

# Forecasting, monitoring and management of several agricultural pests under surveillance in the province of Quebec

Saguez J.<sup>1,\*</sup>, Fréchette I.<sup>1</sup>, Neau M.<sup>1</sup>, Toma C.<sup>1</sup>, Légaré J-P.<sup>2</sup>, Blondlot A.<sup>3</sup>, Grenier P.<sup>3</sup>, Gagnon A-È.<sup>4</sup>

<sup>1</sup> CÉROM, Saint-Mathieu-de-Beloeil, Qc (Canada); <sup>2</sup> MAPAQ, Quebec City, QC (Canada); <sup>3</sup> Ouranos, Montréal, Qc (Canada); <sup>4</sup> Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, Qc (Canada)  
Contact: \* julien.saguez@cerom.qc.ca

The province of Quebec (Canada) represents the northernmost area of distribution of several pests including lepidopteran and hemipteran pests. Due to cold winter conditions, several of them migrate annually in spring to Quebec, flying from their native distribution area. Using bio-climatic models, we also identified non-native pests that could invade the province and adapt to Quebec's northern climate. In a context of climate change, we evaluated their potential establishment and determined if they could overwinter at our latitudes in the near future. We present here forecasting models, scouting and monitoring methods currently used or that could be used in Quebec to manage these pests.

## True armyworm

*Mythimna unipuncta* (Haworth)  
(Lepidoptera: Noctuidae)



**Status:** Occasional pest, does not overwinter, migrates each year, not established.

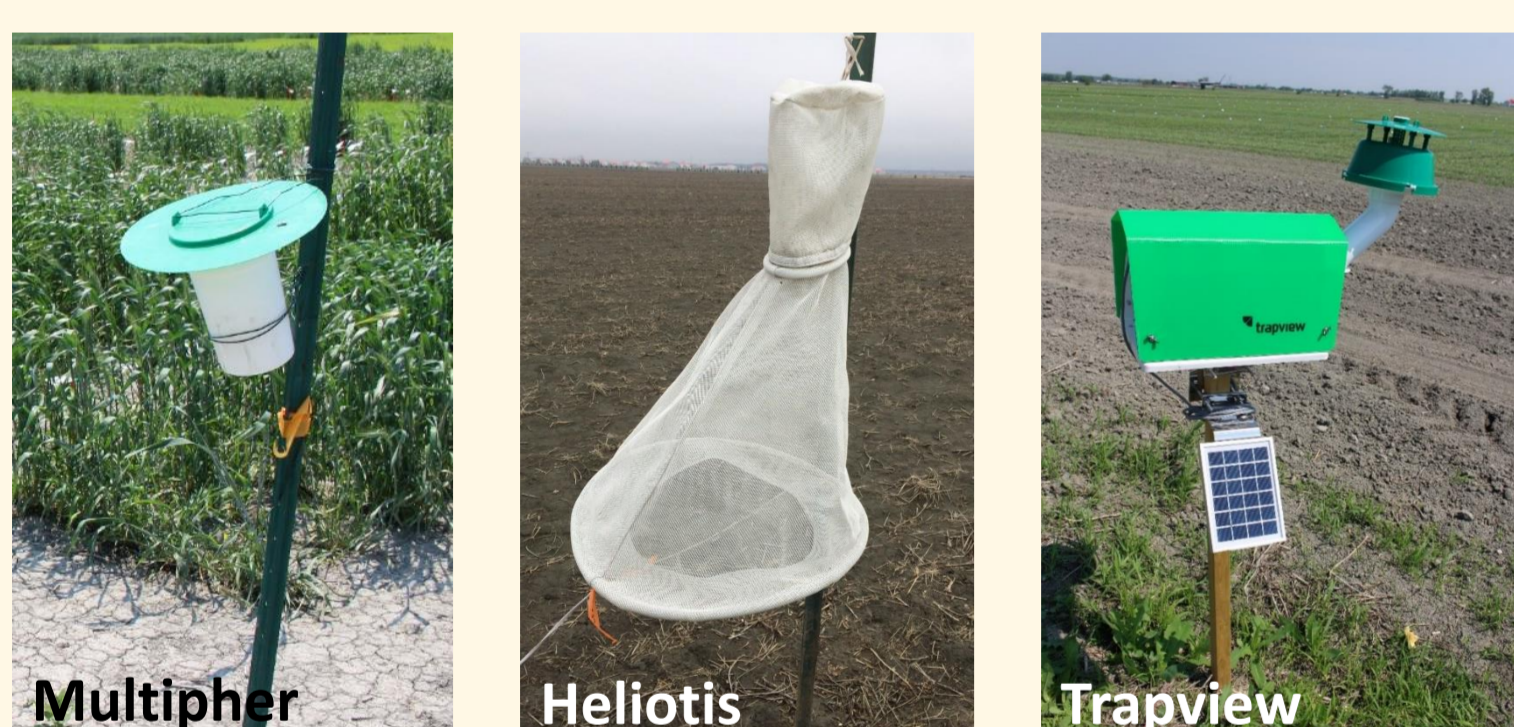
**First mention in Quebec:** 1980's.

