

Parasitoids Released in Benin Against *Maruca vitrata* Pest

In Benin, local farmers and project scientists with the Feed the Future Legume Innovation Lab project *IPM-omics: Scalable and Sustainable Biological Solutions for Pest Management of Insect Pests of Cowpea in Africa* released almost 49,000 adult parasitic wasps (32,000 *Therophilus javanus* and 17,000 *Phanerotoma syleptae*), which work in synergy to destroy *Maruca vitrata* larva and caterpillars that can wreak havoc on cowpea crops in West Africa. Cowpea is a major food security crop in West Africa that rarely achieves its full yield potential in the field due to insect pests, which are the greatest biotic constraint to cowpea production.



The *Therophilus javanus* wasp

Therophilus javanus, a wasp, operates as an ovo-larval parasitoid, which lays its own fertilized egg in *M. vitrata*'s egg. As the *T. javanus* wasp develops, it consumes and destroys the *M. vitrata* egg, killing the insect pest at the very beginning of its lifecycle and breaking the pattern of cowpea destruction with every *M. vitrata* egg it infests. This wasp then perpetuates its destruction of *M. vitrata* through mating and the laying of its own eggs in *M. vitrata* eggs found on cowpea leaves. With decreased destruction of cowpea

flowers and pods through insect pests, the cowpea plants live to harvest, providing food and a source of income to the planting farmer.

Phanerotoma syleptae is a sturdier larval parasitoid that can detect the presence of caterpillars of *M. vitrata* inside cowpea flowers and pods. After mating, these *P. syleptae* wasps quickly locate and inject fertilized eggs into the *M. vitrata* caterpillar; these embryos then feed on the caterpillar, being careful not to destroy its vital organs until they're ready to emerge. At full growth, the *Phanerotoma syleptae* emerge from the caterpillar's body, which they have consumed in their own development, and in act of emergence from the *M. vitrata* caterpillar.

Releasing both biocontrol agents helps ensure the maximum damage to *M. vitrata* during its early developmental cycles, helping to stop the destruction of cowpea plants by destroying *M. Vitrata* offspring before they reach maturity and continue to spread destruction throughout the cowpea field.

The parasitoids were released with the participation of local communities in six regions of Western Benin on patches of a wild alternative host for the pod borer, where the pest



A farmer in southern Benin releases *Maruca vitrata* parasitoids as part of Feed the Future's Legume Innovation Lab project, *IPM-omics: Scalable and Sustainable Solutions for Pest Management of Insect Pests of Cowpea in Africa*

feeds and reproduces during the off season, ready to invade cowpea fields at the onset of the cropping season.

In conjunction with the releases, project scientists conducted practical training on releasing pod borer parasitoids and monitoring their establishment with farming communities to explain the basic principles and rules of biological control and the releases campaigns in their communities. In particular, farmers learned about the need to refrain from applying inappropriate chemical pesticides during and soon after the release time to protect biocontrol agents. Instead, the farmers were taught that the use of alternative pest control in the form of biopesticides, such as neem extracts, which are also part of this project's sustainable integrated pest management work, are compatible with the action of the biological control agents.

Preliminary field data indicated a good establishment by both biocontrol agents just a few months after their initial releases.

Project scientists expect these parasitoids to establish on patches of wild vegetation where they were



Project scientists teach farmers about the biocontrol release of parasitoids on their fields to help ensure their safe distribution throughout the fields for maximum pest management.

released and produce several generations of offspring, increasing the population and colonizing neighboring patches of host plants for *M. vitrata*. With the onset of the rainy season and the cowpea cropping seasons, the parasitoids will follow the *M. vitrata* populations migrating to cowpea fields. Scientists anticipate a 30 to 50 percent reduction of *M. vitrata* damage, depending on such local conditions as rainfall patterns, planting dates, and cowpea varieties.

This effort is part of the overall IPM strategy for controlling cowpea pests that includes

using resistant varieties and the judicious use of pesticides (eventually replaced with locally produced biopesticides) along with modern ICT approaches to empower low-literacy farmers to make informed decisions about pest control options.

Releases such as these follow detailed research studies on the *M. vitrata* and other pest population in West Africa, both during and outside the cowpea cropping cycles, to establish the location of *M. vitrata* and other pest populations throughout the year to determine when and where cowpea farmers should intervene with pest control strategies to the greatest effect.

With the parasitoids released, cowpea farmers in West Africa can anticipate fewer field losses due to pest damage, a greatly anticipated effect for the men and women who rely on cowpea harvests to feed their families and increase household income.

