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Perception about pollinating insects at Federal Rural University, Rio de Janeiro, Brazil

Percepção da comunidade universitária sobre polinizadores na Universidade Federal Rural do Rio de Janeiro, Brasil

SANTOS, Adriano Prexedes Lima dos[1]; MENEZES, Mariana Romanini[2]; LAVISKI, Bianca Ferreira da Silva[3]; ; FRANÇA, Eder Cleyton Barbosa[4]; QUEIROZ, Jarbas Marçal[5]

[1] 0000-0002-4910-3110; Universidade Federal Rural do Rio de Janeiro. Seropédica, RJ, Brasil. adrianolima325@gmail.com.
[2] 0000-0003-1697-2341; Universidade Federal Rural do Rio de Janeiro. Seropédica, RJ, Brasil. marianaromenezes@gmail.com.
[3] 0000-0002-2400-7261; Universidade Federal Rural do Rio de Janeiro. Seropédica, RJ, Brasil. biancalaviski@gmail.com.
[4] 0000-0002-5158-5358; Universidade Federal do Paraná. Curitiba, PR, Brasil. edercleytonbarbosa@gmail.com.
[5] 0000-0002-4175-1834; Universidade Federal Rural do Rio de Janeiro. Seropédica, RJ, Brasil. jarquiz@ufrrj.br.

A B S T R A C T

Pollination is an essential ecosystem service, threatened by the decline of insect populations, the major pollinators. It is caused by factors such as habitat loss through urbanization. Another obstacle to be overcome is society perception, influenced by social and cultural constructions. Thus, diagnosis of public perception is necessary for developing awareness actions. The aim of this Project was to do a survey of the perception of the university community and visitors to the Botanical Garden of Universidade Federal do Rio de Janeiro (JB-UFRRJ) on pollinating insects. The survey was applied via Google Forms, divided in four sections: 1. Profile; 2. Contact with nature; 3 e 4. Pollination/Pollinators. 92 answers were obtained. Despite having found a certain contact with nature and knowledge about pollination, there were negative responses. Flies and wasps had negative feedback, whereas bees and butterflies had positive responses, reinforcing flies and wasps' great rejection. Damages stood out among the given responses. This exposes the tendency of directing feelings of aversion to animals characterized as insects, especially to the non-charismatic ones. The data indicates the need of divulgation actions, involving multimedia tools (e.g.: photographs; social networks) and extension actions aiming to reverse this context.

R E S U M O

A polinização é um serviço ecossistêmico essencial para a vida na Terra ameaçado pelo declínio nas populações de insetos, principais polinizadores, causado por fatores como a perda de habitat pela urbanização. Outra barreira à conservação é a percepção da sociedade, fruto de construções sociais e culturais. Assim, são necessárias ações de diagnóstico da percepção do público para o desenvolvimento de ações de conscientização. O objetivo do projeto foi realizar um levantamento da percepção da comunidade universitária e visitantes do Jardim Botânico da Universidade Federal Rural do Rio de Janeiro – UFRRJ (JB-UFRRJ) sobre insetos polinizadores. Foi aplicado um questionário via *Google Forms*, dividido em quatro seções: 1.Perfil; 2.Contato com a natureza; 3 e 4. Polinização/Polinizadores. Foram obtidas 92 respostas. Apesar de ter sido constatado certo contato com a natureza e informação sobre o processo de polinização, houveram respostas negativas. Moscas e vespas obtiveram retorno negativo, enquanto borboletas e abelhas, positivo, reforçando que moscas e vespas possuem grande rejeição. Os malefícios se destacaram entre as respostas dadas. Isso expõe a tendência a direcionar sentimentos de aversão aos animais enquadrados como insetos, nomeadamente aqueles não carismáticos. Os dados indicam a necessidade de ações de divulgação, com o uso de ferramentas multimídia (ex: fotografias; redes sociais) e ações de extensão para a reversão desse quadro.

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Introduction

Pollination is a highly important ecosystem service to the maintenance of biodiversity, especially to plants, on promoting their perpetuation and genetic variability. This process also makes possible the maintenance of insect populations by making available resources such as food and chemical components for pheromone production (Constantino et al., 2012). Three quarters of all angiosperms, including, food species, depend on pollinators for its fertilization (Guiney & Oberhauser, 2009), with those animals being considered a production factor in other countries. (Freitas & Alves, 2009).