**Crops:** Corn, cereal, grass, soybean.

**Damage:** Caterpillars feed on leaves. Sporadic in Quebec, outbreaks difficult to predict.



**Monitoring:** Pheromone traps (Multipher, Heliotis, Trapview).



**Monitoring period:** May-July.

**Economic threshold:**

Depends on the crop.

**Management:** Natural enemies (tachinid flies, parasitoids), virus. Occasional insecticide treatment.



**Climate change impacts:** Each year, populations found in Quebec depend on the winds occurring during moth migration in spring. Models should help to predict their arrival in Quebec and their potential occurrence in fields.

## Soybean aphid

*Aphis glycines* (Matsumura)  
(Hemiptera: Aphididae)



**Status:** Occasional pest, does not overwinter, migrates each year, establishment not confirmed.

**First mention in Quebec:** 2001.

**Crops:** Soybean

**Damage:** Nymphs and adults pierce leaves and suck phloem sap. Could transmit viruses. Sporadic in Quebec, outbreaks difficult to predict.

**Monitoring:** Scouting.



**Monitoring period:** June-August

**Alert/economic threshold:**

250 aphids/plant.

**Management:** Good control by natural enemies (ladybirds, soldier bugs, lacewings, aphid midges, parasitoids,...) and entomopathogenic fungi.



Development of soybean lines resistant to *A. glycines* (varietal selection). Significant reduction of foliar pesticides during the last years. Insecticide treatments are occasional in Quebec.

**Climate change impacts:** High temperatures can be deleterious for aphids. Populations may reduce, but warmer winters could allow aphids to overwinter and cause damage earlier on soybean.

## Western bean cutworm

*Striacosta albicosta* (Smith)  
(Lepidoptera: Noctuidae)



**Status:** New pest, migrates each year, not (yet) established, could potentially overwinter.

**First mention in Quebec:** 2009.

**Crops:** Corn, dry beans.

**Damage:** Young caterpillars feed on pollen and silks. Older caterpillars feed on corn ears. First economic damage in 2016. Can reduce corn quality. Favor the development of pathogenic fungi and mycotoxins.

**Monitoring:** Pheromone traps, egg masses, larvae and damage scouting.



**Monitoring period:** July-August.

**Economic threshold:** 5% of corn plants with egg masses or larvae.

**Management:** Bt Corn products (Viptera®). Occasional insecticide treatment. Could be potentially controlled by trichogramas.

**Climate change impacts:** This pest is currently a major concern in Ontario and will be one soon in Quebec. In the future, this pest could overwinter, attack corn earlier and potentially increase its distribution area in Quebec.

Because management with insecticide is difficult (only efficient before larvae enter in ears), new methods need to be developed to control this pest.

## Brown marmorated stink bug

*Halyomorpha halys* (Stål)  
(Hemiptera: Pentatomidae)



**Status:** Accidentally introduced, established in Montreal. Potential invasive pest in field crops.

**First mention in Quebec:** 2014.

**Crops:** Corn, soybean + others.

**Damage:** Nymphs and adults feed on different parts of the plant (stem, fruits, pods, ...). No damage observed yet in field crops in Quebec.

