

Cereal Aphid & BYDV Control

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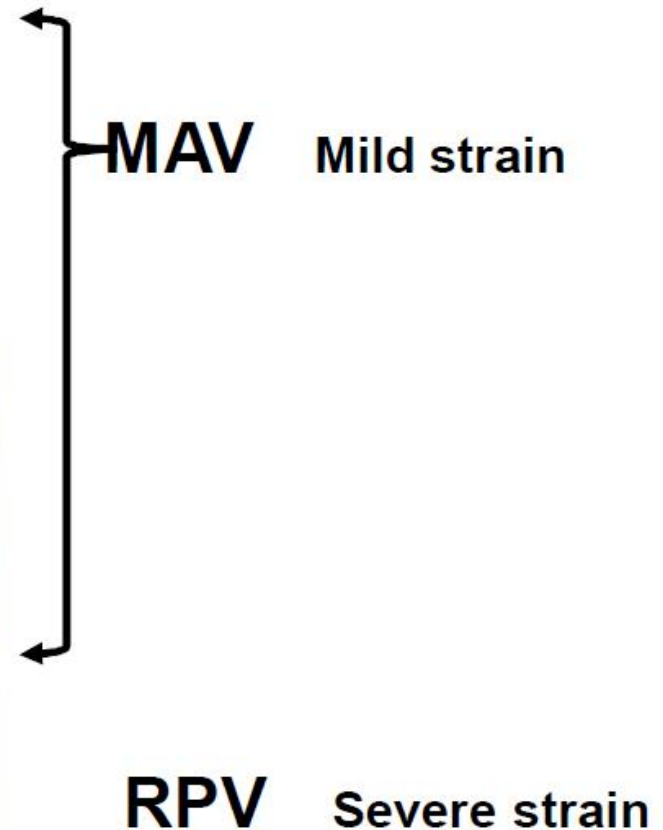
Outline

- ◆ Cereal Aphids & BYDV
- ◆ Kdr resistance
- ◆ Control Options
- ◆ Looking forward

Barley Yellow Dwarf Virus (BYDV)

Aphids:

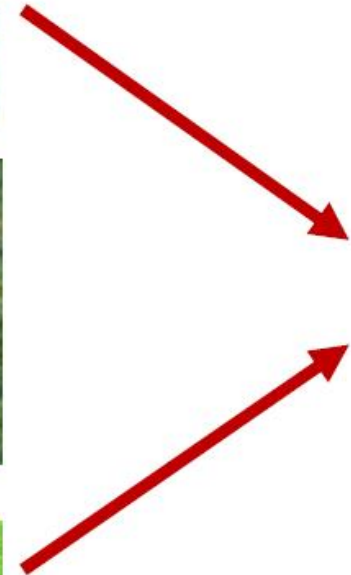
- ◆ Grain Aphid (*Sitobion avenae*)
- ◆ Rose-grain aphid (*Metopolophium dirhodum*)
- ◆ Bird-cherry aphid (*Rhopalosiphum padi*)



Barley Yellow Dwarf Virus (BYDV)

Aphids:

- ◆ Grain Aphid
(*Sitobion avenae*)
- ◆ Rose-grain aphid
(*Metopolophium dirhodum*)
- ◆ Bird-cherry aphid
(*Rhopalosiphum padi*)



PAV

Grain Aphid & BYDV

- ◆ *Sitobion avenae* (Grain Aphid)
- ◆ Reduces grain yield & quality
- ◆ Transmits BYDV
- ◆ *Kdr* confers partial pyrethroid resistance



