DiPel® DF BIOLOGICAL INSECTICIDE | XenTari® BIOLOGICAL INSECTICIDE

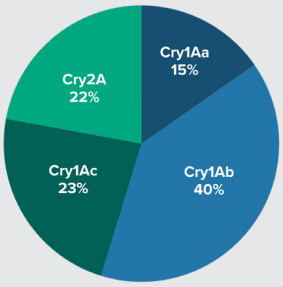
How are DiPel® DF and XenTari® Different from Other Bts?

Bacillus thuringiensis (Bt) is a naturally-occurring bacterium and the most widely used biological insecticide globally. Unlike synthetic insecticides, Bts generate insecticidal crystal proteins (Cry-proteins), which bind to specific target sites only found in the Lepidoptera gut. Cry-proteins cause the Lepidoptera gut to rupture, stopping feeding quickly.

DiPel® DF Biological Insecticide Dry Flowable† and XenTari® Biological Insecticide Dry Flowable† offer effective ratios of unique Cry-proteins to control problematic Lepidoptera. *DiPel* DF is designed for broad spectrum Lepidoptera activity by having a balanced ratio of four Cry-proteins (Figure 1). *XenTari* has a Cry-protein profile that includes Cry1D (Figure 1), which is not found in any other product. *DiPel* DF targets Lepidoptera like leafrollers and internal feeders like codling moth. *XenTari* provides outstanding control of armyworm and diamondback moth Lepidoptera due to its optimized Cry-protein profile.

DiPel DF Cry-Proteins and Fit

- Proven, broad spectrum Lepidoptera control



XenTari Cry-Proteins and Fit

- Optimized armyworm and diamondback moth solution

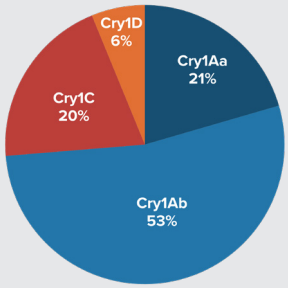


Figure 1. *DiPel* DF and *XenTari* include effective ratios of unique Cry-proteins to control problematic Lepidoptera

The Cry-Protein Strain and Ratio Make the Difference with Bts

Lepidoptera have different Cry-protein target sites, as shown below in Figure 2. Bts can have a broad spectrum (like *DiPel* DF) or a unique spectrum (like *XenTari*) of activity based on the type and ratio of Cry-proteins they contain. Each Cry-protein can bind to a different receptor in the Lepidoptera gut. Figure 2 shows a sampling of key pests and how each is impacted from the optimized strain and ratio of Cry-proteins found in *DiPel* DF and *XenTari*.

Lepidopteran Species	Cry-Proteins only in *DiPel* DF		Cry-Proteins in *DiPel* DF & *XenTari*		Cry-Proteins only in *XenTari*	
	Cry1Ac	Cry2A	Cry1Aa	Cry1Ab	Cry1C	Cry1D
Obliquebanded Leafroller	+	++	+	+	+	-
Codling Moth	-	++	+	++	-	+
Cabbage Looper	++	++	+	+	+	+
Armyworm species	-	-	+	++	++	+
Diamondback Moth	++	-	++	++	++	+

Figure 2. ++ good activity + moderate activity - poor control

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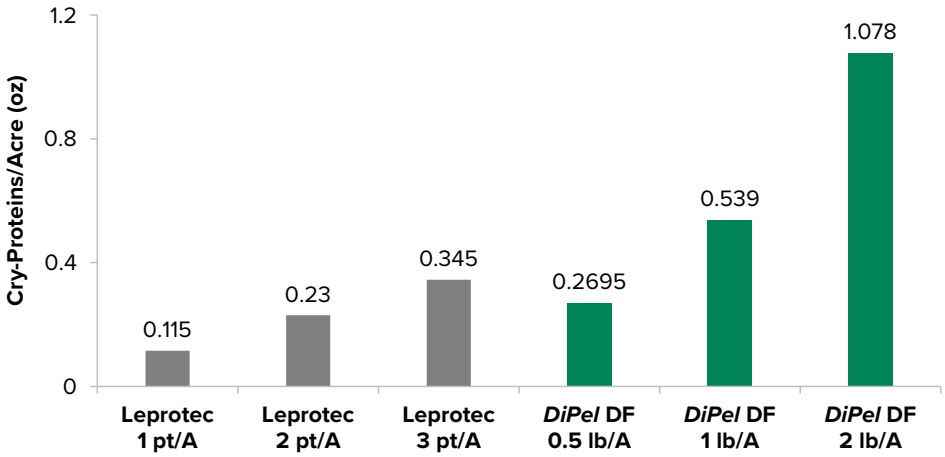
DiPel DF has More Cry-Proteins Than Leprotec® for More Reliable Control