**Monitoring:** Attractive bait traps, sweep nets and visual.



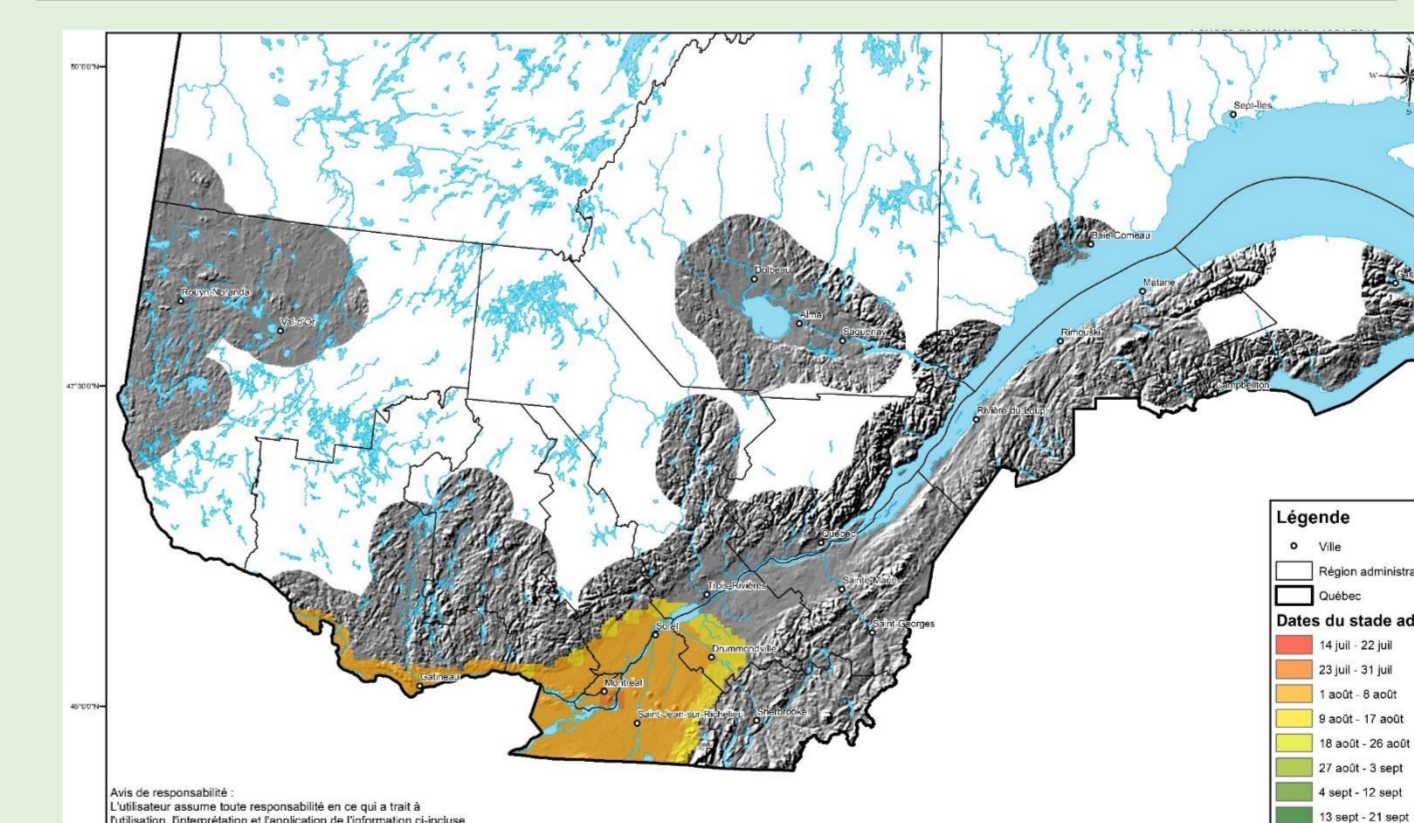
**Monitoring period:** June-October.

**Alert/economic threshold:**

Not yet established for traps. In soybean: 2.5-3.5 bugs/15 sweeps.