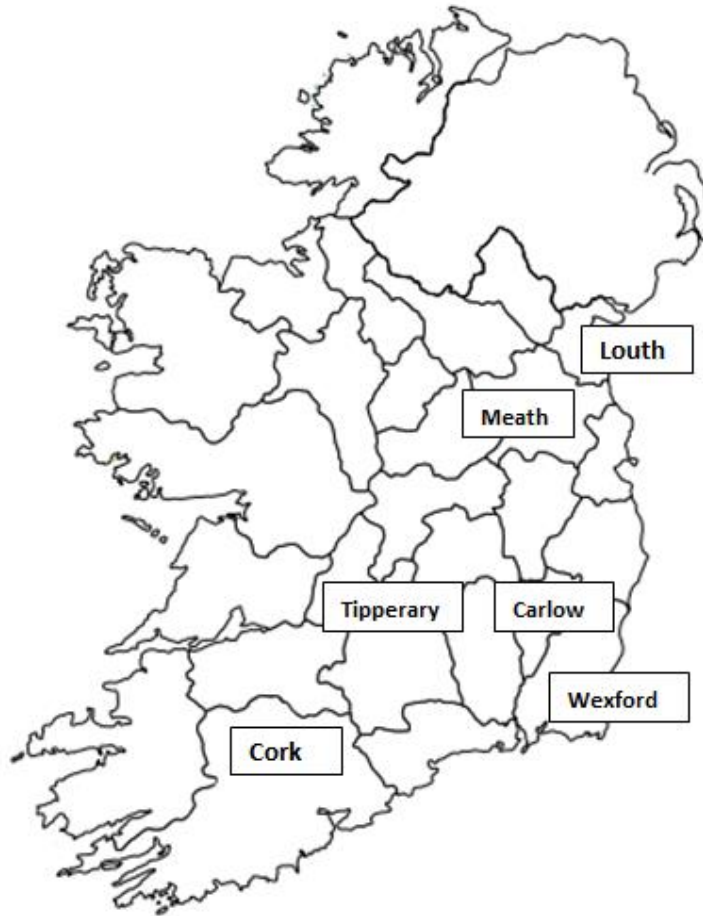
Yield loss due to BYDV	
Crop	Yield Reduction
Winter barley (early Sept)	3.7 t/ha
Spring barley (Late April)	1.99 t/ha
Winter wheat	1.2 t/ha

Kennedy, 2014

'Knock Down Resistance' or 'kdr' was first identified in the UK in 2012 and in Ireland 2013

- Aphids with '*kdr*' gene are less susceptible to pyrethroids
- To date, '*kdr*' has only been identified in *Sitobion avenae* (Grain Aphid), an important vector of Barley Yellow Dwarfing Virus (BYDV)
- In UK & Ireland a single clone (SA3) is most often associated with the *kdr* mutation that confers partial pyrethroid resistance
- Research indicates aphids carrying the resistance gene occur in all major grain growing regions

