



SHORT NOTE

Polistes versicolor (Olivier, 1791) nesting in a deciduous forest, Northern Minas Gerais State, Brazil (Vespidae, Polistinae)

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Abstract

Social wasps use different substrates for nesting, such as plants, rocks, and human buildings, and may adopt different strategies to protect their colony and brood. Here, we report the nesting behavior of *Polistes versicolor* in the deciduous forest, Northern Minas Gerais state, Brazil. The occurrences were recorded during fieldwork from February to December 2021. We found 30 colonies in eight plant species. The statistics demonstrate a preference of this social wasp for the plant *Cereus jamacaru* Cactaceae, which is used for nestings over a large area. Also, we report the first known record of *P. versicolor* colonies on the *Acacia plumosa*, *Commiphora leptophloeos*, *Quiabentia zehntneri*, and *Ziziphus joazeiro*, all of them with thorns. From the preference of *P. versicolor* for plants with thorns, we conclude this study to reinforce the role of these vegetal structures in protecting the colonies.

Social wasps are insects that adopt different substrates for nesting (Da Cruz et al., 2006; Alvarenga et al., 2010; Souza et al., 2014), including native vegetal species with varied habits such as herbaceous and arboreal (Francisco et al., 2018), exotic as eucalyptus (De Souza et al., 2012) and coffee (Milani et al., 2020), besides human buildings (Oliveira et al., 2017).

Different biotic and abiotic factors influence the social wasps nesting, such as the ecosystem conservation degree (Souza et al., 2010), fragmentation (Bueno et al., 2019), preying (Henrique & Palma, 1998), food availability (Santos et al., 2007) and the necessity for camouflage (Souza et al., 2020a; Milani et al., 2021).

Studies developed aiming to elucidate social wasps nesting has a high ecological relevance, above all concerning their relationship with the food webs, once social wasps prey on many agricultural pests (Prezoto et al., 2018), such

as *Polistes versicolor* (Olivier, 1791). This species mainly preys on caterpillars (Elisei et al., 2010; Prezoto et al., 2006) such as *Hedylepta indicata* (Fabricius, 1775), *Elasmopalpus lignosellus* (Zeller, 1848) (Pyralidae), *Spodoptera frugiperda* (JE Smith, 1797), *Heliothis virescens* (Fabricius, 1977), *Pseudoplusia includens* (Walker, 1857) (Noctuidae), *Chlosyne lacinia saundersii* (Doubleday & Hewitson, 1849) (Nymphalidae), *Heraclides anchysiades capys* (Hübner, 1809) (Papilionidae) e *Automeris* sp. (Saturniidae) (Campos-Farinha & Pinto, 1996; Marques, 1996; Marques et al., 2005; Rodriguez et al., 2012).

P. versicolor presents a wide geographic distribution in Brazil (Richards, 1978), occurring in different biomes, including Cerrado and Atlantic Forest (Souza et al., 2020b, c), which act as a synanthropic species (Oliveira et al., 2017), live near agricultural environments (Jacques et al., 2015). Nonetheless, there is no information on this species nesting

in the deciduous forest (Brunismann et al., 2016; Francisco et al., 2018). This way, here we report the nesting behavior of *P. versicolor* in the Dry Forest State Park, aiming to interpret their apparent preference for specific species.

This study was carried out in the Dry Forest State Park (14°97'02''S, 43°97'02''W and 14°53'08''S, 44°00'05''W), northern Minas Gerais, which houses the biggest remnant of dry forest in the world, in the domain of the Atlantic Forest (Oliveira et al., 2006) (Figures 1A to 1D), characterized by the fall of leaves of more than 50% of the vegetation in the dry season (Belém & Carvalho, 2013). The fieldwork was developed from February to December 2021, with 20 sampling days from 9 AM to 5 PM, amounting to 160 hours with a field effort of four researchers. Identifying the plants was only possible for those fertile species being executed in the field, with the help of identification guides and the Dry Forest State Park workers. To verify significant differences in *P. versicolor* nesting preferences, we made the Kruskal-Wallis (KW) H test and, pairwise among the plants, the Mann-Whitney U test from the Past 4.03 Software, according to Hammer et al. (2005).