The larger data peaks for *DiPel* DF equate to three times more Cry-proteins.

More Cry-proteins means better, more reliable control. Additionally, *DiPel* DF has 10 times more PD-100, a Cry-protein synergist.

Cry-protein content determined with CE-SDS.

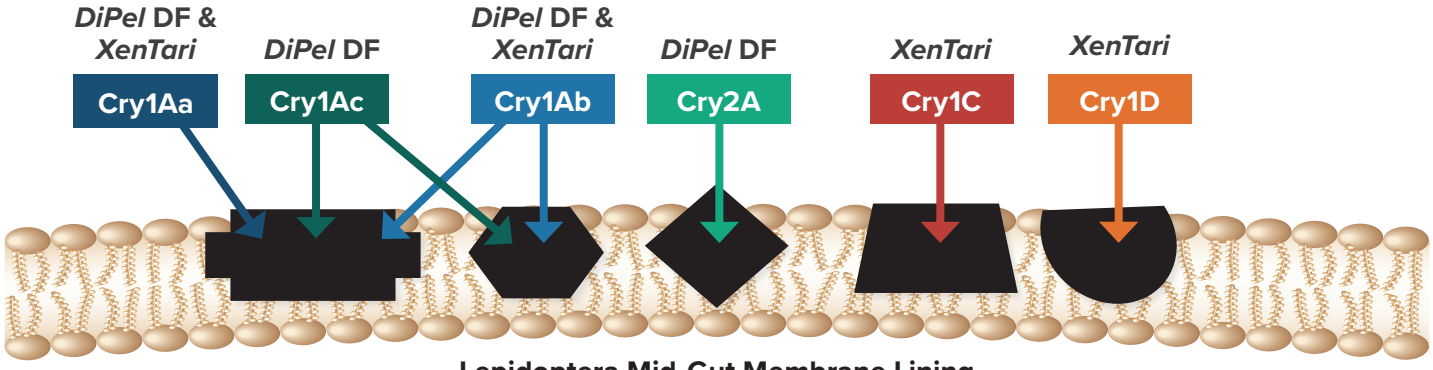
Source: Valent BioSciences



Unique Mode of Action is Key for Resistance Management

Bts contain both Cry-proteins and spores, which enter the Lepidoptera's gut during feeding. Cry-proteins only dissolve in the uniquely high pH of the Lepidoptera's mid-gut and will not affect beneficial insects and other non-target organisms. Cry-proteins bind to specific receptors on cells lining the mid-gut and then insert into the cell membrane forming pores, which quickly stops feeding. Pore formation increases the permeability of the mid-gut lining causing it to rupture. This allows viable spores and gut microbes to invade the insect's body causing sepsis and death. There is no known cross resistance between the Bt mode of action and any other class of insecticides, making *DiPel* DF and *XenTari* some of the most effective tools for managing resistance.

Each Cry-Protein can Target a Different Binding Site in the Lepidoptera Mid-Gut



Lepidoptera Mid-Gut Membrane Lining
(example for *Spodoptera* sp.)

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Always read and follow label instructions.

†DiPel® DF Biological Insecticide Dry Flowable and XenTari® Biological Insecticide Dry Flowable are NOP compliant and OMRI Listed for organic production.

LEARN MORE ABOUT *DIPEL* DF

LEARN MORE ABOUT *XENTARI*