Despite their importance, the world faces a scenario of decline of the insect populations (Sánchez-Bayo & Wyckhuys, 2019). The majority of the loss of biodiversity occurs due to anthropic actions, especially urbanization and the intensive use of pesticides. It's estimated that the damage to the entomofauna may be greater than what is valued (Sánchez-Bayo & Wyckhuys, 2019; Imperatriz-Fonseca et al., 2012), and this context of decrease may have severe impacts to the natural and managed ecosystems (Guiney & Oberhauser, 2009). In addition to this, there's still misinformation around part of Society on the importance of pollination and pollinating insects, which represents an obstacle to the conservation of those arthropods.

Modern Society, in especial the occidental, tends to see insects as negligible beings, unless they are visually pleasant or economically benefic, as it happens with butterflies and bees. (Kim, 1993; Neto & Carvalho, 2000). Berenbaum (2008) indicates the excessive representation of butterflies as an example of a "charismatic challenge" which has to be overcome by the non-charismatic species. Insect representations in the social and cultural dynamics make entrenched ideas circulate, contributing for a pejorative perspective towards those animals, as discussed by Trindade et al. (2012). This fact, added to the lack of information on certain groups, reinforce the negative stigma and occult the importance of those insects in ecological processes as pollination.

Different studies evaluated people perception of pollination and insects. The survey applied by Neto e Carvalho (2000) verified that a great part of the interviewed people attributed some importance to insects. However, there were still negative responses which denotated certain contempt as: "a harmful being" or "transmit diseases". Sumner et al. (2018) applied a virtual questionnaire aiming to verify the public perception about bees and wasps. The paper suggests that wasps and flies hold universal rejection, even among those who are interested in nature. In Silva et al. (2020) was used a survey to analyze the perception of elementary school students about pollinating insects and their conservation. The feedback was considered negative, showing that the majority of students did not have total knowledge of the process of pollination. These results are important indicators of public opinion which help the planning of conservation and extension actions to promote the conscientization of people over those organisms.

According to Guiney e Oberhauser (2009, p.119) "it's possible to increase the interest for insects, considering that they have the advantage of being familiar, common and almost everywhere that humans live". Knowing that environmental education and species conservation, including insects, are parts of the global mission of botanical gardens (Saísse & Rueda, 2008; Cardoso & Gonçalves, 2018), those are potential places for the development of actions focused on the conscientization about pollinating insects. The aim of this study was to make a diagnostic of how the University Community and visitors of Federal Rural University of Rio de Janeiro's Botanical Garden (JB-UFRRJ) perceive the pollinating insects.

Methodological Procedures

The study was based on surveys of the entomofauna previously executed at JB – UFRRJ (Menezes et al., 2022). A virtual questionnaire containing 38 questions was elaborated via *Google Forms*®. The questions were divided into four sections. Then, the project was submitted to the Research Ethics Committee (CEP) through Plataforma Brasil, from the Federal Government, being approved on June 14, 2022. Following CEP recommendations, a Term of Consent (TCLE) was added prior to the questions. The TCLE contained basic information about the project besides other information over the usage policy of the data provided by the respondents.

The target audience was University Community (students; teachers; servers) and visitors of the JB-UFRRJ. The public was reached by the divulgation of the questionnaire on the social medias (*Facebook®; Instagram®; Whatsapp*®) and groups of the University on those platforms. Basic information about the participants as age and education level were collected (Section 1 – Profile). Throughout the survey it was inquired the relation of the participants with nature; green areas and related (Section 2 – Contact with nature). Furthermore, it was verified the perception of people over the process of pollination and pollinators (Sections 3 and 4 – Pollinators/Pollination). Those who affirmed having information about pollination were asked to associate up to three words to the theme. Among the questions, it was also asked to the respondents to identify insects, with the aim of evaluating their entomological knowledge. Two questions were made, in which they had to select form a set of images of arthropods which ones were, and which ones were not insects, respectively. For the first question, photographs of the following animals were provided: a spider (Euchelicherata: Arachnida); a leaf-cutter ant (Insecta: Hymenoptera); an isopod (Crustacea: Isopoda) and a beetle (Insecta: Coleoptera). In the second question, the images provided were: a centipede (Myriapoda: Chilopoda); a bee (Insecta: Hymenoptera); a tick (Euchelicerata: Arachnida) and an earwig (Insecta: Dermaptera). In addition to that, the participants had to answer what is their reaction when coming across an insect, associate the with a benefit and a malevolence; and attribute words to the insects that act as pollinators: bee

(order Hymenoptera); beetle (order Coleoptera); butterfly (order Lepidoptera); ant (order Hymenoptera); moth (order Lepidoptera); fly (order Diptera) and wasp (order Hymenoptera). The insects mentioned in the survey can be seen in the immediate area of JB - UFRRJ.

