BULLETIN D'INFORMATION | GRANDES CULTURES

N° 4, 15 November 2022

List of corn hybrids available for the 2023 season without insecticidal seed treatments (with or without fungicides) or certified organic

Important : This newsletter may be updated during the fall to complete the table with commercially available corn hybrids. To access the most up-to-date version of this newsletter, please keep its link: https://www.agrireseau.net/rap/documents/93339.

Based on integrated pest management of maize seedlings, insecticide-treated seed should be used only when:

- the presence and pressure of seedling pests in a field warrants it;
- the field has risk factors and all other prevention and control methods have been shown to be inadequate.

With this in mind, the Ordre des agronomes du Québec (OAQ) has published *the Reference Grid and Guideline for the Recommendation on the Use of Insecticidal Seed Treatments in Corn and Soybeans*. The use of seed treatments should be the subject of an agronomic recommendation based on risk factors specific to the fields of each farm business.

List of corn hybrids without insecticidal seed treatments (with or without fungicides) or certified organic

Agricultural businesses planning to plant corn with untreated seed (with fungicides only) in 2023 should place their order in the fall of 2022 or early winter of 2023. Table 1 shows, for each seed supplier, the corn hybrids available with fungicide-only coatings, as well as the certified organic hybrids.

The deadline for ordering these seeds as well as links to access the 2023 seed company catalogues online (if available) are also indicated. The Pest Health Warning Network (PAR) would like to thank seed suppliers for their cooperation in developing the content of this table.

Table 1: List of corn hybrids available for grain and forage in 2023 without insecticidal seed treatments (with or without fungicides) or certified organic

Name of Seed Supplier*	Deadline to order	Corn hybrids available without insecticidal seed treatments
BRIEF SEEDS (click here to access the seed guide)	No deadline	*With fungicide seed treatments only:* B79H45AM B82R52AM B83R36AM B85V67AM B91T25AM B93C41AM B93C41AM B95R46AMXT 96H83AM B98D25Q B95N59SXE
CROPLAN BY WINFIELD (click here to access the seed guide)	February 1, 2023 (no seed treatment) December 16, 2022 (fungicides only)	*Without seed treatments:* CF910SCONV CP2790CONV CP3166CONV CF430CONV CP3575CONV CP4188CONV *With fungicide seed treatments only:* CP1440VT2P, CF913SRR, CP2288VT2P, CP2315VT2P, CP2585VT2P, CP2790VT2P, CP2851VT2P, CP2965VT2P, CP2972SS, CP3166VT2P, CF932SRR, CP3341SS, CP3490VT2P, CP3575SS, CP3575VT2P, CP3720TRE, CP3735SS, CP3735VT2P, CP3823SS, CP38980VT2P, CP4188SS, CP4188VT2P, CP4265VT2P, CP4100SVT2P
DE DELL (click here to access the seed guide)	No deadline	Grain corn: the majority of hybrids are available without seed treatments or with fungicidal seed treatments only; 6 organic hybrids are available. Corn silage: the majority of hybrids are available without seed treatments or with fungicidal seed treatments only; No biological hybrids are available.
DEKALB (click here to access the seed guide)	No deadline	The majority of corn hybrids are available with fungicide seed treatments only.
HORIZON SEEDS (click here to access the seed guide)	December 16, 2022	*Without seed treatments:* HZ 1840 HZ 2315 HZ 3015 HZ 3260 HZ 3676 HZ 991 ***With fungicide seed treatments only:*** HZ 1840, HZ 2315, HZ 3015, HZ 3260, HZ 3676, HZ 991, HZ 1451, HZ 1490, HZ 1685, HZ 1710, HZ 797GT, HZ 3295, HZ 3434, HZ 4097, HZ 1052GT
MAIZEX (click here to access the seed guide)	November 30, 2022	All corn hybrids are available with fungicide seed treatments only.
DLF (click here to access the seed guide)	December 15, 2022	*Without seed treatments:* *PS 2332* *PS 2790* *PS 2815* *PS ExPect LFF* *With fungicide seed treatments only:* All corn hybrids are available with fungicide seed treatments only.

