



Fall Armyworm: Fighting the Pest in India

Fall Armyworm (FAW), or *Spodoptera frugiperda*, is an insect that is native to tropical and subtropical regions of the Americas. In its larva stage, it can cause significant damage to crops, if not well managed. It prefers maize but can feed on more than 80 additional species of plants, including rice, sorghum, millet, sugarcane, vegetable crops, and cotton. FAW was first detected in Central and Western Africa in early 2016 and has quickly spread across virtually all of Sub-Saharan Africa.

- The pest was identified in Karnataka in May and has reached as far as West Bengal and Gujarat since then. The devastating insect-pest has been identified for the first time on the Indian subcontinent. It has the potential to spread quickly not only within India but also to other neighboring countries in Asia, owing to suitable climatic conditions. Karnataka is one of the largest maize producers in India, and maize is the third most widely produced cereal in the country.
- The Directorate of Plant Protection, Quarantine & Storage issued an advisory to the agricultural departments of the States affected by the Fall Armyworm. It called for extensive surveys to track the pest's spread. It named a parasitoid that could be released to kill the eggs of the caterpillar. Further, it also suggested pesticides against the armyworm, such as Lambda cyhalothrin, but cautioned that they shouldn't be used simultaneously with the parasitoid.

Reasons for the spread

- **Climate change** as well as **rising trade and transportation between infected and non-infected regions** as the reasons behind the invasion of Fall Armyworms, which potentially puts the world's food security at risk. Hot and humid temperatures (between 20 and 32 Degrees Celsius) and long dry spells are favourable factors for Fall Armyworm reproduction.
- Among the several reasons behind the thriving armyworm population are that it **reproduces rapidly**, and the **subcontinent's tropical and sub-tropical** climates allow it to feed all year round.
- The entry of invasives has been rising the world over in the last few decades, and one likely reason is **increased trade**. According to some research papers, if the trade volume between the source country and vulnerable destination is more than \$500 million, there is a greater possibility of the vulnerable place importing the worm.

Controlling the Pest

- The most popular methods of containing the pest include the **use of GM crops and pesticides**, however, some armyworms have developed resistance to these tactics and are continuing to destroy crops.
- **Natural approaches**, including breeding predators such as wasps, to be released into fields when necessary, as well as developing a "germ warfare" that isolates diseases to which the caterpillar is prone, are being explored by the scientists.

Other Cases of Pest Infection in India

- According to the data from National Bureau of Agricultural Insect Resources (NBAIR) list Australia's eucalyptus gall wasp, Sri Lanka's sapota seed borer, the South American tomato pinworm, and the papaya mealybug are some of the several invasive species that have entered India since 2001.
- In 2008, the **papaya mealybug**, a central American native, entered India and destroyed

plantations in several States. Apart from the Papaya trees, it survived on over 80 other plants, including mulberry, tapioca, hibiscus and several fruits. Within two years, the pest spread to over 50 hectares of mulberry in Tamil Nadu, the crop on which silkworms feed. The Cocoon productivity of Tamil Nadu silk industry dropped by over 60%.

- The thick wax coating on the insect's body made it resistant to chemical insecticides. The insect also killed some of the natural enemies the pest had in India, such as ladybird beetles. Natural predators of the species were imported from its native country. It caused damage worth ₹1,500 crore every year to farmers during the early days. The pesticide sprays caused significant damage to the environment.
- In 2014, the **tomato pinworm**, or *Tuta absoluta*, a South American moth, was spotted in Karnataka. Within a couple of years, it had reached Maharashtra, Gujarat, Delhi and other regions, where it caused widespread damage to tomato crop.

Concerns

- Invasive species cost the global economy \$1.4 trillion every year. Yet infestations generally go undetected or untreated in their initial stages, which prolongs their spread and makes control more difficult.
- Such alien species which migrate to a new geography from their native lands can be a huge risk to both agriculture and wildlife. They could be insects, trees, weeds or viruses. Many of them tend to die out in new environments. Some become naturalised, like a few eucalyptus species have in India. Naturalised aliens maintain their population and do not pose a great risk to biodiversity.
- But a small percentage of aliens, like the Fall Armyworm, turn invasive, which means they spread uncontrollably. The absence of natural predators from their original homes allows them to disrupt ecosystems and cause massive economic losses.

