

# ***Listrus senilis* (LeConte) (Coleoptera: Melyridae), a Little-Known Pollinator Species Associated to Wild and Cultivated *Dahlia* (Asteraceae) in Mexico**

**Jesus Romero Napoles<sup>1</sup>, Jose Abel Lopez-Buenfil<sup>2,\*</sup>**

<sup>1</sup>Institute of Phytosanity, Postgraduate College, Texcoco, Mexico

<sup>2</sup>Research Direction, Postgraduate College, Texcoco, Mexico

## **Email address:**

[jnapoles@colpos.mx](mailto:jnapoles@colpos.mx) (J. R. Napoles), [abel.lopez@colpos.mx](mailto:abel.lopez@colpos.mx) (J. A. Lopez-Buenfil)

\*Corresponding author

## **To cite this article:**

Jesus Romero Napoles, Jose Abel Lopez-Buenfil. *Listrus senilis* (LeConte) (Coleoptera: Melyridae), a Little-known Pollinator Species Associated to Wild and Cultivated *Dahlia* (Asteraceae) in Mexico. *American Journal of Entomology*. Vol. 6, No. 2, 2022, pp. 22-26. doi: 10.11648/j.aje.20220602.12

**Received:** March 25, 2022; **Accepted:** April 27, 2022; **Published:** May 10, 2022

**Abstract:** In Mexico the distribution and role of the *Listrus senilis* species is poorly known. The objective of this paper is to offer information about the role of pollination of *L. senilis* on wild and cultivated plants of the genus *Dahlia*, and some biological observation of this insect in the Central Mexico. The dahlia is considered the national flower of Mexico, the plants are showy with yellow, orange and red flowers; common in rocky areas and roadsides in the mountainous areas of Mexico. It blooms between July and September, in the central region of Mexico it is common to find it in wild and cultivated areas. During 2021 (August to November), in the Estado de Mexico, were collected melyrid pollinators on wild and cultivated plants of the Asteraceae family. We inspected inflorescences on *Cosmos bipinnatus* Cav., *Dahlia coccinea* Cav., *Dahlia merckii* Lehm., *Dahlia rudis* Sorensen, *Tagetes lunulata* Ort., *Tithonia tubaeformis* (Jacq.) Cass., *Montanoa tomentosa* Cerv., *D. rudis*, and *D. campanulata*. We found the *Listrus semilis* species associated on plants wild and cultivated of the genus *Dahlia*, and wild plats of *Tagetes lunulata* Ort., *Tithonia tubaeformis* (Jacq.) Cass., *Montanoa tomentosa* Cerv., in Estado de Mexico. For first time is recorded *Listrus senilis* to the Estado de Mexico, also eight new floral records are added as host for this melyrid species. The adult habitus of male and female as well as genitalia of both sexes are illustrated.

**Keywords:** Pollinator, *Listrus*, Melyridae, *Dahlia*

## **1. Introduction**

In Mexico, 21,841 species of angiosperms have been registered, of which approximately 80% depend to some degree on the pollination service provided by animals [1, 15].

Currently there is a preoccupation about the crisis of bees and its work as pollinators, just as an example, bees pollinate about 75 percent of the fruits, vegetables, and nuts grown in the United States. Under the economic point of view, around the world bees pollinate \$217 billion worth of crops each year, and more than \$15 billion to the United States [14]. Some of the main problems of bees' loss are associated to diseases, pesticides, climate change, and loss of habitat; but this is only the tip of the iceberg; actually there are in insects a lot of species working as pollinators that we must consider.

For Mexico, being a center of origin and diversification of important crops, and a country that hosts a very high biological diversity, it is necessary to generate information on pollinating organisms and their ecosystem services, which will contribute to the definition of priorities and establishment of measures that contribute to their conservation and sustainable use of pollinators [3].

According to Mawdsley [11] insect orders Hymenoptera, Diptera, Lepidoptera, and Coleoptera are important pollinators of flowering plant species, just in beetles there are eleven families with pollinator species. In western North America, about 300 species of the beetle subfamily Dasytinae (Coleoptera: Melyridae) are commonly found on flowers, where adults feed on both nectar and pollen. In the genus *Listrus* Motschulsky, *L. senilis* (LeConte 1852) is a

very well-known species in United States, according to Mawdsley [11] this species can pollinate flowers of 22 species in 11 plants families, and has wide distribution, it has been recorded in Arizona, California, Colorado, Kansas, Nebraska, New Mexico, Texas, and Utah.