The results of the answers were expressed in percentage, utilizing graphics generated with the *Microsoft Office Excel*® software. In order to verify the terms that were most used to describe the approached topics, "wordclouds" were generated, in which the size of the word indicates its frequency (Sumner et al., 2018). For the confection of the "wordclouds", we considered only words that had frequency equal or higher than 2, and misspelled words were (e.g.: "politization" was corrected to "pollination"). Thereto, long answers were summed up in its principal terms. With those data, results were compared whit the available bibliography, in order to suggest actions directed to the conscientization, especially about those insects with the worst impressions.

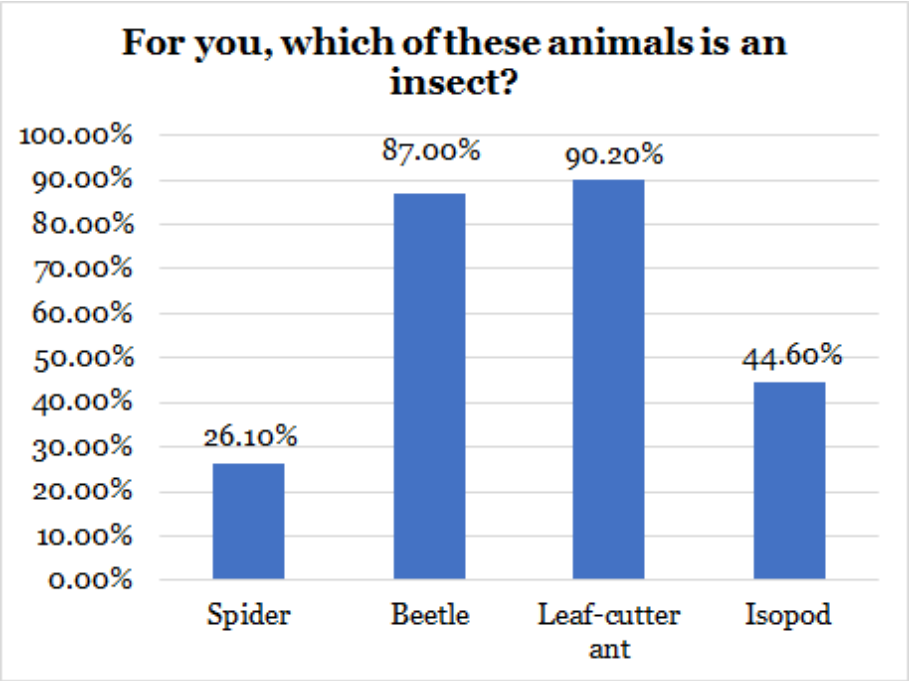
Results e Discussion

92 people, including students, alumni, servers, visitors and habitants of Seropédica responded the survey. The average age of the participants was 24,8 years, with the youngest being 18 years old, and the oldest 55 years old. The survey reached people from 37 different courses, between graduation and post-graduation. From those who informed to have finished High School, only on did not declare to be on a graduation course.

When identifying the arthropods, the majority of respondents chose the image of the ant, followed by the image of the beetle (figure 1). In the second question, most people selected the centipede as a non-insect, followed by the tick. 44,6% selected between the Options the image of the isopod, a crustacean; and 26,1% chose the spider as an insect. For the non-insects, there was still a small number of people who chose the bee and the earwig (16,3%), affirming that both were not insects (figure 2). In respect to pollination, 94,5% affirmed to have already heard about the topic, with school being the main source of information (71,9%). Righ after that, college/University appeared with 20,2%. Other sources were such as social media and family were also mentioned. Among the cited terms, "flower"/"flowers" had a greater occurrence, followed by "bee" e "pollen" (figure 3, item A).

Figure 1.