Name of Seed Supplier*	Deadline to order	Corn hybrids available without insecticidal seed treatments
PIONEER (click here to access the seed guide)	No deadline, but preferable to order before December 20, 2022	*Without seed treatments:* P8407 P9188 P9301 P9492 P9998 P0075 P0157 *With fungicide treatment only:* P7005AM P7211AM P7389AM P7574AM P7861AM P7955AM P8048AM P8294AM P8294Q P8407AM P8407Q P8537AM P8537Q P8602AM P8736AM P8820Q P8859AM P8859Q P8989AM P9188AM P9188AMXT P9233AM P9233Q P9301AM P9301Q P9316Q P9466AML P9492AM P9535AM P9608AM P9608Q P9624Q P9789AMXT P9815AM P9845AM P9998AM P9998Q P0035AM P0035Q P0075Q P0157AMXT
SAATBAU (click here to access the seed guide)	1er March 2023	*Without seed treatments, with fungicide seed treatments only or organic* Albireo Amello Arcadio Atlantico Cassander Danubio Delicao Egidio Filmeno Isanto Katedralo Leonido Marcamo Primino *Without seed treatments or with seed treatments fungicides only:* Aalborg Aletto
PRIDE SEEDS (click here to access the seed guide)	December 7, 2022	All corn hybrids are available with fungicide seed treatments only.
SYNGENTA (NK) (click here to access the seed guide)	Mid-December 2022	All corn hybrids are available with fungicide seed treatments only.

* Check with your seed supplier to find out if you are eligible for the reseeding guarantee for fungicide-only seed.

Why not use insecticidal seed treatments consistently?

According to screening data conducted in Quebec in recent years, **the systematic use of insecticide-treated seed is not justified**. The majority of corn fields should, therefore, be planted with kernels that are not treated

with an insecticide. Indeed, comparative trials of seed treated and untreated with seed insecticides have shown that "less than 5% of sites had sufficient pest populations to warrant the use of control methods" (Labrie et al., 2020).

In Quebec, the main insects that can attack corn seedlings are wireworms (VAW). Other insects, for which risk factors are known, can also cause problems, but only sporadically. An economic intervention level has been determined for the stocky wireworm (*Hypnoidus abbreviatus*), the predominant species of VAW observed in corn in Quebec. This threshold is three VAWs per trap per week. This species is smaller and less damaging to field crops than species in the genera *Melanotus*, *Agriotes* and *Limonius*, for which the economic threshold is one VAW per trap per week.

From 2017 to 2021, the Field Crops PCR screened 330 fields with a combination of factors deemed conducive to the presence and abundance of VAW. The following table, taken from the RAP Field Crops Information Bulletin *Wireworms: Status Report and Decision Support Tools* of August 9, 2022, presents the percentage of fields that have met the economic action levels by species. Preliminary results for the 96 fields surveyed in 2022 indicate that 4% of fields exceeded the threshold of three VAW/traps, while 8% of fields exceeded the threshold of one VAW/trap for the genera *Agriotes*, *Limonius* and/or *Melanotus*. These results show that the proportion of fields exceeding the economic intervention thresholds is generally low.

Année	% des champs[1] dépassant le seuil de 3 VFF/piège (*Hypnoidus abbreviatus*)	% des champs dépassant le seuil de 1 VFF/piège (*Melanotus*, *Limonius* et/ou *Agriotes*)
2017	4 %	2 %
2018	4 %	3 %
2019	8 %	1 %
2020	3 %	3 %
2021	5 %	5 %

1. Noter que les champs suivis dans le cadre du RAP sont en grande partie sélectionnés sur la base des facteurs favorisant la présence de VFF.

Insects are not the main cause of corn emergence problems. In fact, a decline in corn population resulting from damage by insect pests of seedlings will not necessarily result in a loss of yield. It depends on the percentage of missing plants and their distribution in the field. If the missing plants are evenly distributed throughout the field, scientific studies show that a population loss of 5,000 plants/ha (final population of 79,100 plants/ha) does not affect yield. For more information, see the Grain *Corn Yield and Stand Density fact sheet*.

Large areas treated with insecticides result in significant environmental costs, including water quality and pollinator health. Table 2 presents the Health Risk Indices (HRIs) and Environmental Risk Indices (ERIs) for the main insecticides registered as seed treatments for grain corn and feed corn. These indices take into consideration short- and long-term toxicity to human health and non-target species, including bees, earthworms and aquatic organisms, as well as the mobility and persistence of these products in the environment.

