

NOTE

**TROPIDURUS SEMITAEINIATUS
(SQUAMATA: TROPIDURIDAE) AS A
SEED DISPERSER OF THE PLANT
COMMIPHORA LEPTOPHLOEOS
(BURSERACEAE) IN THE
CAATINGA OF NORTHEASTERN
BRAZIL**

LEONARDO BARROS RIBEIRO¹

MELISSA GOGLIATH²

ELIZA MARIA XAVIER FREIRE¹

¹ Programa de Pós-Graduação em Psicobiologia, Universidade Federal do Rio Grande do Norte, Centro de Biociências, Departamento de Fisiologia, Caixa Postal 1511, Campus Universitário Lagoa Nova, Cep 59078-970, Natal, RN, Brasil.

² Laboratório de Herpetologia, Departamento de Botânica, Ecologia e Zoologia, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Campus Universitário Lagoa Nova, Cep 59072-970, Natal, RN, Brasil.

ribeiro.lb@gmail.com

Reptiles were, together with fish, the first vertebrates to interact with seed-bearing plants (Tiffney, 1984). Recent studies (Cooper and Vitt, 2002; Olesen and Valido, 2003; Castro and Galetti; 2004; Pérez-Mellado *et al.*, 2005) show the important role of lizards in seed dispersal (saurocory) of some plants. Traits of fruits/seeds (e.g. odor, contrasting color: orange or red) and the fact that many fruits/seed grow close to the soil or fall when ripe (Iverson, 1985; Valido and Nogales, 1994; Van Damme, 1999) provide stimuli that lizards respond to. Published diets of *Tropidurus* species include plant material as leaves, flowers, fruits and seeds such as reported for *T. itambere* (Van Sluys, 1993), *T. torquatus* (Teixeira and Giovanelli, 1999), *T. erythrocephalus* (Fontes *et al.*, 2003), *T. montanus* and *T. hispidus* (Van Sluys *et al.*, 2004), and also for *T. hispidus* and *T.*

semitaeniatus (Vitt, 1995; Kolodiuk *et al.*, 2007). Exactly in the locality of this last study, we report for the first time during direct observation, seed dispersal of *Commiphora leptophloeos* (Mart.) Gillett. by *T. semitaeniatus*.

Tropidurus semitaeniatus is broadly distributed in the rocky habitats of the caatingas of northeastern Brazil (Vanzolini *et al.*, 1980). In the context of a behavioral ecology work, a *T. semitaeniatus* population was studied at the Estação Ecológica do Seridó (ESEC Seridó; 06.5767° S, 37.2558° W, datum: WGS84; elev. 192 m), Serra Negra do Norte municipality, Rio Grande do Norte State, Brazil. One of the studied aspects included the foraging behavior of lizards recorded by focal animal samples that consisted of 10 continuous minutes of behavioral monitoring on different individuals, with one session from 0700-1000 h and other from 1400-1700 h, during two consecutive days.

On 09 May 2008, during the morning session, four *T. semitaeniatus* were observed under a *C. leptophloeos* situated in a crevice on a rocky outcrop where we made behavioral observations. *Commiphora leptophloeos* is a deciduous tree (popularly known as imburana) belonging to the family Burseraceae. It has one of the largest values for importance index in phytosociology studies developed in caatinga ecosystems, including at the ESEC Seridó (Sampaio, 1996; Santana and Souto, 2006). This plant has a drupaceous fruit (approximately 2 cm of mean size) that opens up to the middle dropping a single seed, which is coated at the base with an orange or red aril, making it attractive to potential dispersers (Maia, 2004). In each of the four foraging observations (one of these video-documented), focal lizards ingested arils. Seeds, which fell from as high as 300 cm, were quickly bitten by lizards when they hit the sur-



Figure 1. *Tropidurus semitaeniatus* approaching of seed *Commiphora leptophloeos* (A) and biting the seed aril (B) in a rock surface at the Ecological Station of the Seridó, Brazil.

face of the rocky outcrops (Fig. 1A-B). The lizards then moved away from nearby lizards. Once away from other lizards, the focal lizards bit the aril repeatedly. From the perspective of the seed, being eaten by a lizard may reduce the attack by pathogenic fungi on seeds, increasing the germination rates (Leal and Oliveira, 1998). Moreover, removal of the aril exposes the seed micropyle, allowing the absorption of water needed for germination (Leal, 2005). Lizards ate the aril but not the seeds. Seed arils are generally rich in lipids and likely offer a highly nutritious food source to the lizards, particularly in semi-arid environments where resources may be limited (Horvitz, 1981). Considering that plant material constitutes nearly 30% by volume of the diet of *T. semitaeniatus* and more than 63% of the

diet of *T. hispidus* in caatinga (Vitt, 1995), dispersal of seeds by lizards that eat fruit is likely to be very common. Seed dispersal distance by lizards ranged from 210 to 550 cm from the parent tree. Saurocory provides benefits for *C. leptophloeos*, because it may reduce competition among seeds and seedlings under the parent tree. Finally, our observations of lizard-plant interaction when combined with published dietary information, reveal that *T. semitaeniatus*, an endemic lizard of caatingas, may be an important seed disperser of *C. leptophloeos* likely contributing to reproductive success of this plant and may affect spatial distribution of the plant. Finally, our results suggest that conservation of this plant in the semi-arid of northeastern Brazil requires consideration of animal-plant interactions that contribute to reproductive success of the plant species.