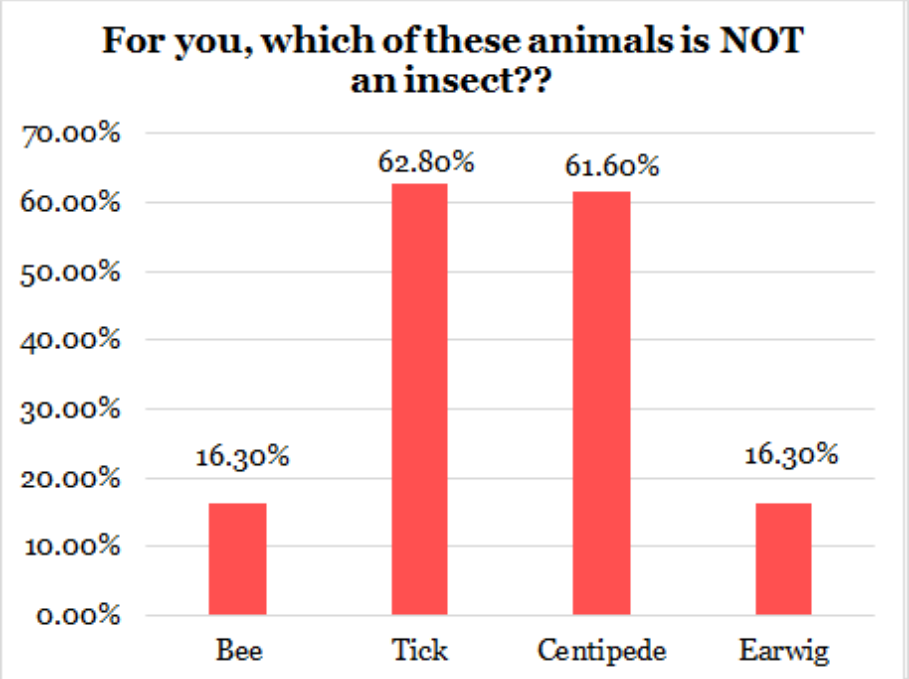
Percentage of answers for the question about the identification of insect arthropods.



Note: research data/Microsoft Office Excel

Figure 2.

Percentage of answers for the question about the identification of non-insect arthropods.



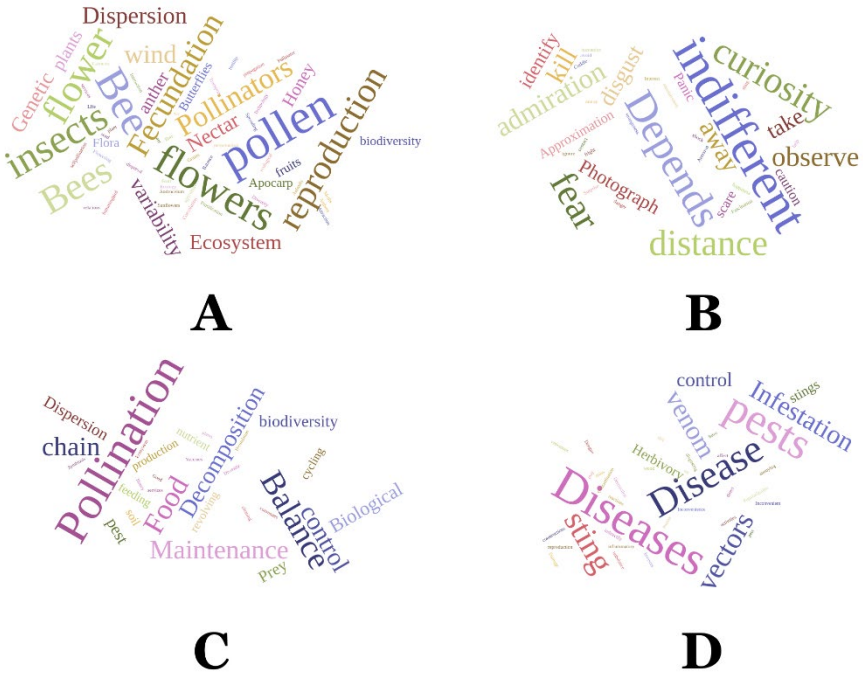
Note: research data/Microsoft Office Excel

When the reaction of the participants when coming across an insect, the most cited words were “depends” and “fear” (figure 3, item B). When it comes to the benefits, the terms

with highest occurrence were “pollination” and “balance” (food; ecological; environmental; ecosystem). Between the malevolencies, “diseases” was the most cited term, followed by “pests” (figure e, itens C e D). In the final potion of the questions, the volunteers attributed words to the presented pollinating insects. Here are represented the major results for bees, butterflies, flies and wasps (figure 4).

Figure 3.

*Word Clouds presenting the most used terms in short answer question: **A** (“Name three words related to pollination”); **B** (“Describe your reaction when coming across an insect”); **C** (“Name a benefit related to insects”); **D** (“Name a harm related to insects”).*



Note: research data/jasonavis.com/wordcloud

Figure 4.

