SAPPA GOOD PRACTICE GUIDE

Management of African bollworm in pecan orchards.

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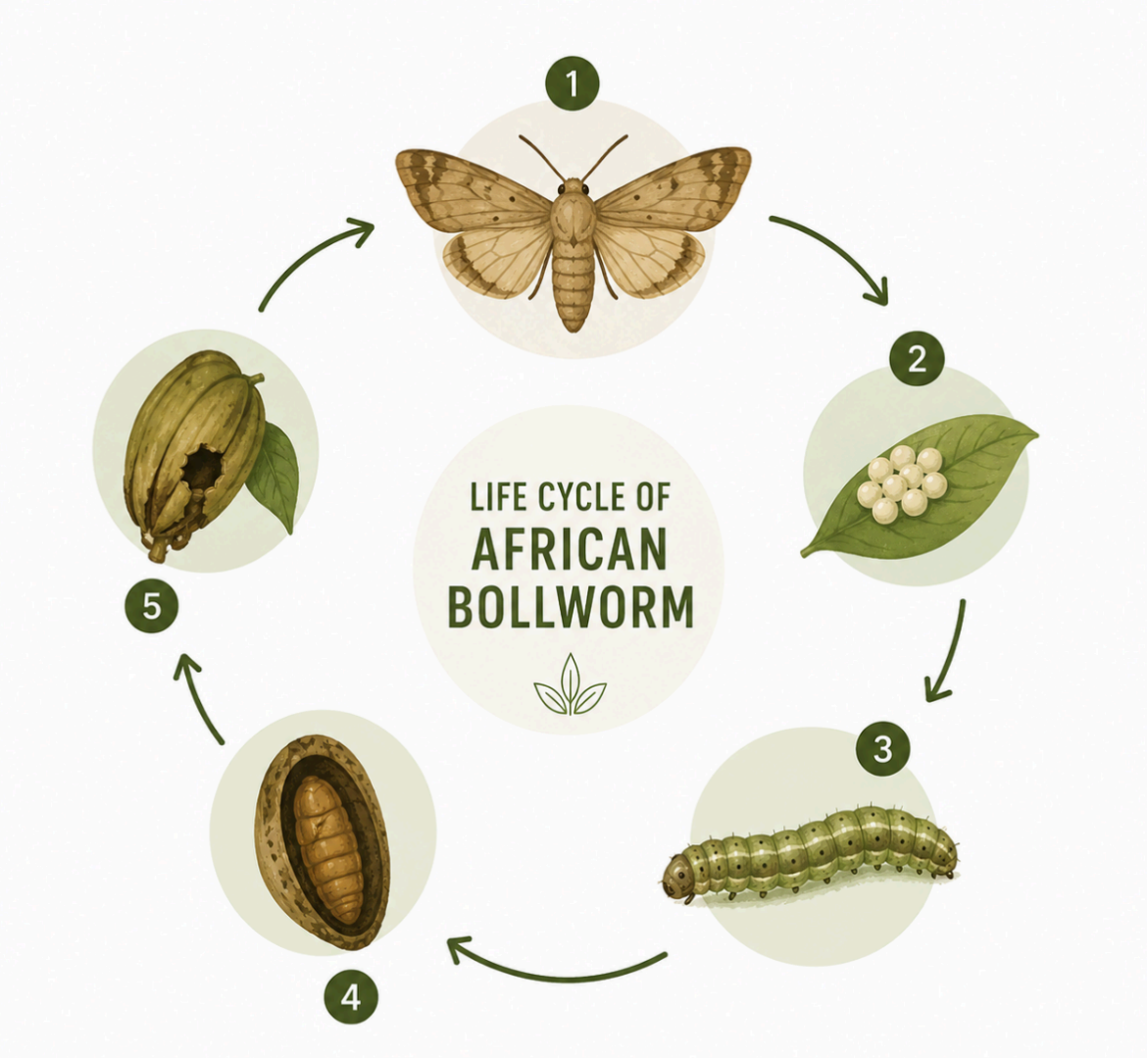
African bollworm (*Helicoverpa armigera*) is a widespread moth pest that occurs on many South African tree and field crops. Crops and other host plants surrounding pecan orchards influence local moth pressure in pecan orchards, particularly as these plants flower, grow and mature. Bollworm larvae preferentially feed on flowers and young, actively growing plant parts, including buds, developing fruit or nuts, and new vegetative growth.