**Management:** No management required currently in Quebec.

**Potential adults distribution area in Quebec (2041-2070 horizon):**

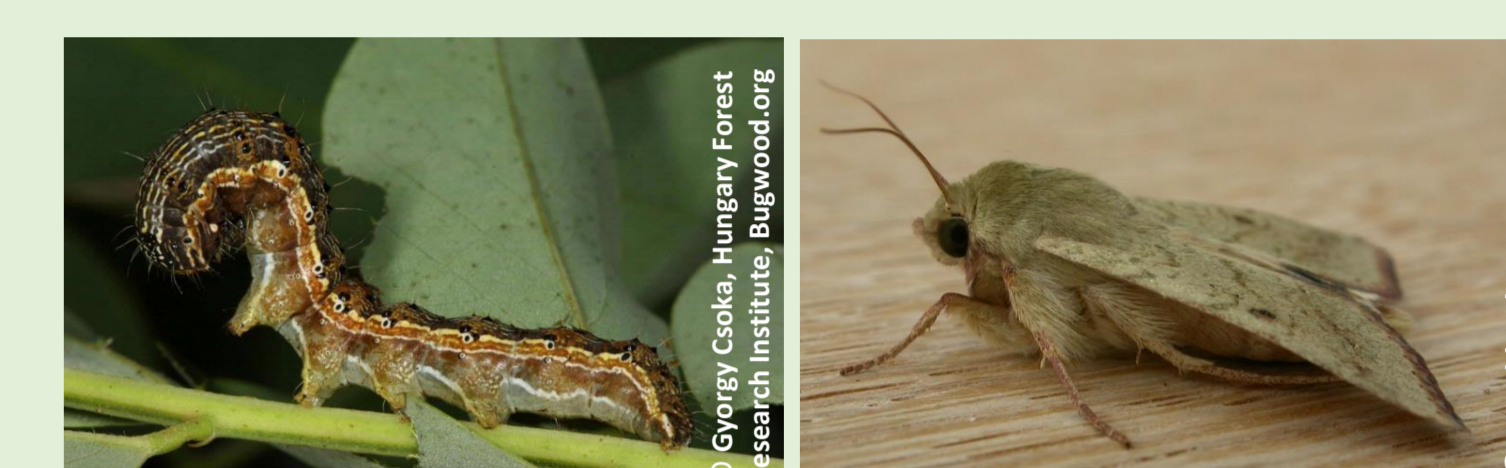


Currently it could not develop from eggs to adults in fields. In the future, adults would appear from end of July to mid of August.

**Climate change impacts:** Crops will be more vulnerable over longer periods. Risk of nuisances for humans.

## Corn earworm/ cotton bollworm

*Helicoverpa armigera* (Hübner)  
(Lepidoptera: Noctuidae)



**Status:** Not yet a pest. Potential invasive pest in Quebec if introduced by trading exchanges.

**First mention in Quebec:** Not yet reported.

**Crops:** Corn + others.

**Damage:** Not observed in Quebec. Could significantly reduce quality and yields in several crops.

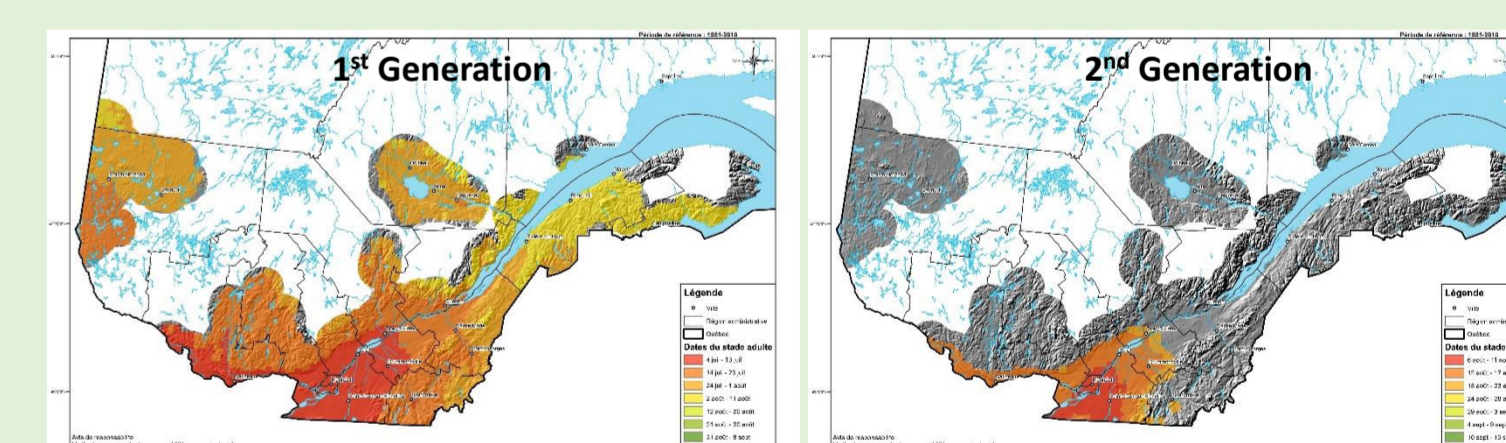
**Monitoring:** Pheromone traps.