All insecticides used in seed treatment have a high leaching potential and are therefore likely to contaminate groundwater and surface water. The use of many of these active ingredients poses high risks to pollinators. However, chlorantraniliprole (**LUMIVIA)** **and** cyantraniliprole (FORTENZA and FORTENZA ROUGE), although they have a lower SRI, IRE and pollinator risks, are extremely toxic to aquatic invertebrates. The report entitled *Presence of Pesticides in Water in Quebec: Portrait and Trends in Corn and Soybean Zones - 2018 to 2020* (Giroux, 2022) reveals, among other things, that:

- For the four rivers in the core network, the most commonly detected insecticides are chlorantraniliprole and neonicotinoids, including thiamethoxam and clothianidin.
- The detection frequency of chlorantraniliprole increased from 76.3% in 2015-2017 to 99.5% in 2018-2020.

- In recent years, the concentration of chlorantraniliprole has been increasing.
- Exceedances of the criterion for the protection of chronic aquatic life were found for neonicotinoid insecticides, specifically in 46.1% of thiamethoxam samples, 42.2% of clothianidin samples, and 28.3% of imidacloprid samples.

Table 2: Health and Environmental Risk Indices (HRIs) and Other Environmental Characteristics of Key Active Ingredients Used in Insecticidal Seed Treatments in Corn for Grain and Forage

Trade name	Active Ingredient	IRS	WRATH	Persistence in soils	Mobility in soils	Risk to bees	Risk to aquatic invertebrates
CRUISER 5FS	Thiaméthoxame*	62	170	High	High	High	Weak
PONCHO 600FS NIPSIT INSIDE 600	Clothianidine*	66	211	High	High	High	Weak
SOMBRERO 600 FS	Imidaclopride*	4	211	High	High	High	Moderate
LUMIVIA	Chlorantraniliprole**	3	91	High	High	Weak	Extremely High
FORTRESS	Cyantraniliprole**	3	73	Moderate	High	Moderate	High
ACCELERON + Insecticide	Tetraniliprole**	54	170	High	High	High	Moderate

For a detailed description of the toxic effects on health and non-target species, as well as a description of the environmental fate and behaviour of all products registered for seed treatment, you can consult the SAgE pesticides website.

* Regulated active ingredients requiring agronomic justification and prescription (document that accompanies the agronomic justification).
** Active ingredients for which an agronomic prescription is not required for use, but which must nevertheless be the subject of an agronomic recommendation.

Situations in which the use of insecticidal seed treatments may be warranted

The decision to use insecticide-coated seed against insect pests of seedlings should be based on the analysis of different risk factors, the company's agricultural practices and other available control methods. Although the vast majority of fields are not at risk of damage from seedling pests, VAWs are most likely to attack corn seedlings, followed by cornseed maggot. Decision-making is based primarily on the risk factors associated with these two pests. These are addressed in the Guideline and Decision Tree on pages 26-27 of the *Reference Matrix and Guideline for the Recommendation on the Use of Insecticidal Seed Treatments in Corn and Soybeans*. Although less common, other pests, for which risk factors are known, can also attack corn seedlings.

Here are the main risk factors, preventive methods and control methods for these different insects.

Wireworms

VAWs are attracted to the release of CO2 produced by germinating grains. They can drain the contents of the kernels, feed on the roots and other underground parts of the seedlings, leading to stunted growth, wilting or death of the plants.

Risk Factors

- **Infestation history** : This is a very important risk factor. A field that has already experienced an infestation of these insect pests is at higher risk of further infestations.
- **Species(s) present**: The species of VAW found during the scouting of a field, their abundance and their stage of development (size) influence the potential for damage to the crop. Reminder of thresholds by

species or genus: three VAWs per trap per week for *Hypnoidus abbreviatus* and one VAW per trap per week for *Melanotus*, *Agriotes* and *Limonius*. Click here to learn more about the VAW screening method.
- **Previous** crop: Fields with a previous soybean crop are less at risk than grass meadows. Fields with a history of cereals, grassland, or a corn monoculture for at least two years may promote VAW.
- **Soil type** : clay soils are very low risk, while organic soils often contain high populations. Soils with light to medium textures are also more likely to have larger VAW populations.

