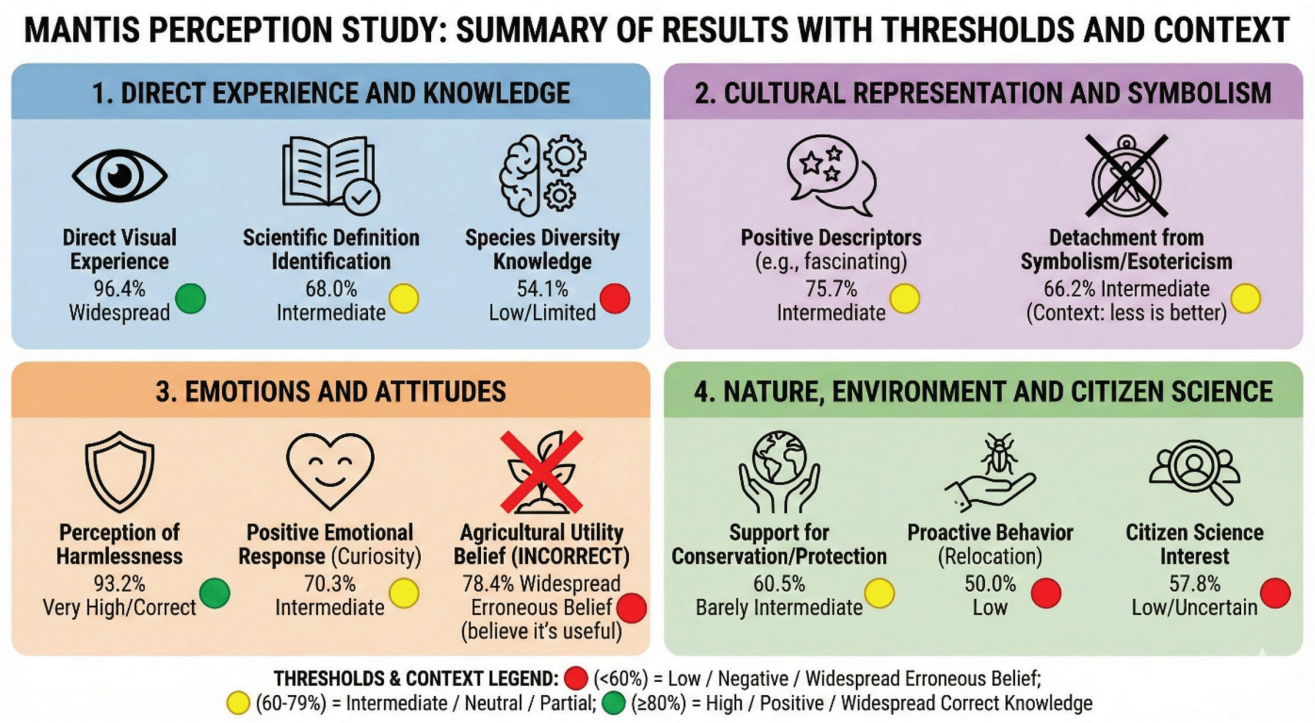

Figure 5. Schematic summary of the main results of the mantis perception survey, organized into four thematic domains: (1) direct experience and knowledge, (2) cultural representation and symbolism, (3) emotions and attitudes, and (4) nature, environment, and citizen science. For each domain, key variables are shown together with the percentage of respondents expressing a given response. Colored indicators represent interpretative thresholds: green indicates high or widespread correct knowledge or positive perception (≥80%), yellow indicates intermediate or partial understanding (60–79%), and red indicates low levels, uncertainty, or widespread erroneous beliefs (<60%). The figure highlights a strong direct visual familiarity with mantises and generally positive emotional responses, contrasted by limited taxonomic knowledge, persistence of incorrect beliefs regarding agricultural utility, and comparatively low engagement in proactive conservation behaviors and citizen science activities. Image AI generated by Nano Banana Pro (Google LLC).

public understanding of mantises as ecologically complex organisms, non-selective predators and potential bioindicators rather than symbolic entities or supposed agricultural allies is essential to steer collective perception toward scientific accuracy. Increasing exposure to reliable information, fostering participation in citizen science and addressing the most persistent misconceptions would strengthen both conservation outcomes and ecological literacy.

Finally, it is important to acknowledge the structural limitations of the sample, which reflect voluntary participation and an overrepresentation of young adults and women. Despite these constraints, the overall picture offers a robust and informative perspective on how mantises are understood and represented by the public. Mantises emerge as organisms that are simultaneously familiar and misunderstood, admired yet often idealized, and still surrounded by a thin layer of distorted information. Bridging this gap between perception and scientific knowledge represents a key challenge for future outreach and conservation, especially in a context shaped by climate change, biological invasions and shifting landscape dynamics that will influence how people encounter mantises across Italy, Europe and the whole world.

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