Are Arthropods the Canary in the Coal Mine?

Article and Photos by **FORREST SMITH**

Canaries in a coal mine are sentinels for a bad omen. Through observation, they can reveal a problem (carbon monoxide gas) before humans can otherwise perceive it. Arthropods (insects, spiders and crustaceans) may figuratively be the "canary" in our native habitat when it comes to the effects of exotic grasses.

Our research at CKWRI has documented an interesting relationship between arthropods and exotic grasses. In western South Texas, Aaron Flanders found 60 percent more arthropods in native habitats than in sites with exotic grasses. This is quite a difference, especially considering that exotic grass sites in his research contained just 11 to 20 percent exotic grass cover. He also found that there were fewer native forbs and birds, including quail, on sites with exotic grass. This cascade of impact – from exotic grasses to a decrease in native forbs, arthropods and birds – was an eye opener. This reduction in native forbs following exotic grass establishment was also documented in subsequent research conducted by Joey Sands. Sands found that areas with more than 25 percent exotic buffelgrass cover had 73 percent less forb cover than native sites.

In another study, Erin Cord, working in eastern South Texas during 2009-2010, also found greater abundance and diversity of arthropods in native plant dominated patches compared to patches of Old World bluestem. Again, loss of native forbs in exotic grass patches was pointed to as a cause for the decline in arthropods. Her work documented the loss of whole groups (orders) of insects, as well much lower arthropod diversity in general, in exotic grass stands. In another recent project, Adam Mitchell working on the Welder Wildlife Refuge, also found far fewer species of arthropods in Old World bluestem patches compared to nearby native plant communities. Old World bluestem patches had large numbers of only one or two species of arthropods, whereas native plant dominated areas had 10 times as many species. The ability of native forbs to support diverse populations of arthropods was emphasized by another study in Kingsville. Dr. Richard Patrock, a consulting entomologist working for our partner the USDA NRCS E. "Kika" de la Garza Plant Materials Center, documented *47 species of pollinators* utilizing a single quarter-acre plot of the native forb Rio Grande clammyweed in Kingsville last summer and fall. Other native forbs monitored by Dr. Patrock hosted similar numbers of pollinating arthropods: Indian blanket-33 species; orange zexmenia-31 species; and, awnless bush sunflower-32 species. These numbers clearly indicate the importance of native forbs.

Loss of plant diversity, especially of flowering forbs because of exotic grass dominance, appears to have considerable implications for loss of arthropod diversity. In turn, this change likely has negative impacts on many insect-dependent wildlife species such as quail, as well as on other important ecosystem-level processes such as pollination and nutrient cycling. Arthropods may be the most telling indicator of ecosystem change resulting from exotic grasses coverage. They just may be the "canary in the coal mine" when it comes to native habitats and the effects of exotic grasses.


Native bee on Indian blanket.


Pipevine swallowtail on Rio Grande clammyweed.