Other factors, such as agricultural region and tillage, are also important. It is the combination of all these factors that influences the level of risk of finding VAWs and observing damage in a field. Click here for examples of combinations of factors for which high abundances of VAW have been observed in PCR screenings.

To assist in decision-making and determining the level of risk of VAW in field crops, use the VAW QC tool and scout as needed. The VFF QC tool allows you to:
- assess the level of risk of observing VAW in a field;
- download the VAW screening method for field crops;
- enter screening data;
- Download *the Guide to the Identification of Wireworms in Field Crops in Quebec*;
- obtain information on other pests targeted by seed treatments.

Prevention and control methods
- Crop rotation that includes soybeans, a crop that is less popular with VAW, or a crop that is a PW repellent such as buckwheat or mustard.
- Control of weeds, especially grasses, to deprive young larvae of food.
- Seed under conditions that promote rapid emergence to reduce the time during which seeds and seedlings are susceptible to VAW damage.
- Use of insecticide-treated seed, refer *to the Reference Grid and Guideline for the Recommendation for the Use of Insecticidal Seed Treatments in Corn and Soybeans*.

Find out more
- Worms Newsletter *: State of Play and Decision Support Tools*
- Factsheet *Seedling Pests: Scouting and Economic Thresholds*
- *Guide to Soil Pests in Field Crops*
- *Guide to the Identification of Wireworms in Field Crops in Quebec*
- The *VAW QC tool: the digital application on wireworms in field crops in Quebec*
- Video clips: Using VAW QC (*Part 1) - Risk Level Assessment* and *Using VAW QC (Part 2) - Screening Data Capture*

Seedcorn maggot

Seedcorn maggot larvae, a sporadic pest in field crops, can feed on soybean and corn kernels during germination. They also attack the roots and seedlings of many crops. High seedling mortality, lack of emergence, or delays in emergence may be signs of this pest. In Quebec, according to seasonal norms, the

peak of fly activity generally occurs towards the end of the planting season and few fields are affected by this insect. However, when a field is heavily infested, the losses can be considerable.

The RAP publishes a degree-day accumulation model to predict the date of peak spring activity (50% of emergent maggots) of the first generation of cornseed maggots. It should be noted that this forecasting model predicts the peak of spring cornseed maggot activity and not the infestation pressure. Fields planted close to peak and with risk factors may be susceptible to cornseed maggot damage. The presence of larvae and damage can be observed about two weeks after the predicted peaks.

Risk Factors

- Organic Amendments and Plant Residues: There is a risk associated with the application of manure or slurry, as well as the incorporation of cover crops or other fresh plant material in the spring, close to the planting date. Chicken manure applied two weeks or less before planting is particularly attractive, while other solid manures are attractive if applied two days or less before planting.
- Tillage: Freshly tilled, moist, organic matter-rich fields are at higher risk than no-till fields.
- Unfavourable emergence conditions: Early planting in conditions that delay emergence (cold temperatures, moist soils, etc.) exposes seed to cornseed fly for a longer period of time. The same is true for seedlings in heavy soils that retain moisture and slow down germination and plant emergence.
- Crop susceptibility stages: When larval emergence is synchronized with susceptible crop stages (germination to emergence), the risk of damage is higher. Cornseed maggot has less impact on the crop after emergence, especially when the cornseed no longer needs the grain to grow.

Prevention and control methods

When damage is observed, it is too late to take action against cornseed maggot. However, to determine if they are indeed caused by this pest, it is necessary to carry out a diagnosis and damage assessment. In the event of economically significant damage from cornseed maggot, preventive strategies should be considered the next time a susceptible crop is planted.

- Organic amendments and plant residues: Wait at least two weeks before planting when cover crops or manures have been applied or incorporated in the spring.
- Emergence Conditions: o Avoid early planting in cool, wet conditions that delay emergence;
  - o Sow at an optimal depth, depending on soil type and moisture, to promote rapid emergence.
  - o Close the furrow of the cornseed tightly to ensure good contact between the soil and the seed. o Increase seeding rates in at-risk fields to compensate for potential losses.
- Tillage: No-till, as cornseed maggot damage rarely occurs in fields without tillage.
- Planting date: Avoid planting fields with risk factors during peak seeding maggot activity. Shift the sowing date outside of peak activity to limit the risk of infestation and damage related to this pest.
- Insecticidal seed treatments: Currently, there is no economic threshold for intervention in Quebec. The use of insecticide-treated seed is justified only when risk factors are present. Refer to the OAQ's Reference Grid and Guideline for the Application of the Decision Tree on Insecticidal Seed Treatments in Corn and Soybeans as a decision support tool.

