

DOI:10.55278/MPLW6595

Shaping landscapes to “Bee at home”***P. V. Rami Reddy****Division of Crop Protection, ICAR-Indian Institute of Horticultural Research,
Bengaluru – 560089, Karnataka, India.****Corresponding author: pvreddy2011@gmail.com***

Flowering plants and insects have co-evolved for a long time (estimated to be about 400 million years) and their interactions resulted in a highly synchronized mutualism that benefits both mankind and the environment. While plants reward insect visitors with resources like pollen and nectar, bees, in turn, help them in transferring, though inadvertently, pollen from anthers to stigma on the same plant or between plants of the same species, thus helping in their pollination without which many cross-pollinated plants would have gotten extinct. About 80% of flowering plants are benefitted from animal pollinators of which insects, especially bees, constitute a major chunk. Pollinator fauna is not limited to a few species of honey bees and brightly coloured butterflies that are more frequently seen on flowers. In fact there are thousands of species of native bees, butterflies, moths, hummingbirds, wasps, flies and beetles that are not seen but have been strengthening our ecosystems.

Of late, natural populations of bees, both wild and managed, are declining at alarming rates leading to a “pollinator crisis” that could have cascading effects on food production, nutritional security, and

biodiversity. Anthropogenic interventions, invasive species, insecticide poisoning, habitat loss, and climate change are major factors behind the pollinator decline. In this context, there is a need to have concerted efforts at individual as well as community levels to conserve native bee fauna and enhance their ecosystem services.

Bee positive landscapes

Since habitat loss is one of the major causes that resulted in bees deserting their natural nests, redesigning or shaping landscapes, both natural and managed, with bee-friendly interventions would go a long way in conserving bees and many other flower-visiting insects. There are different kinds of landscapes like orchards, agricultural lands, forests, grasslands and manmade ones like parks and gardens. Every kind has the potential to make it more bee-friendly.

What to do?

Following are some approaches to make landscapes amenable for the conservation of pollinators in general and bees in particular.

- Enrich the existing landscapes with perennial plants (trees and shrubs) known

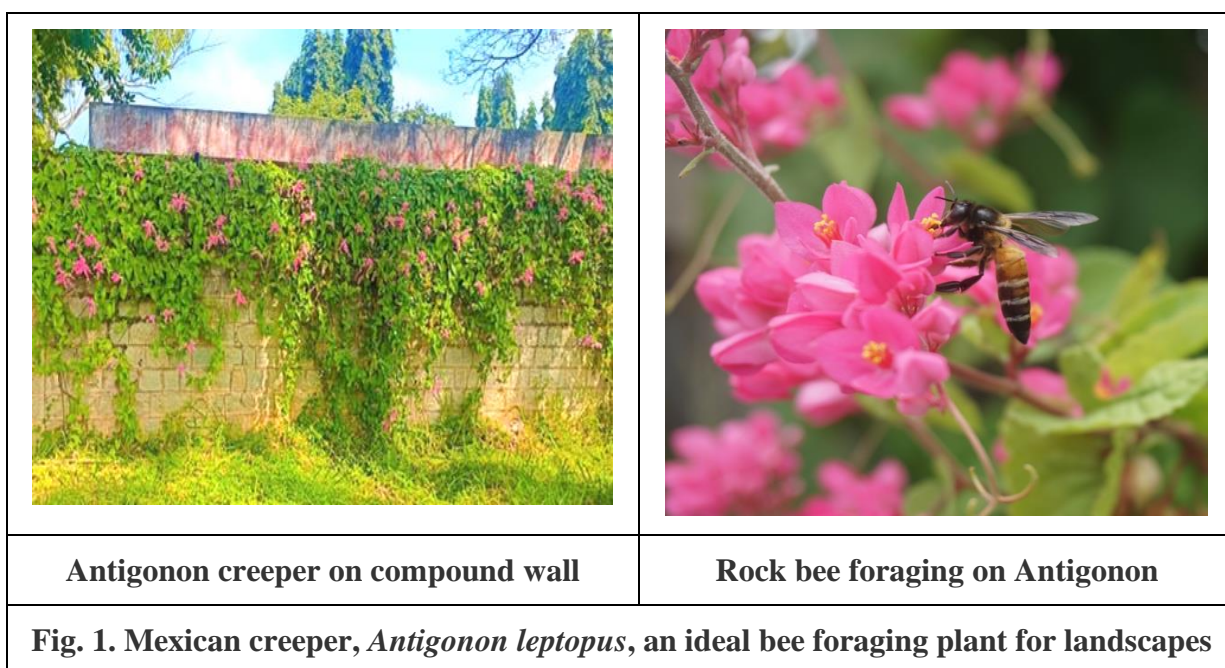
to have pollen and nectar. Gathering information on the flowering time of each species is essential so that plants of staggered flowering times can be chosen. It facilitates the availability of floral resources for longer periods. Perennial flowering plants with abundant nectar reserves are ideal to be incorporated. For instance, the Mexican creeper, *Antigonon leptopus* with its attractive pink flowers (white variants also found) rich in pollen and nectar, makes an ideal choice. It flowers for about 8-10 months in a year and attracts honey bees and many other insects in large numbers. This creeper was introduced at ICAR-Indian Institute of Horticultural Research, Bengaluru where it was planted along borders and trained on compound walls. It serves as an ornamental plant as well as a bee foraging source (Reddy, 2020) (Fig. 1).

- Medium-sized fruit trees like guava, citrus, Singapore cherry or ornamental plants like bottle brush, *Antigonon* are some of the options. These can be supplemented with annual flowering herbs which have to be planted at frequent intervals.
- In orchard-based landscapes, annual flowering plants like niger, mustard, and sunflower can be grown as intercrops during the off-season to sustain bees and other pollinators. To the maximum extent possible, clean cultivation must be avoided. In one of our studies, it was established that mango orchards following clean and intensive cultivation attracted a significantly lesser number of pollinators compared to the ones following conservation horticulture.
- ‘Less lawn more plants’ should be the concept to save on resources in maintenance and enhance pollinator visitation. Unfortunately, many urban gardens are partial towards extended lawns which are of little use to bees. Besides enriching existing landscapes with flora and practices that support bees, creating ‘pollinator gardens’ in urban areas would help in retaining and augmenting bee fauna. Landscape architecture has to shift its approach from exclusive eye-catching beauty to that of ecological relevance too.
- Providing nesting sites such as bamboo pieces and mud pots help wild bees to settle in landscapes. Native wild bees have very different nesting requirements than that of domesticated ones as they are solitary or nest in very small numbers. The majority nest in the ground and others in tree barks, rat tunnels, underneath flower pots, wooden supports given to creepers etc.
- Above all they should be maintained, as far as possible, free from chemical pesticide applications.
- Burning field bunds or public landscapes decimate several soil-dwelling beneficial insects.

Conclusions

There is an absolute need to spread awareness among the public on the importance of conserving pollinator fauna and how one can contribute to this endeavour. Besides a playground, all schools should have a pollinator garden and involve school students in its maintenance. Ironically, most of us equate insects with only disease-causing

mosquitoes and agricultural pests. But the beautiful world of insects beyond and their services to the environment and human welfare are rarely appreciated. Behind every fruit and vegetable, every drop of sweet and delicious honey, every string of silk saree, every pinch of cosmetic creams, every inch of land cleared of decomposed wastes... there is an insect. The concluding take-home point is; “More blooms..more buzz.”



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MS Received on 25th October 2023
MS Accepted on 20th November 2023