For identifying *P. versicolor*, we adopted dichotomous keys (Richards, 1978; Carpenter & Marques, 2001) and made comparisons to the Social Wasps Collection (CBVS) of

Minas Gerais Federal Institute (IFSULDEMINAS) Campus Inconfidentes, where the specimens were deposited. SISBIO and IEF provided the needed licenses for this work (ICMBio: 76140-1 and IEF: 038/2020).

We recorded 30 colonies of *P. versicolor* on eight different plant species (Table 1). The Kruskal-Wallis test demonstrated that there was a nesting preference of the social wasp ($p = 0,0009$), which was specified by the Mann-Whitney U test, revealing a preference for *Cereus jamacaru* de Candolle (Figure 2A) ($p < 0,005$), on which we found 21 colonies.

The Cactaceae *C. jamacaru* presents rectilinear branches of greenish color with the presence of yellowish and radial thorns, which may achieve 9 to 30 cm long. This species does not present leaves; its flowers are white, laterally projected, and subapical. Its fruit is edible and has an elliptical shape (Leal Sales et al., 2014). Due to its long thorns, this cactus may offer protection for the social wasp colony, such as *P. versicolor*. Also, in Caatinga environments, these social insects prefer to nest in trees or cactus, both of them with the presence of thorns (Santos et al., 2007). Such a fact is true for different species of the *Polistes* genus (Santos & Gobbi, 1998; Santos et al., 2007), and it is probably related to the absence of a protective casing, so becoming more susceptible to predation (Jeanne, 1975), including by birds (Almeida, 2015; Van