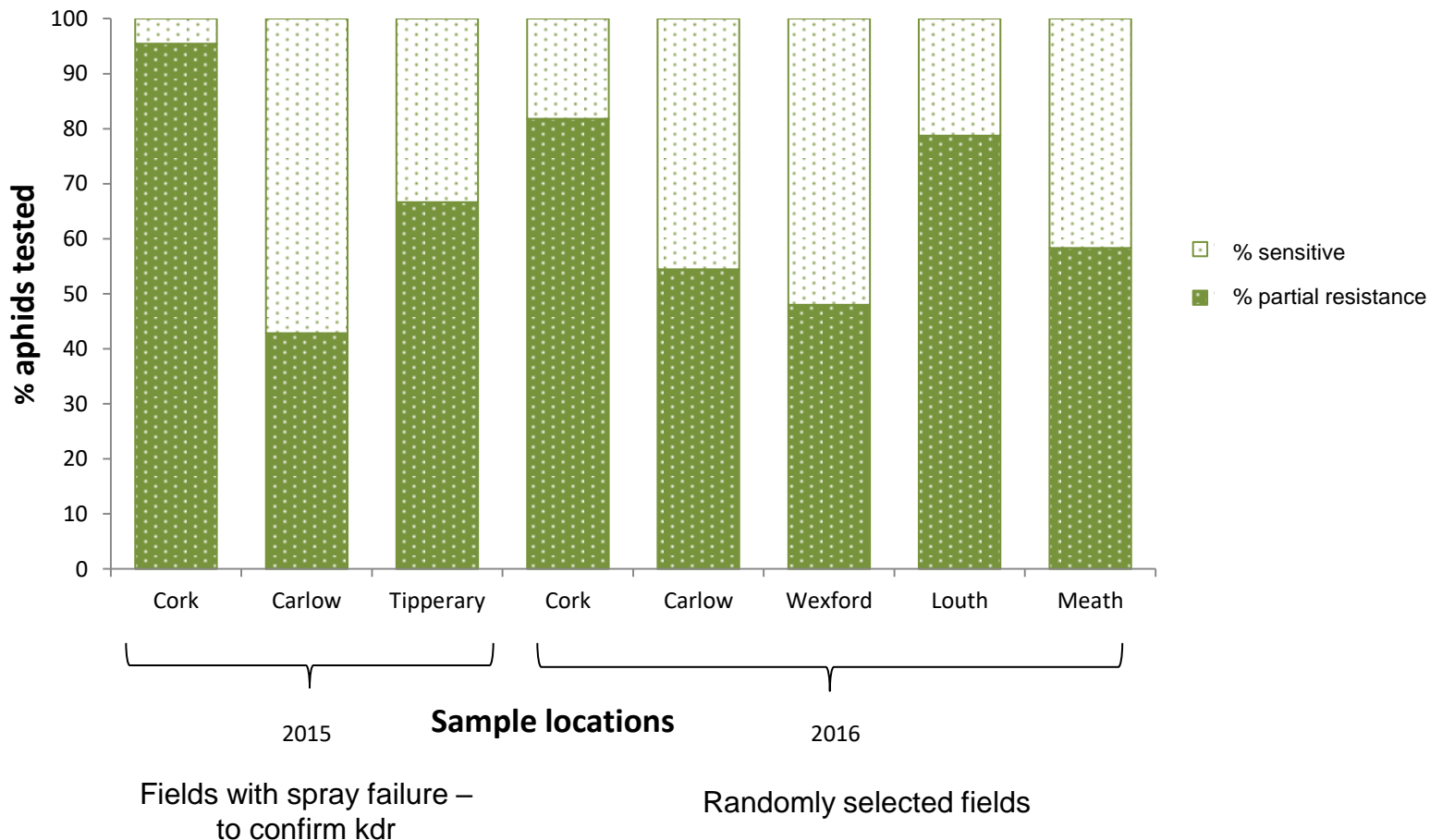
Field Collection sites



Field collections have been focused in major barley growing counties based on Teagasc acreage data