African bollworm develops through four main life stages: egg, larva, pupa and adult moth. Eggs are laid on suitable plant tissue and hatch into larvae, which pass through several larval growth stages while feeding. Mature larvae leave the plant and pupate in the soil. Adult moths emerge from the pupae, mate and lay eggs, beginning the next generation.



Identification

Larvae can grow to 40 mm long and vary considerably in colour, from yellow-green to almost black. A distinctive whitish stripe running lengthwise along each side of the body can assist with identification.

Adult moths are light to golden-brown, with a wingspan of approximately 35 – 40 mm. A slightly darker band extends across the forewings, with a darker spot near the center of each wing.

Integrated Pest Management of the African bollworm

Integrated Pest Management (IPM) combines prevention, monitoring and targeted intervention to manage African bollworm effectively while reducing unnecessary pesticide use. The aim is to understand when pest pressure is increasing, detect the pest early and only intervene when necessary, using the most appropriate control option at the correct time. Where intervention is required, biological and chemical control options should be integrated to reduce reliance on any single control method and support effective long-term pest and resistance management.

PREVENTION

- Know what is happening around your orchards. Be aware of and, where practical, monitor known surrounding host crops, particularly when they are flowering or producing reproductive growth. As these hosts mature, are harvested or become unsuitable, moth pressure in nearby pecan orchards may change.

- Understand the vulnerable period. Research conducted by SAPPA has shown a strong seasonal pattern in adult moth activity from August to October.

- Maintain good orchard hygiene. Maintain orchard hygiene and remove damaged or infested plant material where practically appropriate. African bollworm larvae pupate in the soil, where pupae can remain until adult moths emerge. Orchard-floor management and sanitation may therefore help reduce opportunities for pest carry-over, although moths can also move into orchards from surrounding host plants

- Protect natural enemies. Parasitoids, predators and pathogens can contribute to suppression of African bollworm. Avoid unnecessary broad-spectrum insecticide applications, particularly early in the season, as these can disrupt beneficial insect populations. Conservation of natural enemies is an important component of IPM.

MONITORING

African bollworm monitoring should begin before obvious damage is present. Monitoring should focus on adult moth activity, followed by targeted scouting for eggs, young larvae and fresh feeding damage. Once large larvae and damaged nutlets are readily visible, the most effective intervention window may have passed.

Pheromone lures for monitoring male moth activity

Sex pheromone lures placed in bucket traps mimic the pheromone released by female moths and are used to monitor male African bollworm moth activity. A dichlorvos block can be used in the trap, according to product directions, to kill captured moths and preserve the wing markings needed for identification. Pheromone traps provide an early indication of moth presence and help identify seasonal activity and flight peaks. Trap catches do not directly indicate how many larvae are present or how much damage will occur. Instead, an increase or peak in moth catches should be used as a trigger to intensify orchard scouting and determine whether intervention is required. Correct timing is important because available control options are most effective when susceptible larvae are still small and exposed.

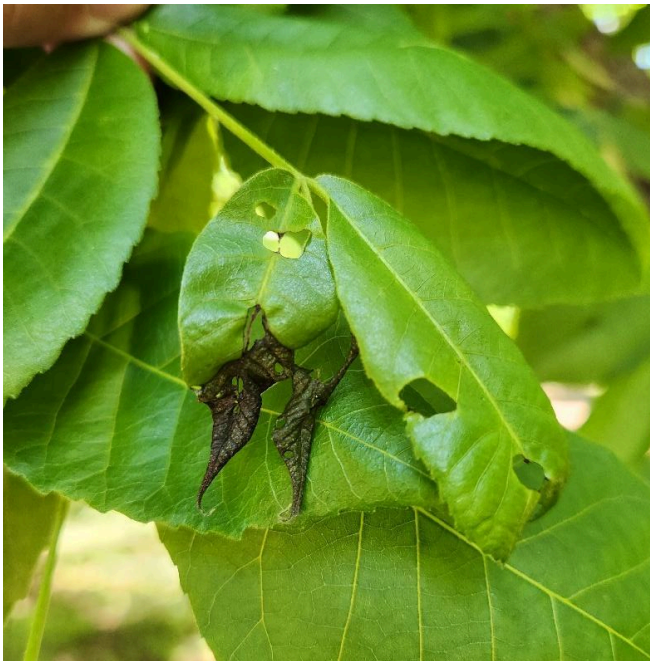
Several trade names and formulations of African bollworm (*Helicoverpa armigera*) pheromone lures are commercially available, and recommendations for trap type, placement, density, and lure replacement interval may differ between products. Always follow the instructions provided for the specific lure and trap system being used. As a general guideline, approximately one pheromone trap per 5 to 10 ha can be used for monitoring, with lures commonly replaced every 4–6 weeks. Traps should be checked regularly and maintained throughout the monitoring period.