*Word Clouds with the terms used to describe the insects: **E** (bee); **F** (fly); **G** (butterfly); **H** (wasp).*

Note: research data/jasondavis.com/wordcloud

The results demonstrate that the evaluated public, in its majority, often obtains information about nature and related topics, besides having contact with nature and grow plants. The most cited source of information was the *YouTube*® videos, followed by social networks through profiles and pages dedicated to scientific divulgation. Most of the participants (70,7%) informed to reside close to green areas. The majority affirmed to visit green areas at least once a week; 70,7% affirmed to grow plants at their residencies, growing four plants or more. When it comes to pollination, the respondents showed some knowledge of the subject, which may be related with the level of education, since a great part of the participants study or have a degree on courses of the biological or agrarian area.

With regard to the insects, although the majority had identified them correctly, there was still some confusion on the identification. In other words, even with a certain level of instruction, there were incorrect answers. It was also noticed that some people could not identify the beetle on the provided image, mistaking it for a sharpshooter. Some respondents even mentioned the word “frog”. So, the results denotate the establishment of the ethnocategory “insect”, in which the feelings caused, usually negative, are enough to fit the animals in it (Hermógenes et al., 2016). This classification refers to the organisms that are culturally perceived and categorized in the same group regards to their general aspect, feelings caused as disgust or for being seen as disease causing. (Costa-Neto & Magalhães, 2007).

As observed by Belarmino Alves et al. (2018), reactions as “fear”, “disgust” e “kill” were present among the answers. A great part also said that the reaction “depends on the insect” (figure 3, item B), which shows that the demonstrations of empathy for animal are ordered in an unconscious nature scale, where the species thar are perceived as closer to humans in behavior, appearance or function are more appreciated. (Sousa et al., 2013). Harms were had more mentions than benefits, which reinforces that the pejorative actions are more easily recognized (Brito & Sousa, 2020). Like the observed by Hermógenes et al. (2016), the ecological benefits and disease transmission were respectively the most cited benefit and harm. Aspects related to insects or other organisms of the ethnocategory “insect”, such as “mucus” e “goop”, are normally associated with dirt, diseases, contagion or are interpretated as signals for such (Neto & Pacheco, 2004).

As seen in Sumner et al. (2018), bees and butterflies obtained positive feedback, while flies and wasps got negative responses. Bees and butterflies were frequently associated to pollination, both in questions about insects and about pollination. This fact reinforces the argument of de Kim (1993) that those organisms are seen positively due to the economic benefit they provide, added to fact of being esthetically pleasant. On the other hand, this reinforce that the other insects need to overcome a barrier when it comes to their perception (Berenbaum, 2008). Added to, the obtained data reinforce the hypothesis that flies and wasps possess global rejection (Sumner et al., 2018), even among people who have a certain contact with nature and related topics. The frequent association with diseases, pain and dirt exposes de context of rejection faced and the negligence over the benefits provided. Modro et al. (2009) utilize the term “pejorative ambivalence” to define the tendency to direct feelings of disgust or aversion to the animal of the ethnocategory “insect”, which is intrinsically related with cultural an social aspects (Trindade et al., 2012).

As much as the participants have a good idea of what is pollination, negative perceptions over insects still persist, namely those seen as non-charismatic (figure 4, itens F e H). To change this scenario, becomes necessary the use of information and conscientization tools. In an analysis of the perception about, Paixão e Martínez (2018) expose the need of information channels to remind of the importance of those insects. Considering that most of the volunteers affirmed to obtain information about nature through videos and profiles dedicated to scientific divulgation, becomes opportune the use of multimedia tools and social networks of the JB-UFRRJ and the University for actions of divulgation. Scientific divulgation is a tool that brings science to people in an objective and reliable way, with an accessible language making possible the dialogue with who consumes the content (Miceli & Rocha, 2022). Guiney e Oberhauser (2009) also point that the use of photographs is a manner of increasing the public interest over insects, making possible the expose of the beauty of those organisms, constituting an important visual resource to be used in action of awareness and divulgation such as shows and exhibitions.

Final considerations

The respondents presented favorable perceptions about pollination. However, it was observed that the insects had as non-charismatic presented great rejection. Moreover, negative reactions and the harm caused by insects were predominant over positive reactions and the benefits. This makes necessary the application of tools of scientific divulgation in order to spread information about the importance of all insects to the University community and surroundings, especially those who gave negative feedback about the insects and little knowledge about pollination. Scientific dissemination tools such as the use of visual resources na social networks associated to extension actions are potential options of great extent to help to change this scenario.

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