**Monitoring period:** Undefined for Quebec.

**Economic threshold:** Undefined.

**Management:** No management required currently in Quebec. Bt plants and insecticides are used in other countries where this pest is a concern for crops protection.

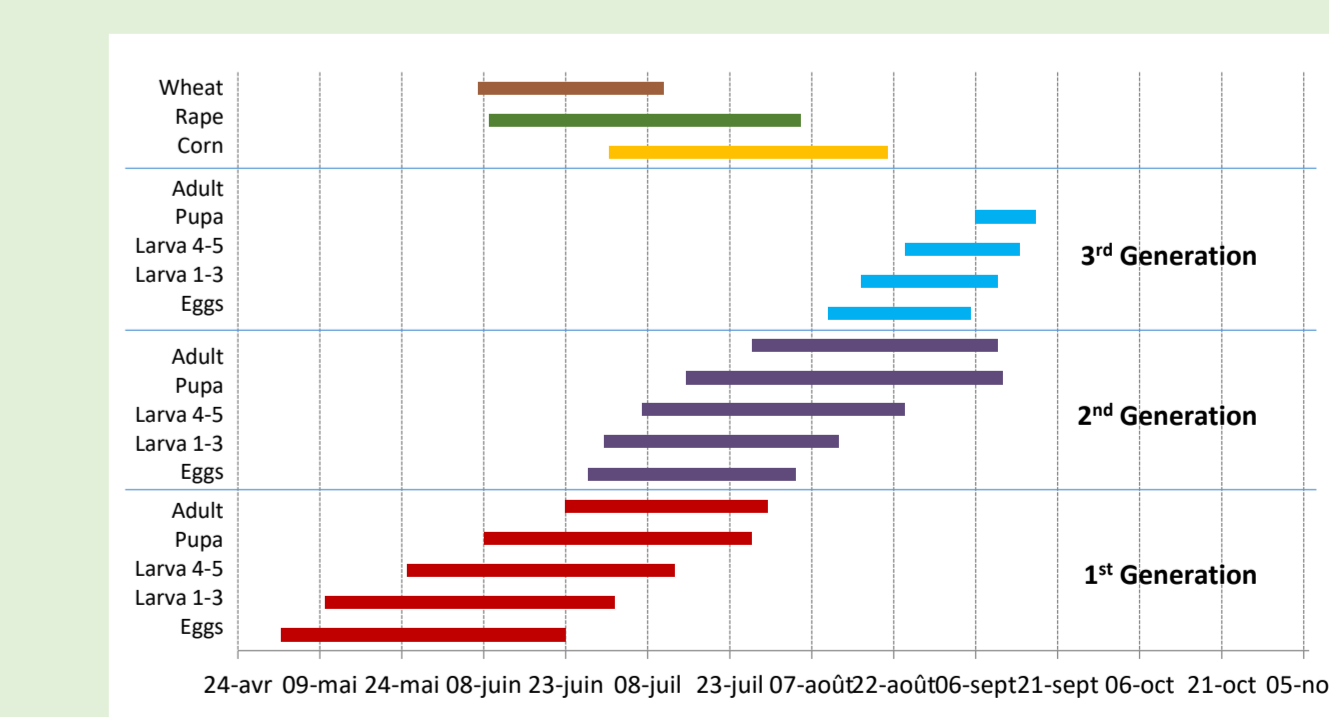
**Potential adults distribution area in Quebec (2041-2070 horizon):**



We could expect at least one adult generation in each region and two in southern regions.

**Climate change impacts:**

Crops would be exposed to several generations of this pests.



It could be interesting to search control methods in analog regions to anticipate crop protection.

## Annual migrant pests in Quebec

## Potential exotic invasive pests in Quebec

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