

Potato Virus and Aphid Management for Montana Seed Growers

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Potato viruses are transmitted by aphids in two basic ways. The virus is either non-persistent (stylet-borne) or persistent and circulative (they are ingested and persist in the aphid throughout its life). The most common persistent and circulative virus affecting potatoes in Montana is potato leaf roll (PLRV). Common non-persistent or stylet-borne viruses are potato virus Y, Potato virus A, Potato virus S and potato virus M. Because the aphid has to feed for more than several minutes to transmit persistent-circulative viruses, control by insecticides is highly effective, whereas with a stylet-borne virus the virus is transmitted as soon as the aphid stylet penetrates the leaf- **too soon for any insecticide to kill the aphid and prevent virus transmission.** The near absence of PLRV in recent years is primarily due to the effectiveness of seed treatment or in-furrow insecticides such as imidacloprid-based products (Admire Pro, Gaucho, Nuprid, Mana Alias, etc) or thiamethoxam based-products (Platinum or Cruiser). These materials will provide 60-80+ days of control from time of application.

Aphids can be either residents overwintering on Prunus species as eggs or on weeds (hairy nightshade, mustards, ground cherry, tumble mustard, flixweed, shepherds purse, chickweed, mallow, horseweed, pennycress, redstem filaree), or bedding plants, or they can be winged migrants originating from 10's to 100's of miles away. Control of aphids on bedding plants or over-wintering host plants is an important component of any IPM aphid/virus control program since these plants can also be sources of viruses. Some aphids such as the green peach or potato aphid can colonize potato, while others will not colonize potato. Non potato colonizing aphids that can transmit non-persistent viruses can migrate as winged adults to potato fields from alfalfa or small grains as these crops are cut or mature. They will simply move through the potato planting, attempting to feed and thus can be major factors in spreading non-persistent viruses such as PVY. Thus, removing in-field sources of virus by rouging is important.

Chemical control of aphid virus vectors should begin just prior to the expected time in decline of soil or seed treatment insecticides (effective residues of 60-80+ days from planting can be expected depending on soil and environmental variables). Any gap in insecticide protection until total vine kill can result in significant virus transmission. Insecticide resistance in green peach aphid is common (some authors consider that many populations are resistant to the synthetic pyrethroid insecticides such as Asana, Pounce, Ambush, Baythroid XL, Warrior, Mustang Max, etc- the status of resistance in Montana is unknown) and resistance management precautions should be observed. In addition, the use of synthetic pyrethroid or organophosphate insecticides may result in increased aphid infestations due to mortality of aphid predators and parasites. It is important to understand which chemical class of each insecticide is used so that the aphid population is not sequentially exposed to the same class (mode of action). This is particularly important for neonicotinoid insecticides (Admire, Gaucho, Provado, Platinum, Actara, Cruiser, Assail, Belay, Nuprid, Venom) where foliar neonicotinoids sprays should not follow neonicotinoid planting time or seed treatments. Table 1. below provides information on insecticides recommended for aphid control, their chemical class and mode of action, product use rate, and limits to harvest or other restrictions. The materials recommended are generally safer to both people and aphid predators and parasites, thus should preserve as much biological control as possible. In addition, they do not tend to agitate aphids so movement is minimized.

Table 1. Insecticides recommended for aphid control foliar application for seed potatoes in Montana, their chemical class and mode of action, product use rate, and limit to harvest or other restrictions.

Insecticide (common name)	Class ¹	Product/A	Restrictions (PHI=pre harvest interval)
Assail 30 SG Assail 70 WP (acetamiprid)	N N	1.5-4.0 oz 1.0-1.7 oz	Higher rate is suggested, no more than 4 applications per season, do not apply more than once in 7 days. 7 day PHI. Through coverage is critical. Use MSO. COC or organosilicone adjuvant not spreader/sticker type adjuvant
Brigadier (bifenthrin+imidacloprid)	P+N	4.8-6.14 oz	Do not make applications <7 days apart, 21 day PHI. Use < 25.6 fl.oz per season. Use adjuvant such as MSO, NIS or COC.
Hero (bifenthrin+zetacypermetrin)	P	4.0-10.3 oz	21 day PHI, Maximum 0.2 lb/A/season
Fulfill (pymetrozine)	SFB	2.75-5.5 oz	Use < 11 oz/season, allow 7days between applications, 14 day PHI. This material stops aphid feeding. Translaminar movement so spray is rainfast as soon as it is dry
Belay 2.13SC (clothianidin)	N	1.9-2.8 oz	Use < 8.4 oz per season, allow 7days between applications, 14 day PHI.
Beleaf (flonicamid)	PC	1.2-2.8 fl. oz.	Higher rates are suggested. Up to 14 days residual control. Use < 8.4 fl. oz. or 3 applications per season. 7 day PHI
Provado 1.6 F (imidacloprid)	N	3.8 fl. oz	Use < 16 fl. oz per season, observe plant back restrictions, 7 day PHI
Leverage (imidacloprid+ cyfluthrin)	N+P	3.8 fl. oz	7 day PHI
Movento (spirotetramat)	LBI	4.0-5.0	7 day PHI, 7 day minimum interval, maximum 10 oz/season
Actara (thiamethoxam)	N	3 fl. oz	Use < 6 oz per season, 14 day PHI, may need two applications at 7-10 day intervals
Venom 20 SG	N	0.33 lb	7 day PHI- no not exceed 0.99lb/A /season
Voliam Flexi (thiamethoxam +chlorantaniliprole)	N+D	4 oz	Use < 8 oz per season, > 7days between applications, 14 day PHI
Endigo ZC (thiamethoxam+ lambda-cyhalothrin)	N+P	4-4.5 fl.oz	Use < 10 fl. oz per season, 14 day PHI
Monitor	OP	1.5-2.0 pts	14 day PHI-while very effective may cause surviving aphids to move, thus resulting in greater virus spread.

1. N= neonicotinoid, P=pyrethroid, PC=pyridine carboxamide, OP= organophosphate, D=diamide, LBI=Lipid biosynthesis inhibitor, SFB=selective feeding blocker