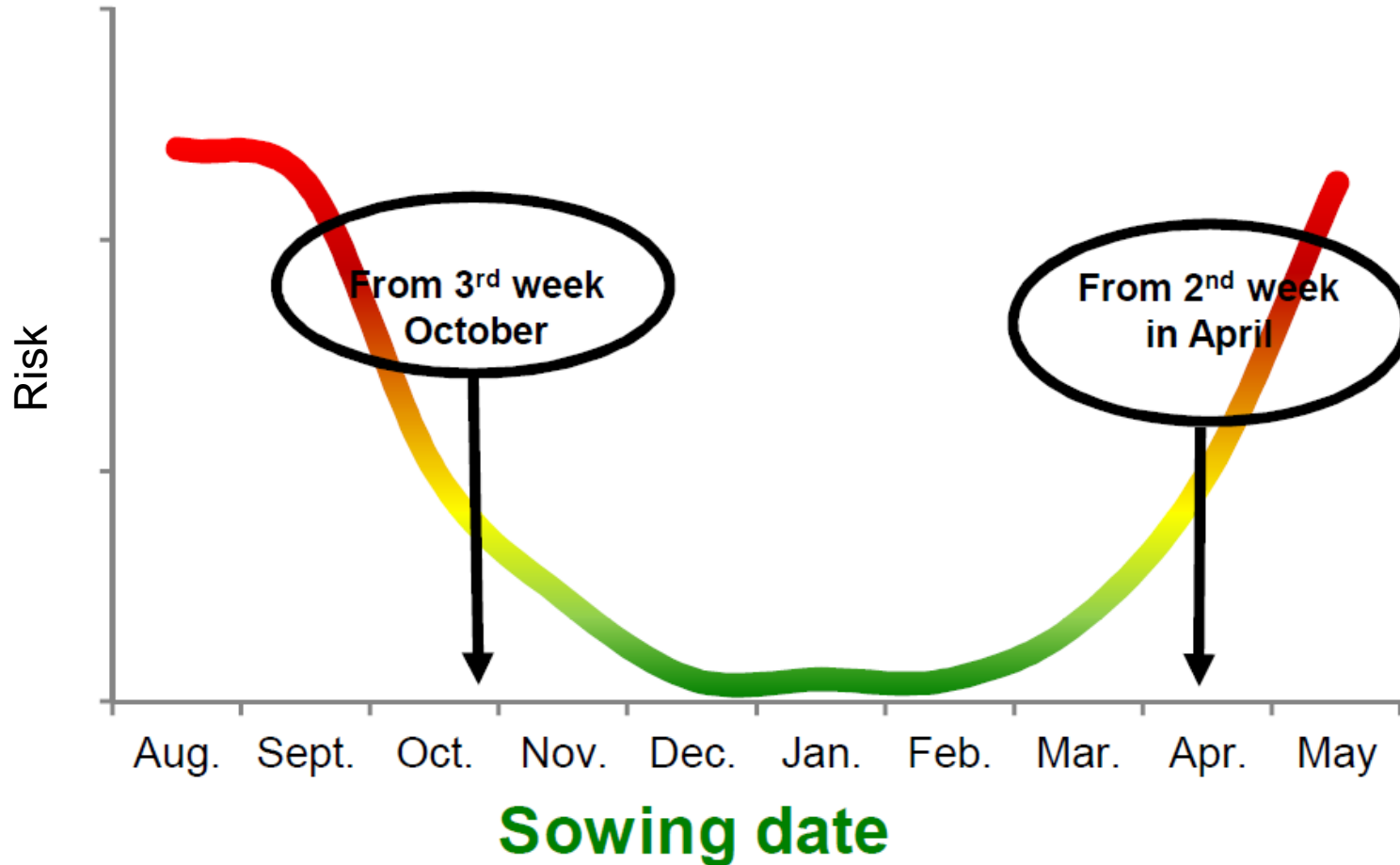
kdr incidence in Ireland



kdr widely present in *S. avenae* populations across arable counties in Ireland
kdr occurs in aphid populations on both barley crops and adjacent grass hosts