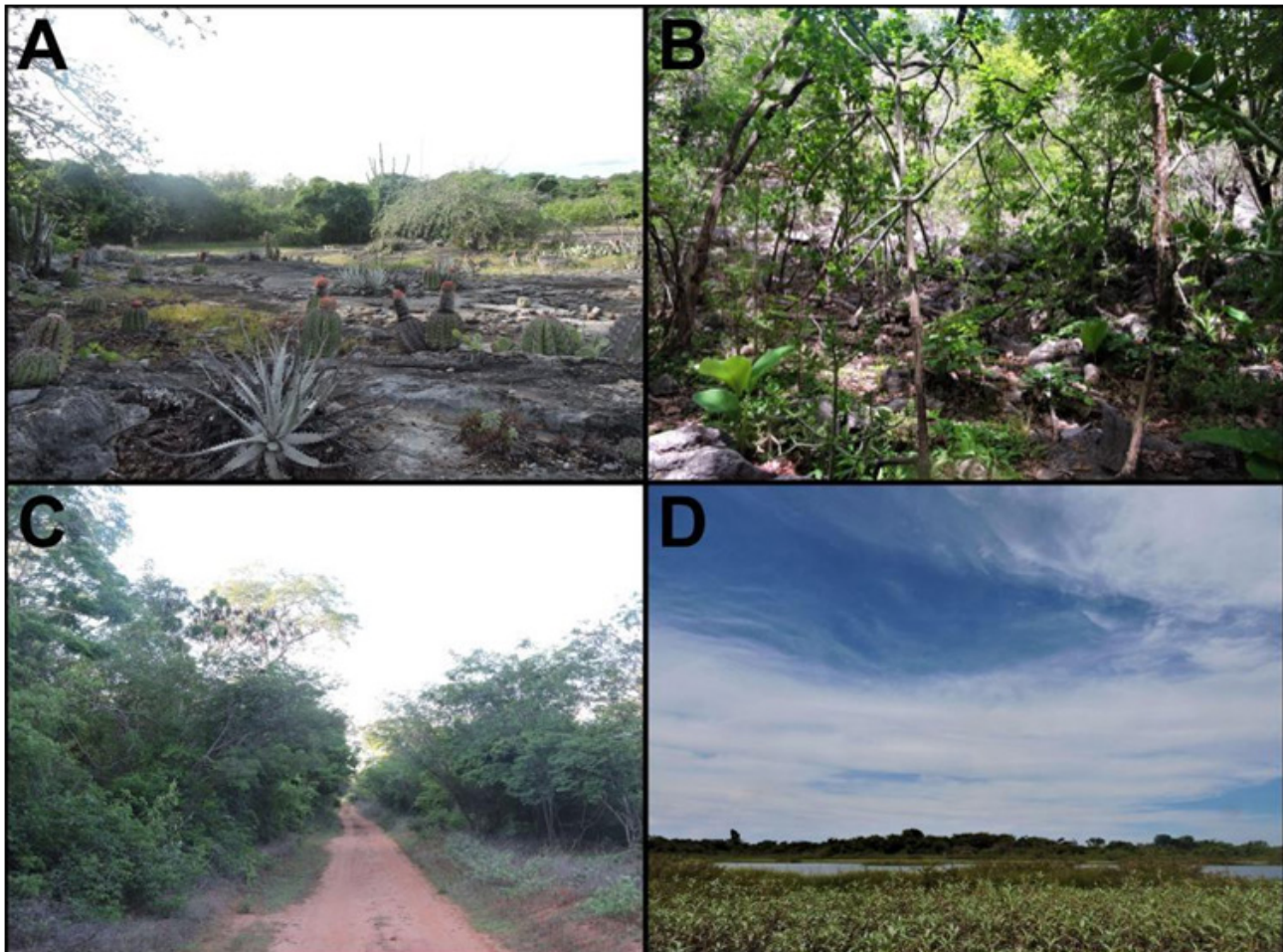


Fig 1. Study area. A. Open area of rock outcrop. B. Forest environment with a temporary dry stream channel. C. Forest environment without a stream channel. D. Open area of a marginal lake margin.

Bergen, 2019) and mammals (Ying et al., 2010). Therefore, thorns could constitute protection, supporting previous studies (Richards, 1978; Detoni et al., 2021). Additionally, cactus may serve as a food source, as demonstrated by Santos et al. (2007), whose work relates *P. versicolor* collecting food in *C. jamacaru*, *Pilosocereus catingicola* (Gurke), *Harrisia adscendens* (Gurke), *Pilosocereus gounellei* (F.A.C. Weber) and *Melocactus bahiensis* (Britton and Rose).

Also, we recorded the first occurrence of a *P. versicolor* colony occurrence on *Acacia plumosa* Lowe (Figure 2C),

Quiabentia zehntneri (Britton and Rose), and *Ziziphus joazeiro* Martius. These species are characterized by presenting thorns (Zappi & Taylor, 2020), which may favor the protection of *P. versicolor* colonies, as discussed before.

Still, we recorded for the first time *P. versicolor* nesting on *Commiphora leptophloeos* (Mart.), the imburana. This one is an arboreal, heliophila, and deciduous species constituted by tortuous branches. Also, it presents a smooth rhytidome that detaches in thin orangish layers when senile, exposing its green stem (Pareyn et al., 2018; Barrus, 2020).