In Mexico *L. senilis* is a very poorly known species, and the distribution has been restricted to Saltillo, Coahuila and in Alvarez Mountains, Guanajuato; also it is distributed to Guatemala and Panama [4, 5].

The objective of this paper is to give information about the role of pollination of *L. senilis* on wild and cultivated plants of the genus *Dahlia*, and some biological observation of this insect.

## 2. Material and Methods

Three areas located at Estado de Mexico, Mexico were revised, the first was located in an archeological place Tetzcotzinco forest (the king's Nezahualcoyotl recreative place), it is located approximately 7 km east of Texcoco, it belongs to the town of Tlaminca. In this place were inspected the following plant flowers: *Cosmos bipinnatus* Cav., *Dahlia coccinea* Cav., *Dahlia merckii* Lehm., *Dahlia rudis* Sorensen, *Tagetes lunulata* Ort., *Tithonia tubaeformis* (Jacq.) Cass., *Montanoa tomentosa* Cerv. all in the Asteraceae family.

The second place is found in the experimental fields of the Postgraduate College, at Montecillo, Texcoco; in this site a small area was revised (30×12 m) planted with cultivated *Dahlia*, as is illustrated in Figure 1, there were plants with flowers of different colors, which were associated with *L. senilis*.

The third place was located in the experimental fields of the Autonomus University of Chapingo, situated at vicinity of Texcoco town, in those fields there is a small area planted with species of medical or rustic use, between these some *Dahlia* species, such as *D. coccinea*, *D. rudis*, and *D. campanulata*.

Collection of flowers were made during 2021, manly in August to November months. Material was prepared, labeled and housed at Coleccion Entomologica of Postgraduate College (CEAM), some specimens were used to photograph and other to examine the male and female genitalia, using the technic stated by Kingsolver [6]. Keys and description by [2, 7, 9, 10].

## 3. Results and Discussion

Taxonomy of *L. senilis* (LeConte, 1852).

*Dasytes senilis* LeConte, 1852; Champion, 1914.

*Listrus senilis*: LeConte, 1866; Champion, 1914; Majer, 1990; Mawdsley, 1999.

*Listrus canescens* Mannerheim, 1843; Gorham, 1882, 1886; Champion, 1914; Mawdsley, 1999.

*Listrus clavicornis* Casey, 1895; Champion, 1914; Mawdsley, 1999.

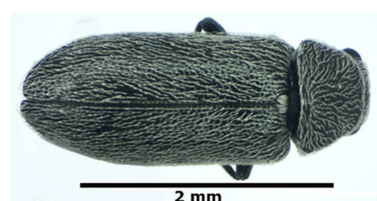
*Amecocerus senilis*: Pic, 1937; Majer, 1990.

The history of *L. senilis* is very confuse due to the changes

through time. The species was described by LeConte in 1852 in the genus *Dasytes*, but later in 1866 the same author changed it to the *Listrus* genus; moreover, there a couple of synonyms (*L. canescens* and *L. clavicornis*). The next problem came when one catalogue transferred erroneously all species in *Listrus* to the species-group *Amecocerus* [12], and this information was reproduced in the Nomina Insecta Nearctica [13], ignoring the previous paper published indicating to *Listrus* as a valid genus [8].