Black cutworm

Black cutworm moths arrive from the United States in early spring. Their larvae (caterpillars) can cause significant damage by cutting plants if the corn is at an early stage (five leaves or less). However, it is difficult to predict when and where infestations will occur. Therefore, the use of insecticidal seed treatments as a preventive approach against this pest is not warranted. Economic damage occurs only when larvae are present and corn is at a vulnerable stage (five leaves or less).

Risk Factors

- **Weeds, Crop Precedent and Crop Residues** : Fields with high weed abundance in early spring (two to three weeks before planting) or crop residues (soybeans, forage grasses, winter cereals destroyed by winter) are more likely to be damaged. The larvae can feed on most field crop species. Egg-laying occurs in dense vegetation, at ground level and usually before tillage in the spring. Although maize is the main

crop affected, the larvae appear to prefer to feed on weeds. When weeding is done late, larvae migrate to corn and crop damage occurs if corn is still in the vulnerable stage (five leaves or less).
- **Late sowing** : from the six-leaf stage, the larvae can no longer cause yield losses. In Quebec, it is estimated that corn that has been planted on optimal planting dates generally reaches the six-leaf stage before the larvae are developed enough to cut the plants.
- **Infestation** history: Fields with a history of black cutworm infestation are at higher risk of future infestations.

Prevention and control methods

- Killing weeds and cereal regrowth in the fall, or at least two weeks before planting, especially in fields with a history of damage, can reduce their attractiveness to black cutworms.
- Scouting for at-risk fields when corn is at the susceptible stage helps determine if a post-emergence foliar insecticide application is warranted. The RAP installs pheromone traps in several regions of Quebec to monitor the arrival of adults from the United States. The catches are used to estimate the risk and the probable date of the first damage. Catch status is disseminated via warnings that include recommendations on when to scout. An application of foliar insecticide when the economic threshold is reached will limit damage and economic losses.
- Some Bt hybrids offer protection against black cutworm, but this protection is effective only against the early larval stages. In addition, some insecticidal seed treatments are registered for black cutworm, but these protect plants for up to four weeks after planting. Thus, in the event of a severe infestation, damage to corn can be observed even with the use of these control methods.

White grubs

White grubs are larvae that mainly belong to three species of beetles (European chafer, common chafer and Japanese beetle). They can attack a wide range of crops, including corn, soybeans, cereals and grasslands.

Risk Factors

- **Infestation** history : Fields with a history of grubs infestation are at higher risk of future infestations.
- **Crop precedent** : Fields at the right angles from meadows or infested with weeds should be monitored.
- **Soil type** : Light soils are more at risk.

Prevention and control methods

- Avoid planting susceptible crops in at-risk fields and avoid early planting, especially in cool, wet conditions that delay emergence.
- Tillage, such as ploughing, also kills larvae and exposes them to predators (birds, skunks, raccoons, etc.).
- There is currently no economic threshold for grubs in Quebec, but according to the one used in Ontario, a population equal to or greater than two larvae per square foot (30 cm x 30 cm) at all field scouting stations may warrant a phytosanitary intervention such as insecticidal seed treatments. Routine use of this control method is not warranted for grubs control, as problems with these pests are infrequent (Labrie et al. 2017).

Corn rootworms

The two species of rootworms found in Quebec, Western Rootworm and Northern Rootworm, are considered secondary pests, although some fields may be severely affected. Rootworm larvae damage the roots of corn plants, causing them to lod. Adults feed on foliage, pollen and silks, which is rarely harmful except in some cases where severe feeding on silks interferes with corn pollination.

Risk Factors

- **Corn monoculture fields** : larvae must feed on maize to complete their life cycle. Following the laying of adults in corn the previous summer, the larvae emerge in the spring, and if the field is still seeded to corn, they can feed on the roots.
- **Infestation history** : Fields with a history of damage are more at risk.
- **Soil type** : Heavy or medium textured soils are more at risk.