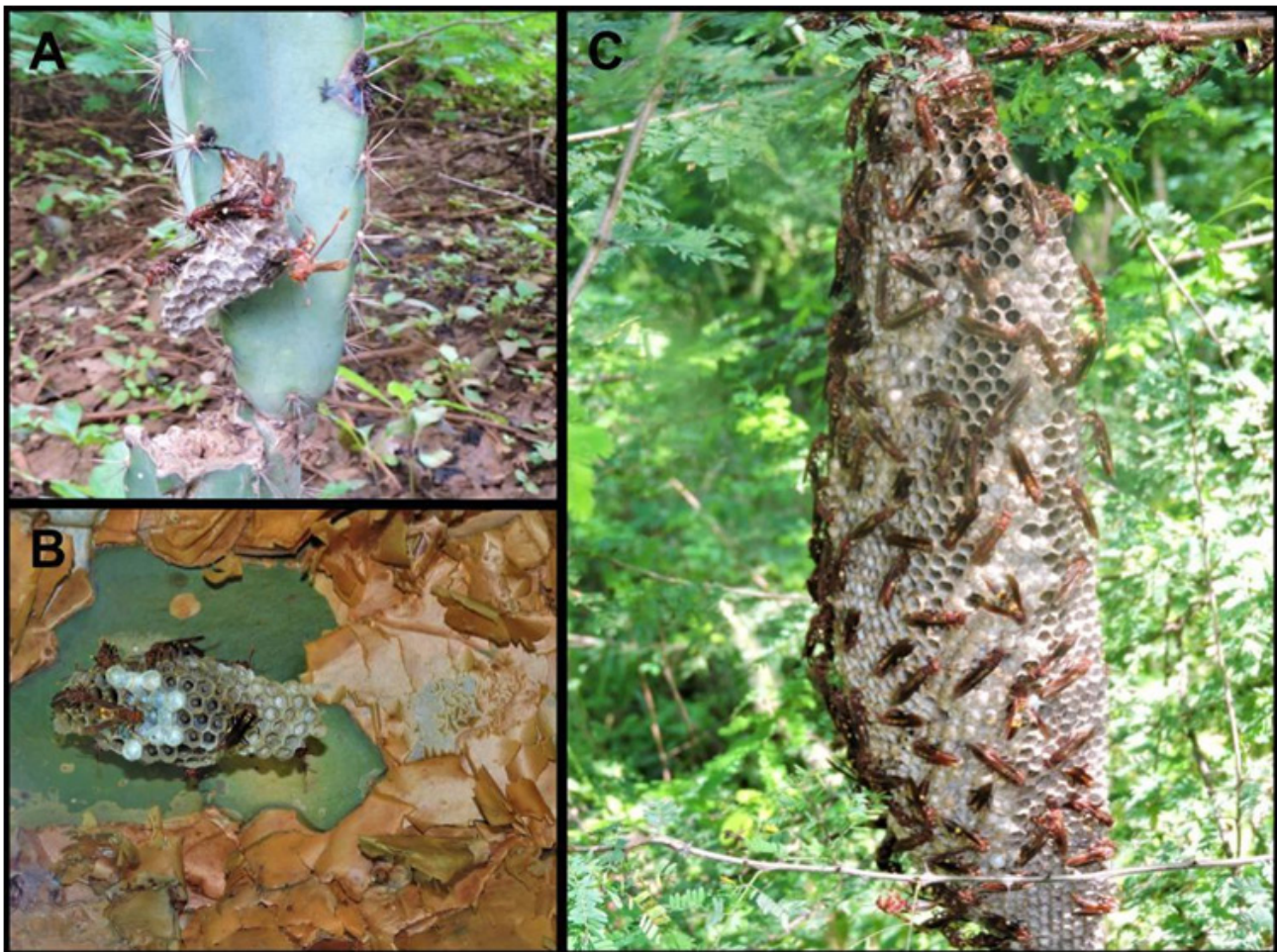


Fig 2. Colonies of *Polistes versicolor* in (A) *Cereus jamacaru*, (B) *Commiphora leptophloeos* and (C) *Acacia plumosa*.

Therefore, due to the rhytidome projections, we interpret the occurrence of *P. versicolor* nesting on imburana due to the possibility of providing nest camouflage (Figure 2B). Such a possibility of camouflage has been raised before by Souza et al. (2020). They demonstrated the colors of the vegetal structures, such as the tree bark, flowers, and leaves, provide camouflage for *Mischocyttarus anthracinus* Richards, 1945, *Parachartergus smithii* (de Saussure, 1854) and *Parachartergus wagneri* Buysson, 1904.

From the field data and the statistics, we conclude that *P. versicolor* prefers to nest in *C. jamacaru* in deciduous forests, which reinforces the hypothesis that plants with thorns provide a favorable environment for the protection of social wasps colonies, which was already reported for the *Polistes* genus.

Table 1. Number of colonies of *Polistes versicolor* found in each plant species in the Dry Forest State Park.

Vegetal species	Family	Number of colonies
<i>Acacia plumosa</i>	Fabaceae	1
<i>Cereus jamacaru</i>	Cactaceae	21
<i>Commiphora leptophloeos</i>	Burseraceae	2
<i>Quiabentia zehntneri</i>	Cactaceae	1
<i>Ziziphus joazeiro</i>	Rhamnaceae	1
sp. 01	Asteraceae	2
sp. 02	-	1
sp. 03	-	1

Author's Contribution

PAM: Investigation; Writing-Original Draft

GCJ: Conceptualization; Formal analysis; Resources; Writing-Review & Editing

GTGS: Investigation; Writing-Original Draft

MMS: Supervision; Methodology; Resources; Writing-Review & Editing

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