### 3.1. Adult Habitus of Male and Female

*L. senilis* can be identified by the elongate, slender, subcylindrical body (Figure 1a, b); female distinctly broader than male (Figure 2a, b); integument black, shining, frequently with metallic blue or coppery sheen; elytra uniformly pubescent, without denuded spots; pubescence long and dense; penultimate antennal segment transverse, the fifth distinctly larger than the sixth, 9-11 forming a definite club, antennae extending nearly to base of pronotum; pronotum convex, slightly broader than long, broadest at basal third and tapering to base and apices, disc coarsely and densely punctate, punctures often becoming strongly rugose, lateral margin minutely serrate, posterior and lateral margins outlined by a row of reclinate overlapping white setae; anterior tibia without any spines on the outer margin; appendages of the claws are broad, as long as the claws themselves and connate with them almost to the tip; fifth visible abdominal sternite elongate and apically emarginated in males (Figure 3), shorter and rounded apically in females (Figure 3). In Figure 4a-b is showed a photograph of median lobe of male genitalia in lateral and ventral view, where the typical tridentate apical portion of the species can be seen and in Figure 4c the tegmen; in Figure 5 is illustrated the female genitalia, where can be seen the sternite VIII, baculy, style, and bursa copulatrix; also is showed part of digestive tube full of pollen.

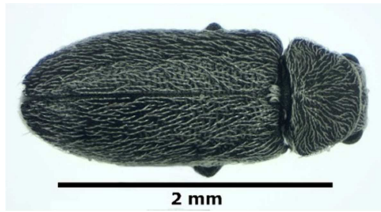


a). Habitus of male of *Listrus senilis* (dorsal view).



b). Habitus of male of *Listrus senilis* (lateral view).

**Figure 1.** Habitus of male of *Listrus senilis*; a) dorsal view, b) lateral view.



a). Habitus of female of *Listrus senilis* (dorsal view).



b). Habitus of female of *Listrus senilis* (lateral view).

**Figure 2.** Habitus of female of *Listrus senilis*; a) dorsal view, b) lateral view.



**Figure 3.** Ventral view of male and female abdomen.



a). Male genitalia, median lobe in lateral view.

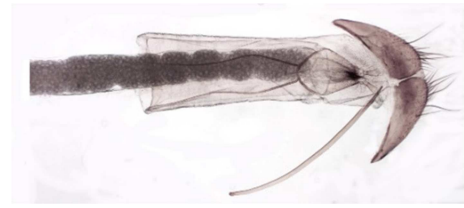


b). Male genitalia, median lobe in ventral view.



c). Male genitalia, tegmen.

**Figure 4.** Male genitalia; a) median lobe in lateral view, b) median lobe in ventral view, c) tegmen.



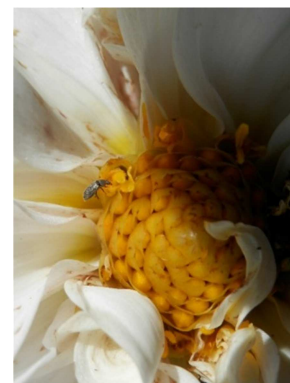
**Figure 5.** Female genitalia.



**Figure 6.** Flowers of *Dahlia coccinea* Cav.



a). Flowers of cultivate dahlia.



b). *L. senilis* in flowers of cultivate dahlia

**Figure 7.** Cultivate dahlia and *L. senilis*; a) Flowers of cultivate dahlia, b) *L. senilis* in flowers of cultivate dahlia.



**Figure 8.** *L. senilis* in flowers of *Dahlia campanulata*.

### 3.2. Biological Observations

In the first area there were collected 25 specimens of *L. senilis* in flowers of *Dahlia coccinea* Cav. (Figure 6), all specimens were feeding on pollen. This is the first record of this melyrid on this plant. Of the 25 specimens captured 13 were males and 12 females making a sexual proportion 1:1.08; about its length in this population were male 2.27-2.75 mm (pronotum-elytra) and female 2.3-2.75 mm (pronotum-elytra). The collection data of the insect material were: Cerro Tetzcotzinco, 7 km E Texcoco, Tlaminca, Estado de Mexico, 18/IX/2021, 2514 m, col. J. Romero N., floral record *Dahlia coccinea* Cav., 19°29'50.37"N, 98°49'9.62"W. Later, on 24/X/2021, in the plant *Montanoa tomentosa* Cerv. (Asteraceae) was collected a couple specimens, with this information it can be considered as a new floral record to *L. senilis*.