BYDV Infection and sowing date

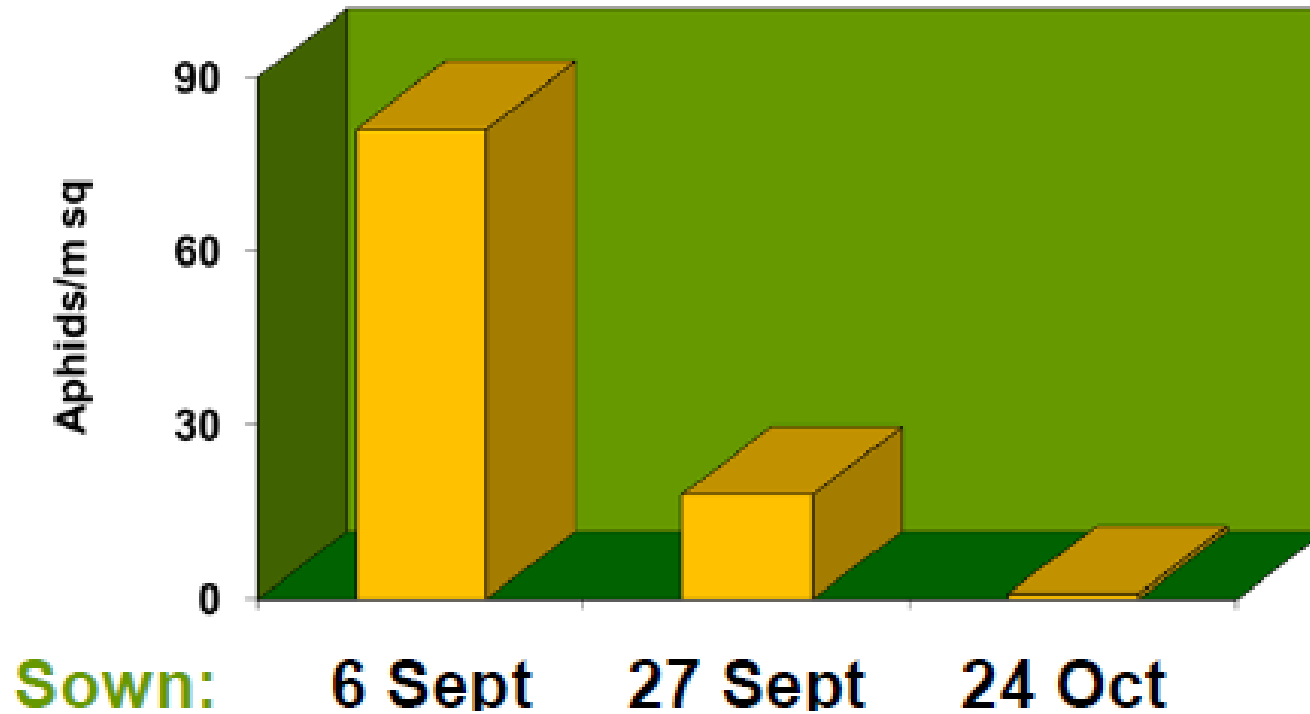
General representation



Kennedy, 2014

Aphid No/m² in barley sown on three dates

Sampled 30 November



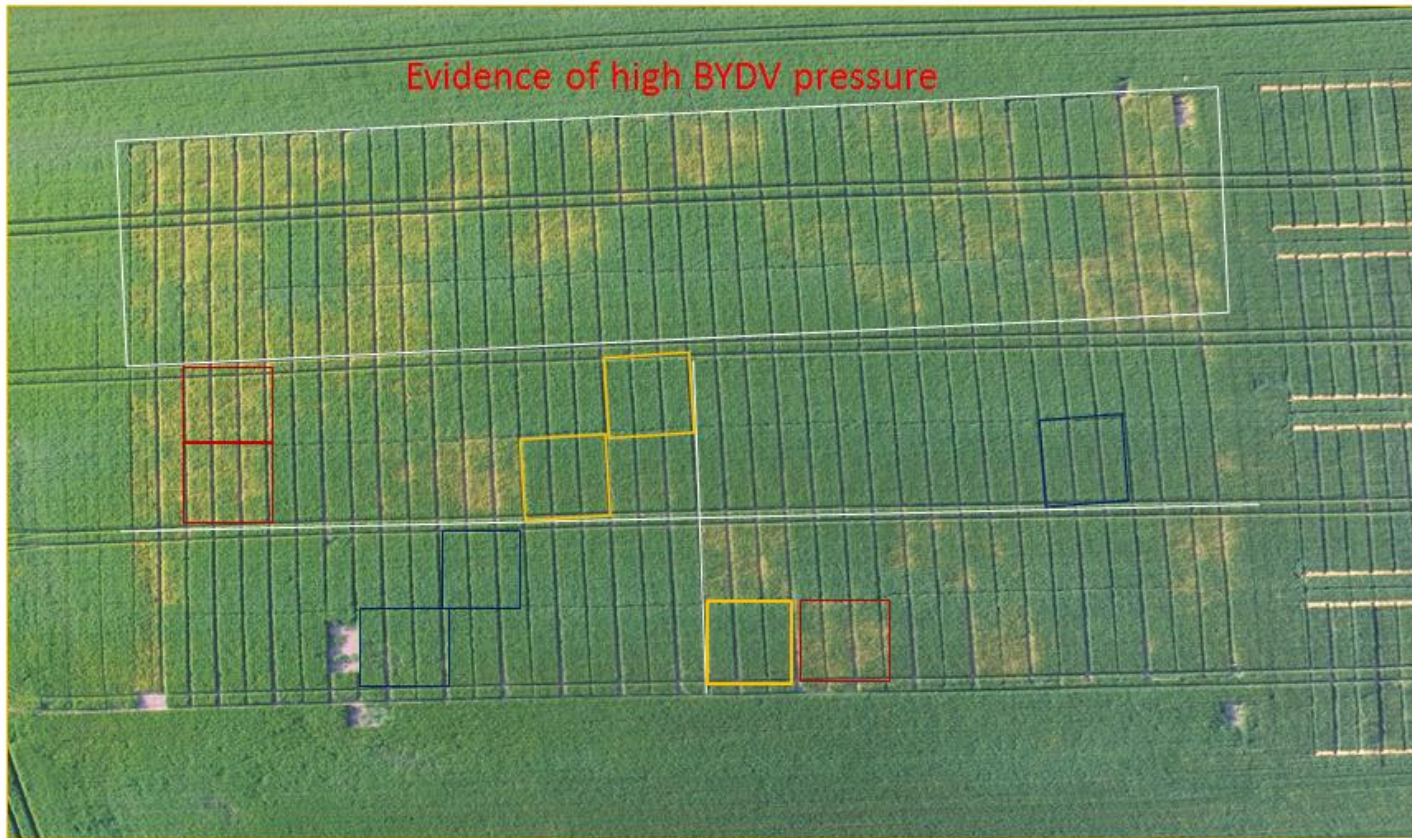
Kennedy, 2014

Autumn BYDV Control

Crop	BYDV Risk	Control Action
Early sown (Sept) cereals	High	Seed treatment & pyrethroid in Nov <u>Or</u> Spray at 2/3 leaf stage & 1 st week Nov
Oct sown	Medium to high	Seed Treatment <u>Or</u> Pyrethroid spray 1st week Nov
Emerging after Nov	Low	Control needed in mild winters where aphids are plentiful or in risk areas

Monitor for control failure – do not reapply the same treatment.
Late spraying of previously unsprayed crops – beneficial when virus is widespread

