2016 Apple MRL Charts: Adjusted Pre-harvest Intervals to Comply with the Maximum Residue Limits of U.S. and Selected Export Markets for Single and Multiple Applications of Five **Insecticides Registered for Use in Managing Late Season Pests in Michigan**

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Purpose & Methods: These charts were developed to provide adjusted pre-harvest intervals for five pesticides registered for use on apples against late season pests. The charts are based on crossreferencing residue degradation curves with the maximum residue limits (MRLs) of key apple export markets. Data are from replicated trials conducted at Michigan State University on apples that received either single or multiple application of Assail, Danitol, Delegate, Exirel, or Imidan close to harvest in 2015. Residue analysis was conducted on freshly harvested fruit and followed a generally accepted standard protocol known as the QuECHERS method. The MRLs used to develop this tool come from those published by Bryant Christie, Inc. as of May 2016. Markets included in each chart are USA, Brazil, Canada, Central America (i.e. Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), China, Columbia, Dominican Republic, India, Israel, Jordan, Mexico, Philippines, Saudi Arabia, Singapore, Thailand, and Vietnam.



RED means that the product should not be used during this time either because of EPA label restrictions or due to a high risk of exceeding MRLs for a given market.

YELLOW means that the product *should be used with* caution during this time given all the variables (e.g. tank mixes, application methods and calibration, use of adjuvants, environmental conditions post-application, and post-harvest handling) that can impact the time it takes for a residue to degrade in order to meet the MRL for a given market.

GREEN means that the product is *likely to be safe for use* at this time with low risk of residues remaining at harvest that would exceed MRLs for a given market.

Chart 1 (below). This chart indicates that Assail[®] (acetamiprid) is not recommended for use within 1 month of harvest if exporting to Vietnam. Otherwise use as directed on the label for the other markets listed.

Chart 1: Assail [®] (acetamiprid) – 1 or 3 applications								
Time before harvest (7 Day PHI)								
1 mo.	28 days	21 days	14 days	7 days	3 da			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
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low risk	low risk	low risk	low risk	low risk	Do not			
low risk	low risk	low risk	low risk	low risk	Do not			
Do not use	Do not use	Do not use	Do not use	Do not use	Do not			
	Imo. Iow risk Iow risk	Time1 mo.28 dayslow risklow risk	Time before has1 mo.28 days21 dayslow risklow risk	Time before harvest (7 Da1 mo.28 days21 days14 dayslow risklow risk	Time before harvest (7 Day1 mo.28 days21 days14 days7 dayslow risklow risk			

Charts 4a (left below) and 4b (right below). These charts indicate that when exporting to China or Vietnam, one application of Delegate[®] Charts 5a (left below) and 5b (right below). These charts indicate a high risk of exceeding MRLs for China and Vietnam when Exirel[®] (spinetoram) is risky within 14 days of harvest, and if multiple applications are planned, they should end 28 days before harvest. Otherwise use as (cyantraniliprole) is applied once within 1 month of harvest, and should be used with caution within 7 days of harvest for all other markets listed. Multiple applications are not recommended within 1 month of harvest for any of the markets listed. directed on the label for the other markets listed.

Chart 4a: Delegate [®] (spinetoram) – 1 application							
INTENDED		Time before harvest (7 Day PHI)					
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days	
USA (0.2)	low risk	low risk	low risk	low risk	low risk	Do not use	
Brazil (0.02)	low risk	low risk	low risk	low risk	low risk	Do not use	
Canada (0.1)	low risk	low risk	low risk	low risk	low risk	Do not use	
Cent. America (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
China (0)	low risk	low risk	low risk	Do not use	Do not use	Do not use	
Columbia (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Dom. Rep. (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
India (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Israel (0.1)	low risk	low risk	low risk	low risk	low risk	Do not use	
Jordan (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Mexico (0.2)	low risk	low risk	low risk	low risk	low risk	Do not use	
Philippines (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Saudi Arabia (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Singapore (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Thailand (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Vietnam (0)	low risk	low risk	low risk	Do not use	Do not use	Do not use	

Chart 4b: Delegate [®] (spinetoram) – 3 applications							
INTENDED	Time before harvest (7 Day PHI)						
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days	
USA (0.2)	low risk	low risk	low risk	low risk	low risk	Do not use	
Brazil (0.02)	low risk	low risk	low risk	low risk	low risk	Do not use	
Canada (0.1)	low risk	low risk	low risk	low risk	low risk	Do not use	
Cent. America (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
China (0)	low risk	Do not use					
Columbia (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Dom. Rep. (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
India (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Israel (0.1)	low risk	low risk	low risk	low risk	low risk	Do not use	
Jordan (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Mexico (0.2)	low risk	low risk	low risk	low risk	low risk	Do not use	
Philippines (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Saudi Arabia (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Singapore (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Thailand (0.05)	low risk	low risk	low risk	low risk	low risk	Do not use	
Vietnam (0)	low risk	Do not use					