India's Quarantine System

- A quarantine system, under which imports of grains and plants that can host such insects are inspected at shipping ports, airports and land border crossings is the first line of defence taken by the countries across the world.
- In India, quarantine responsibility lies with the Directorate of Plant Protection, Quarantine & Storage (headquartered in Faridabad, Haryana). The short staffed directorate and the lack of a strong legislation have made the task of policing borders difficult in India.
- The quarantine system in India is governed by the Plant Quarantine (Regulation of Import into India) Order of 2003, which is notified under the Destructive Insects and Pests Act of 1914.
- Under the Plant Quarantine Order, grains or plant material can come to India only through notified points of entry. These include 44 sea ports, 23 airports, 19 land frontier stations, as well as foreign post offices and container depots. Imports at each of these points is to be inspected by officers from the Directorate of Plant Protection.

Problems with the Quarantine System in India

- The directorate lacks key experts at some of these ports. Some quarantine stations do not have nematologists (scientists who study roundworms) while others are missing virologists. Even when virologists are present, they may not have equipment such as ELISA testing kits for detecting viruses. (ELISA or enzyme-linked immunosorbent assay is a plate-based assay technique designed for detecting and quantifying substances such as peptides, proteins, antibodies and hormones.)
- Also, there are gaps in regulating the import of plant materials by individual passengers. Under the Quarantine order, around 2 kg of cut flowers and dry fruits are exempt, but any seeds or larger quantities of flowers must be accompanied by a certificate declaring that they are free of pests and microbes. If not, passengers arriving at international airports are required to declare them. The long and cumbersome process is hardly followed by the passengers.
- The Destructive Insects and Pests Act is subsidiary to the Customs Act, 1962, because of which quarantine officers must wait for customs officers to flag suspicious goods before they can check them. Quarantine officials do not have the power to search and seize.

Way Forward

- A stronger quarantine system might not prevent the entrance of fall armyworm in India, but it can certainly reduce the risk of introduction.
- Prominent signboards in airports warning passengers of the dangers of bringing exotic fruits and flowers into the country can create awareness about the species.
- Better training of plant quarantine officers and for providing them with equipment to detect dangerous species can also reduce the chances of the entrance of invasive plants in the country.
- India can also learn from a country like Australia that has employed sniffer dogs to detect agricultural material on passengers. It also has scanners that can detect organic material such as seeds in baggage. Also, it has the provision of stringent penalties for the people who violate the rules.
- India also needs to strengthen its “domestic quarantine” imposition (prevent the pest from spreading to other States after initial reports, such as imposing restrictions on the movement of plant material from the infected State).
- The Government needs to provide support to the farmers through Integrated Pest Management to sustainably manage FAW in their cropping systems.

Agricultural Biosafety Authority of India

- After widespread recognition of the lapses in the current quarantine system, a new Bill called the Agricultural Biosecurity Bill was tabled in the Lok Sabha in 2013.
- The Bill borrowed from some of the most stringent quarantine regimes in the world, such as the U.S., Australia and New Zealand.
- Unlike India’s Directorate of Plant Protection, Quarantine and Storage which comes under the Ministry of Agriculture, the Bill envisaged setting up an Agricultural Biosafety Authority of India as an autonomous body following the lines of the U.S.’s Animal and Plant Health Inspection Service (APHIS) and Australian Quarantine and Inspection Service (AQIS).
- It also provided wider powers to the Quarantine officers.
- The Bill empowered the authority to penalize States for not following its directions in controlling an invasive species outbreak.
- However, this Bill has lapsed. Introduction of similar legislation is needed to improve the quarantine facilities in the country.

From the Mughals to the British and the Portuguese, India has traditionally been extra vulnerable to invasive species because of its history of political invasions. The Lantana species, camara, which was first introduced by the British as an ornamental hedge in the 19th century is one such example. Today, it is widespread across India and threatens biodiversity by taking over forest understorey and grabbing resources from other species. Managing the invasive species like the Fall Armyworm at a single location cannot serve the purpose of destroying it. Coordination across the region and country boundaries is the need of the hour.