Yellow bucket trap

Damage Symptoms

Physical orchard scouting should accompany pheromone monitoring. During the susceptible period, inspect orchards and developing nutlets for eggs, young larvae and fresh feeding damage. Affected nuts show a distinct, relatively large round entry hole**,** with larvae feeding on the developing contents of the nut. Feeding at this early stage stops further nut development and results in crop loss.

African bollworm egg on a pecan leaf

Intervention

Several chemical and biological plant protection products are registered for African bollworm control on pecans. Where intervention is required, applications should target the susceptible stage, and repeat applications should be based on continued monitoring and the registered product label.

The registered chemical options represent three Insecticide Resistance Action Committee (IRAC) mode-of-action groups, which is important for selecting actives and managing insecticide resistance. African bollworm has a high risk of developing insecticide resistance. Because bollworm feeds on many crops, the same population may be exposed to insecticides used on different crops as it moves through the production landscape. Bollworm is also highly adaptable, and resistance to several insecticide groups, including pyrethroids

and emamectin benzoate, has already been reported internationally. Repeated use of the same mode of action can therefore quickly select for resistant individuals and reduce the effectiveness of available control options.

Chemical control

Active ingredient	IRAC Group	How it works	Practical implication
Emamectin benzoate	6	Acts on glutamate-gated chloride channels, disrupting nerve and muscle function and causing paralysis.	Has translaminar activity in treated plant tissue. Best targeted at small, actively feeding larvae while they are still exposed.
Chlorantraniliprole + lambda-cyhalothrin	28 + 3A	Chlorantraniliprole disrupts calcium regulation in muscles, resulting in feeding cessation and paralysis. Lambda-cyhalothrin disrupts nerve signalling and provides rapid contact activity.	Combines two different modes of action. Correct timing and coverage remain important.
Alpha-cypermethrin	3A	Disrupts sodium channels in the nervous system, resulting in rapid knockdown, paralysis and death.	Primarily contact activity; good coverage of the target is important.
Canola oil + garlic juice extract + pyrethrin extract	3A for pyrethrin	Pyrethrins disrupt sodium channels in the insect nervous system, producing rapid knockdown. Other components may contribute through physical or behavioural effects.	Best suited to exposed larvae; thorough spray coverage is important for effective contact activity

Biological control

Nucleopolyhedroviruses (NPVs) are naturally occurring, host-specific viruses that infect bollworm larvae. Unlike contact insecticides, the virus must be eaten by the larval stages. This makes early application, good spray coverage and targeting small, actively feeding larvae particularly important.

Biological control agent	Type	How does it work?	Practical implication
Helicoverpa armigera nucleopolyhedrovirus (HearNPV)	Baculovirus	Virus particles must be eaten by the larva. Once ingested, the virus infects the larva, multiplies within its tissues and eventually kills it. Infected larvae usually stop feeding as the infection progresses.	Best targeted at newly hatched and small, actively feeding larvae. Thorough coverage is important to maximise ingestion before larvae enter developing nuts.
Bollworm nucleopolyhedrovirus (NPV)	Baculovirus	Works through ingestion. Larvae consume virus particles deposited on treated plant surfaces; the virus then infects and multiplies within the larva, ultimately causing death.	Apply early, when young larvae are exposed and actively feeding. Good coverage and correct timing are particularly important because the virus must be ingested.

KEY TAKE HOME MESSAGE

Monitor early and target young larvae. Use pheromone traps to identify moth activity and flight peaks, then intensify physical scouting for eggs, young larvae and fresh damage. Where intervention is required, act before larvae enter developing nuts, follow the registered product label and rotate between different IRAC groups.