Prevention and control methods

- **Crop rotation is the most effective method of controlling this pest.** Its effectiveness in reducing rootworm populations is far superior to all other control methods.
- Planting Bt corn hybrids is an alternative that allows the pest to be controlled when rotations are not possible. Refer to the *list of corn hybrids and Bt traits available in Canada* for the different resistance genes available on the market and the requirements for establishing refuges. **This control method should only be used when necessary, as resistance to Bt is developing in Quebec.**
- As for seed treatments, only the highest rate of some insecticides offers some protection, but this does not prevent the emergence of adults. Refer to the product label for the recommended rate of insecticide for corn rootworms.

Find out more

- Video How to Manage Corn Rootworms in Corn *for Grain and Silage*
- Fact Sheet *Prevention Strategy for Corn Rootworm Resistance to Bt Corn*

Insects Targeted by Seed Treatments

Depending on the different risk factors, the use of insecticidal seed treatments may be justified for one or more insect pests of seedlings. Table 3 presents insect pests of seed corn and feed corn that are controlled by the products and active ingredients used in seed treatments.

Table 3: Products and Active Ingredients Registered as Seed Treatments for the Control of Insect Pests of Seed Corn and Forage

Trade name	Active Ingredient	Resistance Group*	Target Pest						
			Wirewoom	Cornseed maggot	Cutworm	Hanneton européen	Hanneton commun	Japanese beetle	Corn rootworm
						White grubs			
CRUISER 5FS	Thiaméthoxame**	4A	✓***	✓	-	✓	-	-	Suppressed by dose 322 ml/100 kg only
PONCHO 600FS NIPSIT INSIDE 600	Clothianidine**	4A	✓	✓	✓	✓	✓	✓	Suppressed by dose 166,7 ml/ Only 80,000 grains
SOMBRERO 600 FS	Imidaclopride**	4A	✓	-	-	-	-	-	-
LUMIVIA	Chlorantraniliprole	28	✓	✓****	✓	✓	✓	✓	-
FORTRESS	Cyantraniliprole	28	✓	✓****	✓	✓	-	-	-
ACCELERON + insecticide	Tetraniliprole	28	✓	✓	-	✓	✓	✓	-

* It is important to rotate resistance groups to prevent insecticide resistance from pests. ** Active ingredients requiring agronomic justification and prescription.
*** The CRUISER 5FS only controls wireworms of the *genera Agriotes*, *Limonius* and *Melanotus.*
****Repression.

Regulatory Obligations for the Use of Neonicotinoids

In order to reduce the use of the most risky pesticides, the Ministère de l'Environnement et de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) has put in place, since September 8, 2018, regulations governing the purchase and use of seeds treated with insecticides of the neonicotinoid family: clothianidin (PONCHO, NIPSIT INSIDE), imidacloprid (GAUCHO,®® SOMBRERO)® and thiamethoxam (CRUISER®).® These three seed-coating neonicotinoids for certain crops (feed corn, grain corn, sweet corn, oats, wheat, canola, barley and soybeans) have been grouped together under a new class of pesticides, Class 3A.

Consult the MELCCFP's notices to find out about all the regulatory obligations related to Class 3A pesticides:

- For farmers
- For Agronomists

For more information on insect pests of seedlings and insecticides registered to control them:

- *Guide to Soil Pests in Field Crops*
- *Guide to the Identification of Wireworms in Field Crops in Quebec*
- Wireworm Fact Sheet
- White Worms Fact Sheet
- Cornseed *maggot data sheet*
- Fact Sheet *Northern Corn Rootworm*
- Western Corn Rootworm *Data Sheet*
- Grey-black worm *data sheet*
- Factsheet *Seedling Pests: Scouting and Economic Thresholds*

To receive the latest news from the RAP, subscribe by clicking here.

This newsletter has been updated by Brigitte Duval, Hélène Brassard, Julie Breault, Stéphanie Mathieu, Ève Richelieu and Véronique Samson, agronomists (MAPAQ), Julien Saguez and Sébastien Boquel, Ph.D., researchers (CÉROM), and Mathieu Neau, biologist (CÉROM). For further information, please contact the RAP Secretariat.