BYDV Control – 2017 Cork Trial



Untreated

Pyrethroid

Seed Treatment

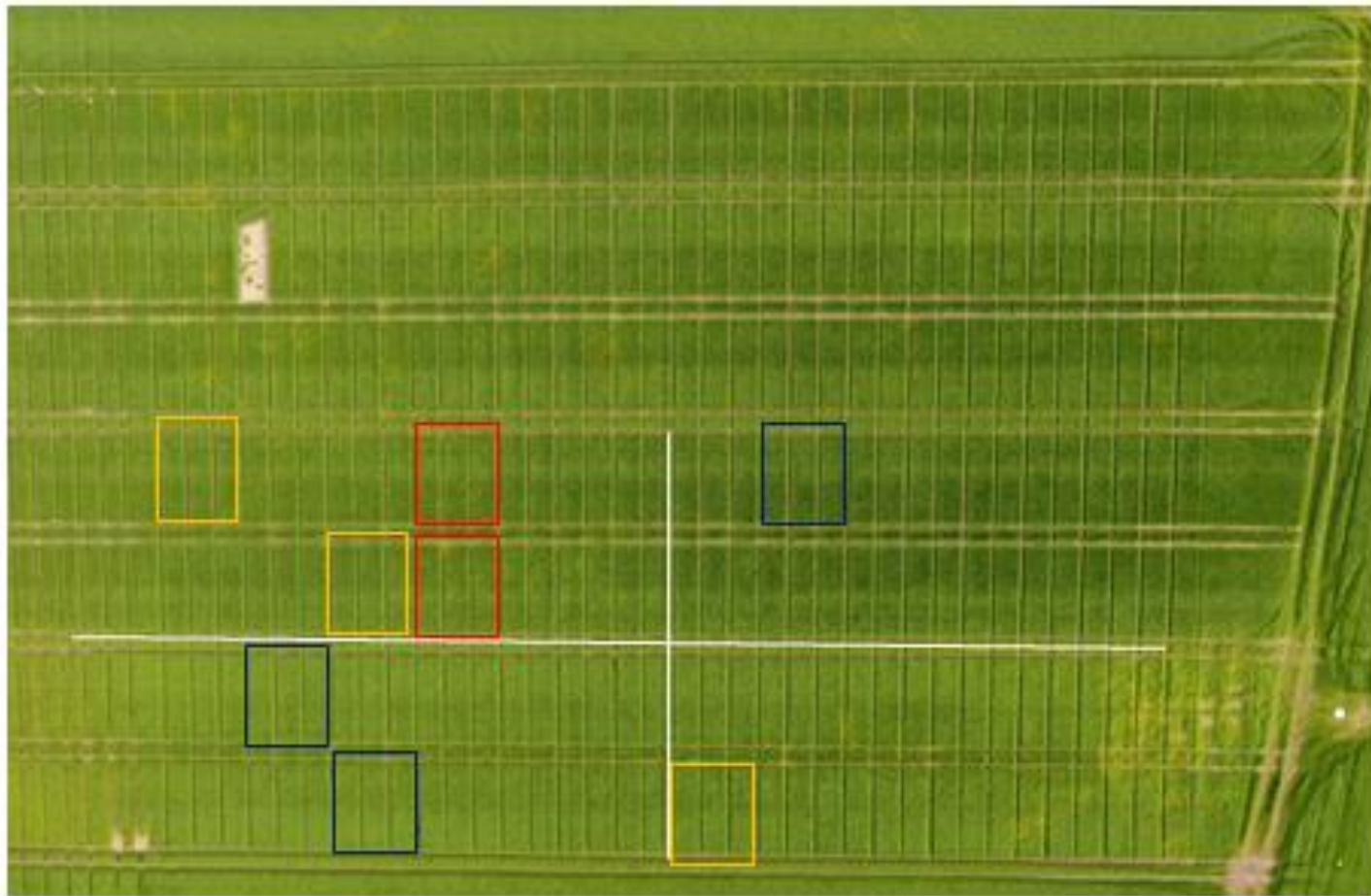
Winter Barley, Cassia, Sown 12th October, Cork

Insecticide trial Cork 2017

Redigo deter Seed Treatment	Pyrethroid foliar application	% BYDV	Yield	No. live aphids/m ² @GS31
No	No	39	4.6	30.9
No	Nov (2/3 leaf stage)	11.4	6.1	7.7
No	Jan	4.5	7	3.9
Yes	No	3	7	4.4
Yes	Nov (6 weeks from planting)	2.6	7	3.3
Yes	Jan	2	7	1.65

