

Improvements in monitoring of peach-potato aphid in seed potato crops

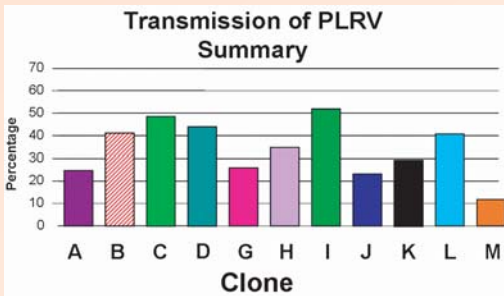
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Introduction

Potato leafroll virus, vectored by peach-potato aphids, continues to compromise healthy seed potato production. In recent years, insecticide resistant aphids have been found in samples of Scottish aphid populations. Research has led to a much better understanding of local populations and the vectoring threat they pose. We have set up demonstration farms to help the farmer determine the best control methods during the growing season. Aphids are collected in a special preservative solution, identified to species and the genetic composition of key species is then determined. This information can then be used to ensure that insecticide applications effectively manage the aphids present in the crops and to avoid the build up of insecticide resistant forms, reducing costs and helping the environment.

Clones of the peach potato aphid exhibit different virus transmission efficiencies.

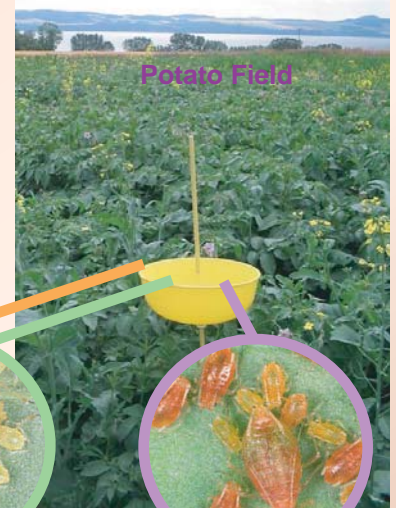


Clones of peach potato aphid exhibit different insecticide resistance mechanisms. Some clones are more resistant than others.

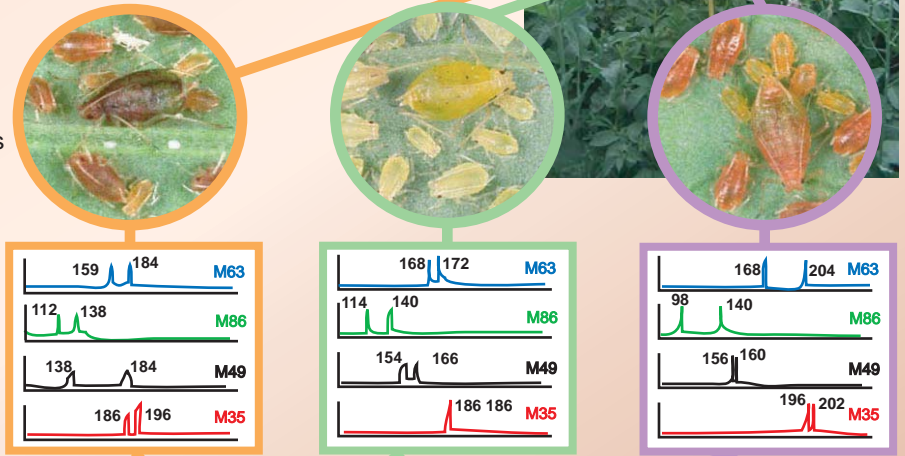
Insecticide Class	Mechanism	Resistance Mechanism			
		Sensitive	Esterase (R1)	Esterase (R2)	Esterase (R3)
Organophosphate	Acetylcholinesterase	S	R	RR	RRR
Monomethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Dimethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Pyrethroid	Excitatory	S	R	R	RR
Chlorogenicity	Acetylcholine receptor	S	S	S	S
Organophosphate	Acetylcholinesterase	S	R	RR	RRR
Monomethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Dimethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Pyrethroid	Excitatory	S	R	R	RR
Chlorogenicity	Acetylcholine receptor	S	S	S	S
Organophosphate	Acetylcholinesterase	S	R	RR	RRR
Monomethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Dimethyl Carbamates	Acetylcholinesterase	S	R	RR	RRR
Pyrethroid	Excitatory	S	R	R	RR
Chlorogenicity	Acetylcholine receptor	S	S	S	S

Methods

1. Samples collected in yellow traps in fields



2. Four sets of DNA microsatellite markers allows individuals to be categorised into clones.

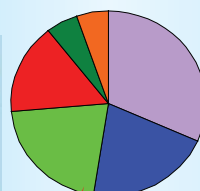


Clone	Resistance	35		49		63		86			
		Esterase	MACE	kdr	1	2	1	2	1	2	
A	R ₃	+	+	196	196	152	158	177	185	113	139
B	R ₁ /R ₂	+	+	196	202	158	162	171	207	99	139
C	R ₁ /R ₂	-	+	186	196	156	168	171	175	137	141
D	R ₂ /R ₃	-	+	186	196	156	156	177	203	127	141
E	R ₂ /R ₃	-	-	198	204	158	166	169	177	103	107
H	S/ R ₁	+	+	180	196	137	175	167	169	103	107
I	S/ R ₁	-	-	186	196	156	206	171	171	127	141
J	S/ R ₁	-	-	186	186	156	168	171	175	115	141
L	S/ R ₁	-	-	186	198	137	158	169	185	139	139
M	R ₂	-	+	196	196	121	168	177	179	103	127

Angus 1

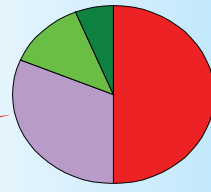


Auchmithie (n=19)



- H (R₂/MACE)
- J (S)
- C (R₁/R₂)
- E (R₂)
- I (S)
- M (S/R₁/MACE)

Inchture (n=16)



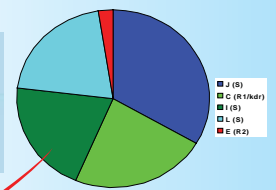
- E (R₂)
- H (R₂/MACE)
- C (R₁/R₂)
- I (S)

These fields contained aphids resistant to all the older chemistries. Neonicotinoids or Plenum would be the best choice here.

Elgin

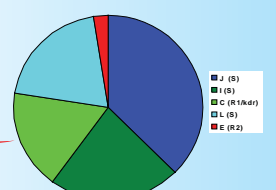


Field 1 (n=40)



- J (S)
- C (R₁/R₂)
- I (S)
- L (S)
- E (R₂)

Field 2 (n=40)



- J (S)
- I (S)
- C (R₁/R₂)
- L (S)
- E (R₂)

These fields contained aphids resistant to pyrethroids. Dimethyl carbamates could still be used here.