

## Herbivore diversity of a unique, islanded and managed sugarcane agro-ecosystem comprising *Saccharum* germplasm

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The islanded and managed sugarcane agro-ecosystem (11°52' N, 75°25' E, 11m MSL) exists in the heartland of the Kannur District, Kerala state, India as an integral part of the ICAR-Sugarcane Breeding Institute Research Centre (encompasses approximately 20 acres), since 1962. The center hosts the world sugarcane germplasm collection which includes ISSCT (International Society of Sugar Cane Technologists), Indian collection consists of approximately 3500 *Saccharum* and related species. The center is located approximately 200 km from the commercial sugarcane belt to manage the field gene-bank free of pests and diseases. The collection is replanted every year during the January-February planting season and the previous year crop being retained until the current year crop gets established in the field. Thus, the center provides a unique agro-ecosystem with the availability of crops throughout the year in the field which is islanded from the main sugarcane growing area and managed following recommended agricultural practices. The landscape has previously been subjected to paddy cultivation as a wetland before the center came up. The center comes under a humid tropical monsoon climate with precipitation is heavily seasonal where June to September is known as the wettest months with south-west monsoon and the occasional occurrence of localized flooding during the time.

The existence of the manmade ecosystem for more than five decades since the establishment subjected to continuous interaction with the dynamic surrounding and urban environment and provided shelter to the various arthropods including herbivores, omnivores and carnivores.

The plant diversity of the ecosystem highly differs from that of mainland sugarcane (Monocropping of *Saccharum spp.* hybrids) with the growth of various *Saccharum spp* viz., *S.officinarum*, *S.barberi*, *S.sinense*, *S.robustum* & *S. edule* and *S.spontaneum*; hybrids of Indian and foreign origin (*Saccharum spp.* hybrids) and sugarcane allied genera such as *Erianthus*, *Narenga*, and *Sclerostachya* which fundamentally created a heterogeneous habitat in the ecosystem (approximate area of the each germplasm grown mentioned in Table 1).

**Table 1. Area of the *Saccharum* germplasm in the ecosystem**

Germplasm	Area (in ac) (Total area= 20 ac approx.)
<i>S.officinarum</i>	2.5
<i>S.barberi</i>	0.2
<i>S.sinense</i>	0.2
<i>S.robustum</i> and <i>S. edule</i>	0.4
<i>S.spontaneum</i>	2.0
Indian hybrids	3.3
Foreign hybrids	3.2
Related genera	1.0
Other clones	2.0
Fallow grassland; Irrigation channels; openwells; farm buildings etc.	5.2

**Herbivore diversity recorded in the ecosystem**

The observational studies were done over three years from 2017- 2020 and details were collected on herbivorous arthropods/pests in the ecosystem (listed below). The abundance and the diversity of habitat vegetation provided numerous herbivores to survive in the ecosystem and some of them are essentially new to the sugarcane and unfamiliar as pests in the mainland sugarcane growing areas.

**List of herbivores recorded in the ecosystem**

1. Internode borer, *Chilo sacchariphagus indicus* (Kapur)
2. Sugarcane planthopper, *Pyrilla perpusilla* Walker
3. Pink stem borer, *Sesamia inferens* (Walker)
4. Sugarcane woolly aphid, *Ceratovacuna lanigera* Zehntner
5. Leaf scraper, *Callispa vittata* Baly
6. Leaf beetle, *Monolepta signata* (Olivier)

7. Flea beetle, *Altica sp.*
8. Leaf miner, *Aphanisticus aeneus* Kerremans
9. White grub, *Heteronychus annulatus* Bates,
10. Rice leaf folder, *Cnaphalocrocis ruralis* Walker
11. Flat grass scale, *Aclerda takahashii* (Kuwana)
12. Sugarcane scale insect, *Melanaspis glomerata* (Green)
13. Pink sugarcane mealybug, *Saccharicoccus sacchari* (Cockerell)
14. Sugarcane whitefly, *Aleurolobus barodensis* (Maskell)
15. Rugose spiralling whitefly (RSW) *Aleurodicus rugioperculatus* Martin
16. Sugarcane aphid, *Melanaphis sacchari* (Zehntner)
17. Rice grasshopper, *Hieroglyphus banian* (Fabricius)
18. Black leafhopper, *Proutista moesta* (Westwood)
19. Sugarcane web mite, *Schizotetranychus sp.*
20. Rice thrips, *Stenchaetothrips biformis* (Bagnall)