One year data only
kdr Grain Aphids identified in plots

BYDV Control – 2017 Carlow Trial



Untreated

Pyrethroid

Seed Treatment

Winter Barley, Cassia, Sown 3rd October, Carlow

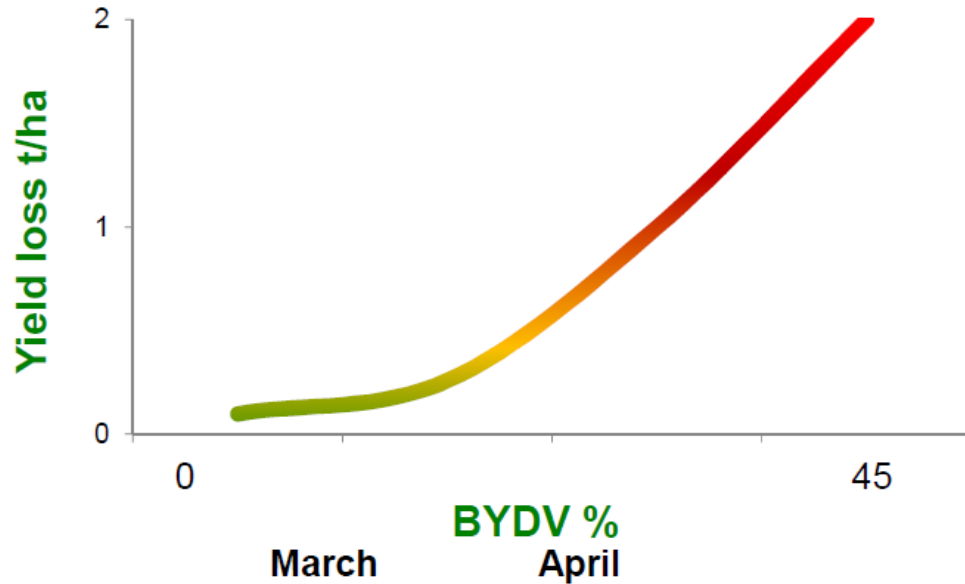
Insecticide trial Carlow 2017

Redigo deter Seed Treatment	Pyrethroid foliar application	% BYDV	Yield	No. live aphids/m ² @GS31
No	No	3.7	7.2	12.7
No	Nov (2/3 leaf stage)	2.3	8.8	0
No	Jan	2.6	8.6	1.65
Yes	No	2	8.8	0
Yes	Nov (6 weeks from planting)	1.9	9	0
Yes	Jan	0.9	9.2	0

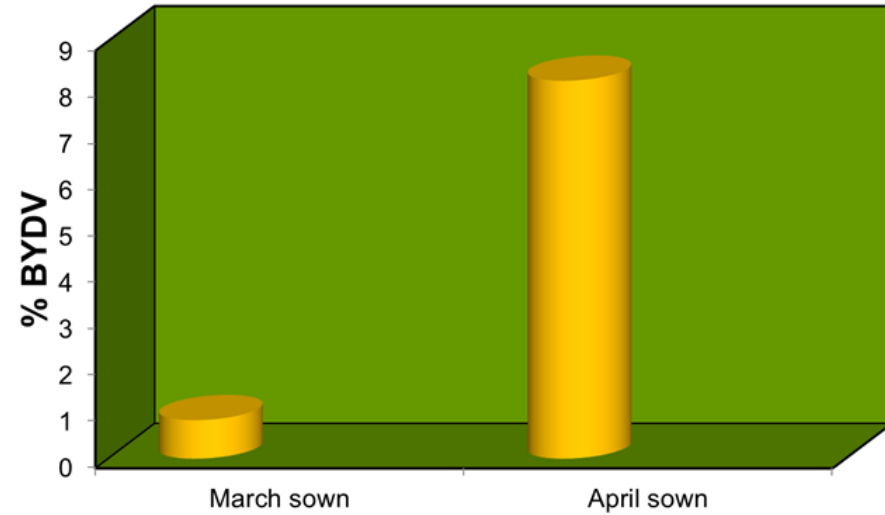
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Spring Barley BYDV Control

Yield loss due to BYDV



March v April % BYDV



Mean of 8 seasons
Kennedy, 2014

Spring BYDV Control

Crop	BYDV Risk*	Control Action
*Based on 8 years Teagasc trials		
March sown spring cereals	V. low	Aphicide spray may not be necessary
April sown spring cereals	Medium to high	Single pyrethroid spray at G.S.14
		Seed treatments <u>not</u> permitted in spring

Looking Forward

Risk Factors

- ◆ Early sown autumn crops / late sown spring crops
- ◆ Mild winters (Aphids overwintering)
- ◆ Mild Autumns (Aphid migration period lengthened)

Challenges

- ◆ No Redigo deter?
- ◆ Further resistance development
- ◆ Climate change

Future Avenues

- ◆ Importance of cultural control
- ◆ Alternative insecticides?
- ◆ Variety selection
- ◆ Biocontrol: Encouraging natural enemies
- ◆ Improved monitoring



Establishment & management of Ecological Focus Areas to enhance IPM

- ◆ Evaluate impact of EFAs within arable systems on
 - ◆ beneficial invertebrates & parasitoids
 - ◆ yield & crop health
- ◆ Test current GLAS arable margin treatments & potential variations
- ◆ Looking for planted arable margins to monitor for aphids and natural enemies
- ◆ Contact: Louise.McNamara@Teagasc.ie,
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