Disclaimer: The authors of this tool cannot guarantee that any of these MRLs have not changed since May 2015, therefore, the user assumes all responsibility for its use subsequently. We also cannot guarantee that a material listed for use here in Michigan is registered for use outside of Michigan (material registration status is determined by the USEPA and State Governments where 'special uses' are concerned). Users outside of Michigan are cautioned to consult with their local extension service to determine what is allowable. We also make no guarantees that any of the products listed will be effective against a particular pest. Finally, given all of the variables that can affect degradation rates – in particular the use of adjuvants and tank mixes, environmental conditions post-application, and post-harvest handling – we cannot guarantee that if a product is used according to this tool it will not leave residues that exceed tolerances (MRLs) for the selected market.

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Chart 2 (below). This chart indicates that Danitol[®] (fenpropathrin) is not recommended for use within 1 month of harvest if exporting to Central America, Columbia, Dominican Republic, India, Israel, Jordan, Philippines, Saudi Arabia, Singapore, or Thailand. Otherwise use as directed on the label for the other markets listed.

Chart 3 (below). This chart indicates that Imidan[®] (phosmet) should be safe to use according to label for exporting to any of the markets listed. However, 2014 data suggested a risk for exports to China at 7 days to harvest and for Israel and Brazil within 1 month of harvest.

Chart 2: Danitol [®] (fenpropathrin) – 1 or 2 applications						
INTENDED		Time	before har	vest (14 Da	y PHI)	
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days
USA (5)	low risk	low risk	low risk	low risk	Do not use	Do not use
Brazil (1)	low risk	low risk	low risk	low risk	Do not use	Do not use
Canada (5)	low risk	low risk	low risk	low risk	Do not use	Do not use
Central America (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
China (5)	low risk	low risk	low risk	low risk	Do not use	Do not use
Columbia (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Dom. Rep. (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
India (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Israel (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Jordan (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Mexico (5)	low risk	low risk	low risk	low risk	Do not use	Do not use
Philippines (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Saudi Arabia (0.01)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Singapore (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Thailand (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use
Vietnam (5)	low risk	low risk	low risk	low risk	Do not use	Do not use

Chart 3: Imidan [®] (phosmet) – 1 or 3 applications							
INTENDED		Time before harvest (7 Day PHI)					
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days	
USA (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Brazil (1)	low risk	low risk	low risk	low risk	low risk	Do not use	
Canada (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Central America (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
China (3)	low risk	low risk	low risk	low risk	low risk	Do not use	
Columbia (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Dom. Rep. (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
India (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Israel (0.5)	low risk	low risk	low risk	low risk	low risk	Do not use	
Jordan (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Mexico (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Philippines (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Saudi Arabia (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Singapore (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Thailand (10)	low risk	low risk	low risk	low risk	low risk	Do not use	
Vietnam (10)	low risk	low risk	low risk	low risk	low risk	Do not use	

Chart 5a: Exirel™ (cyantraniliprole) – 1 application							
INTENDED	Time before harvest (3 Day PHI)						
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days	
USA (1.5)	low risk	low risk	low risk	low risk	caution	caution	
Brazil (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Canada (1.5)	low risk	low risk	low risk	low risk	caution	caution	
Central America (0.8)	low risk	low risk	low risk	low risk	caution	caution	
China (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Columbia (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Dom. Rep. (0.8)	low risk	low risk	low risk	low risk	caution	caution	
India (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Israel (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Jordan (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Mexico (1.5)	low risk	low risk	low risk	low risk	caution	caution	
Philippines (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Saudi Arabia (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Singapore (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Thailand (0.8)	low risk	low risk	low risk	low risk	caution	caution	
Vietnam (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	

Chart 5b: Exirel [™] (cyantraniliprole) – 3 applications							
INTENDED	Time before harvest (3 Day PHI)						
MARKET (MRL)	1 mo.	28 days	21 days	14 days	7 days	3 days	
USA (1.5)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Brazil (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Canada (1.5)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Central America (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
China (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Columbia (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Dom. Rep. (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
India (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Israel (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Jordan (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Mexico (1.5)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Philippines (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Saudi Arabia (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Singapore (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Thailand (0.8)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	
Vietnam (0)	Do not use	Do not use	Do not use	Do not use	Do not use	Do not use	

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