About the second place there were collected 31 specimens in flowers of cultivate *Dahlia* (Figure 7a, b), as the later area, here were feeding on pollen. Also, this is the first floral record for cultivated *Dahlia*. Of the 31 collected specimens 12 were males and 19 females, with sexual proportion of 0.63:1; about its length in this population were male 2.3-2.72 mm (pronotum-elytra) and female 2.32-2.92 mm (pronotum-elytra). The collection data of the material were: Campo Experimental, Postgraduate College, Montecillo, Estado de Mexico, 4/X/2021, 2246 m, Col. J. Romero N., floral record cultivated *Dahlia*, 19°27'55"N, 98°54'09.1"W.

In the third area there were collected 20 specimens of *L. senilis* in flowers of *Dahlia campanulata* Saar, Sorensen & Hjerting (Figure 8), also all specimens were feeding on pollen; this is the first report of the insects on this plant. Of the 20 specimens captured half were males and half females, with a sexual proportion 1:1; about its length in this population were male 2.37-2.87 mm (pronotum-elytra) and female 2.5-2.7 mm (pronotum-elytra). The collection data were: Campo experimental, Autonomus University of Chapingo, Estado de Mexico, 15/IX/2021, 2265 m, J. Romero N., floral record *Dahlia campanulata* Saar, Sorensen & Hjerting, (19°29'20.49"N, 98°52'34.87"W).

## 4. Conclusion

This is the first time that *L. senilis* is recorded to the Estado de Mexico, with this information this insect species has extended its distribution in addition to Coahuila and Guanajuato [2, 3].

About its floral records, the number of known hosts for *L. senilis* has increased to 30 plant species [8], including eight new plant records belonging to the genera *Dahlia*, *Cosmos*, *Tithonia*, *Tagetes*, and *Montanoa*.

Also, it is now documented that *L. senilis* is a component of pollinator insects found in cultivated dahlia.

In Table 1 is showed a list of floral host records for *L. senilis*, where asterisk (\*) indicate the new floral host, the rest of the plants were from bibliography [8].

Table 1. Plant flowers associated to the pollinator *L. senilis*.

PLANT SPECIES	PLANT FAMILY
<i>Rhus glabra</i> L.	ANACARDIACEAE
<i>Achillea lanulosa</i> Nuttall	ASTERACEAE
<i>Aster</i> sp.	ASTERACEAE
<i>Centaurea repens</i> L.	ASTERACEAE
<i>Chrysanthemum nauseosus</i> (Pallas) Britton	ASTERACEAE
<i>Cirsium</i> sp.	ASTERACEAE
<i>Cosmos bipinnatus</i> Cav.*	ASTERACEAE
<i>Dahlia campanulata</i> Saar, Sorensen & Hjerting*	ASTERACEAE
<i>Dahlia coccinea</i> Cav.*	ASTERACEAE
<i>Dahlia merckii</i> Lehm.*	ASTERACEAE
<i>Dahlia rudis</i> Sorensen *	ASTERACEAE
<i>Erigeron annuus</i> (L.) Persoon	ASTERACEAE
<i>Gaillardia aristata</i> Pursh	ASTERACEAE
<i>Grindelia squarrosa</i> (Pursh) Dunal	ASTERACEAE
<i>Helianthus</i> sp.	ASTERACEAE
<i>Solidago occidentalis</i> (Nuttall) Torrey and Gray	ASTERACEAE
<i>Tagetes lunulata</i> Ort. *	ASTERACEAE
<i>Tithonia tubaeformis</i> (Jacq.) Cass. *	ASTERACEAE
<i>Campanula</i> sp.	CAMPANULACEAE
<i>Cerastium arvense</i> L.	CAROPHYLLACEAE
<i>Geranium viscosissimum</i> Fischer and Meyer	GERANIACEAE
<i>Monarda citriodora</i> Cervantes	LAMIACEAE
<i>Monarda</i> sp.	LAMIACEAE
<i>Montanoa tomentosa</i> Cerv.*	ASTERACEAE
<i>Pinus ponderosa</i> Douglas	PINACEAE
<i>Eriogonum heracleoides</i> Nuttall	POLYGONACEAE
<i>Potentilla gracilis</i> Douglas	ROSACEAE
<i>Rosa</i> sp.	ROSACEAE
<i>Salix</i> sp.	SALICACEAE
<i>Solanum elaeagnifolium</i> Cavanilles	SOLANACEAE

\*New floral records for the pollinator *L. senilis* in the Estado de Mexico, Mexico.

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