ACKNOWLEDGEMENTS

We thank the Programa PELD/CNPq – Caatinga: Estrutura e Funcionamento for logistic support, and George Stephenson Batista for identification of vegetal species. Laurie Vitt for invaluable criticisms on earlier version of the manuscript. This study was supported by a research grant from the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) to L.B. Ribeiro (process 141993/2006-5), and the permit for the work was given by IBAMA (Permit 206/2006 and Process 02001.004294/03-15).

LITERATURE CITED

- CASTRO, E. R. & M. GALETTI. 2004. Frugivoria e dispersão de sementes pelo lagarto teiú *Tupinambis merianae* (Reptilia: Teiidae). *Papéis Avulsos de Zoologia* 44: 91-97.
- COOPER, W. E. & L. J. VITT. 2002. Distribution, extent, and evolution of

- plant consumption by lizards. *Journal of Zoology* 257: 487-517.
- FONTES, A. F.; V. A. MENEZES; C. F. D. ROCHA & M. VAN SLUYS. 2003. Dieta, uso do habitat e biologia termal de *Tropidurus erythrocephalus* (Sauria: Tropiduridae) em uma área de caatinga de altitude, Bahia, Brasil. *Congresso de Ecologia do Brasil* 6: 324-325.
- HORVITZ, C. C. 1981. Analysis of how ant behavior affect germination in a tropical myrmecochore *Calathea microcephala* (P. & E.) Koernicke (Maranthaceae): microsite selection and aril removal by neotropical ants, *Odontomachus*, *Pachycondyla*, and *Solenopsis* (Formicidae). *Oecologia* 51: 47-52.
- IVERSON, J. B. 1985. Lizards as seed dispersers? *Journal of Herpetology*, 19: 292-293.
- KOLODIUK, M. F.; L. B. RIBEIRO & E. M. X. FREIRE. 2007. Dieta e comportamento de forrageio de *Tropidurus hispidus* e *Tropidurus semi-taeniatus* em uma área de caatinga do nordeste do Brasil. *CD-ROM dos Anais do XVI Encontro de Zoologia do Nordeste*.
- LEAL, I. R. 2005. Dispersão de sementes por formigas na caatinga: 593-624. *En: LEAL, I. R.; TABARELLI, M. & SILVA, J. M. C. (eds.), Ecologia e Conservação da Caatinga*. Editora Universitária da UFPE, Recife, PE.
- LEAL, I. R. & P. S. OLIVEIRA. 1998. Interactions between fungus-growing ants (Attini), fruits and seeds in cerrado vegetation in Southeast Brazil. *Biotropica* 30: 170-178.
- MAIA, G. N. 2004. Caatinga - árvores e arbustos e suas utilidades. Editora Leitura & Arte, São Paulo, SP, 415 pp.
- OLESEN, J. M. & A. VALIDO. 2003. Lizards as pollinators and seed dispersers: an island phenomenon. *Trends in Ecology and Evolution* 18: 177-181.
- PÉREZ-MELLADO, V.; N. R. RIERA; A. PERERA & S. MARTÍN-GARCÍA. 2005. The lizard, *Podarcis lilfordi* (Squamata: Lacertidae) as a seed disperser of the Mediterranean plant, *Phillyrea media* (Oleaceae). *Amphibia-Reptilia* 26: 105-108.
- SAMPAIO, E. V. S. B. 1996. Fitossociologia: 203-230. *En: SAMPAIO, E. V. S. B.; MAYO; S. J. & BARBOSA, M. R. V. (eds.), Pesquisa botânica nordestina: progresso e perspectivas*. Sociedade Botânica do Brasil, Seção Regional de Pernambuco, Recife, Brasil.
- SANTANA, J. A. S. & J. S. SOUTO. 2006. Diversidade e estrutura fitossociológica da Caatinga na Estação Ecológica do Seridó-RN. *Revista de Biologia e Ciências da Terra* 6: 232-242.
- TEIXEIRA, R. L. & M. GIOVANELLI. 1999. Ecologia de *Tropidurus torquatus* (Sauria: Tropiduridae) da restinga de Guriri, São Mateus, ES. *Revista Brasileira de Biologia* 59: 11-18.
- TIFFNEY, B. H. 1984. Seed size, dispersal syndromes and the rise of the angiosperms: evidence and hypothesis. *Annals of the Missouri Botanical Garden* 71: 55-576.
- VALIDO, A. & M. NOGALES. 1994. Frugivory and seed dispersal by the lizard *Gallotia galloti* (Lacertidae) in a xeric habit of the Canary Islands. *Oikos* 70: 403-411.
- VAN DAMME, R. 1999. Evolution of herbivory in lacertid lizards: effects of insularity and body size. *Journal of Herpetology* 33: 663-674.
- VAN SLUYS, M. 1993. Food habits of the lizard *Tropidurus itambere* (Tropiduridae) in southeastern Brazil. *Journal of Herpetology* 27: 347-351.
- VAN SLUYS, M.; C. F. D. ROCHA; D. VRCIBRADIC; C. A. B. GALDINO & A. F. FONTES. 2004. Diet, activity and microhabitat use of two syntopic *Tropidurus* species (Lacertilia: Tropiduridae) in Minas Gerais,

Brazil. *Journal of Herpetology* 38:
606-611.

VANZOLINI, P. E.; A. M. A. RAMOS-COSTA & L. J. VITT. 1980. Répteis das Caatingas. Academia Brasileira de Ciências, Rio de Janeiro, Brasil, 161 pp.

VITT, L. J. 1995. The ecology of tropical lizards in the caatinga of northeast Brazil. *Occasional Papers of the Oklahoma Museum of Natural History* 1: 1-29.