Teagasc Disease Seminar
1st February 2022

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ALLIUM & BRASSICA AGRONOMY
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What are you in for over the next 25 minutes

- Main ‘leaf spot’ diseases and options for control.
- Oomycete diseases and options for control.
- Fungicide programmes for foliar disease
- Soil-borne diseases
- Virus diseases
- Storage diseases

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Brassica Leaf Spots

Ringspot (*Mycosphaerella brassicicola*)

- Inoculum can be seed, or airborne.
- Concentric rings of pycnidia (spore fruiting bodies)
- Definite lesion margin
- Favoured by cool, wet conditions (August – end November). Temps >10°C.

Brassica Leaf Spots

Light Leaf Spot (*Pyrenopeziza brassicae*)

- Airborne inoculum coming from infected leaves/debris
- Lesions occur as very diffuse white spots due to spore masses; these give way to light/dark brown lesions
- Infection favoured by cold, very wet conditions. October – February (100 hours leaf wetness, >4°C)
- Most commonly seen as a ‘smudgy’ finger print.
- Triazole resistance, particularly tebuconazole in Scotland and N England

Brassica Leaf Spots

Dark Leaf Spot (*Alternaria brassicae/brassicicola*)

- Inoculum can be seed or airborne
- Can cause damping off of seedlings
- Dark brown spots on leaves become larger lesions with yellow margins and necrosis
- Favoured by warm, wet conditions (July-Oct)

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Brassica Leaf Spots

Phoma Leaf Spot (*Phoma lingam*)

- Inoculum can be seed, soil or air borne.
- Light tan leaf spots with black dots (pycnidia) randomly scattered across the lesion.
- Canker may develop as a dry rot on plant stems or on cut stalks in stored cabbage
- Favoured by mild, wet conditions (July – Oct)

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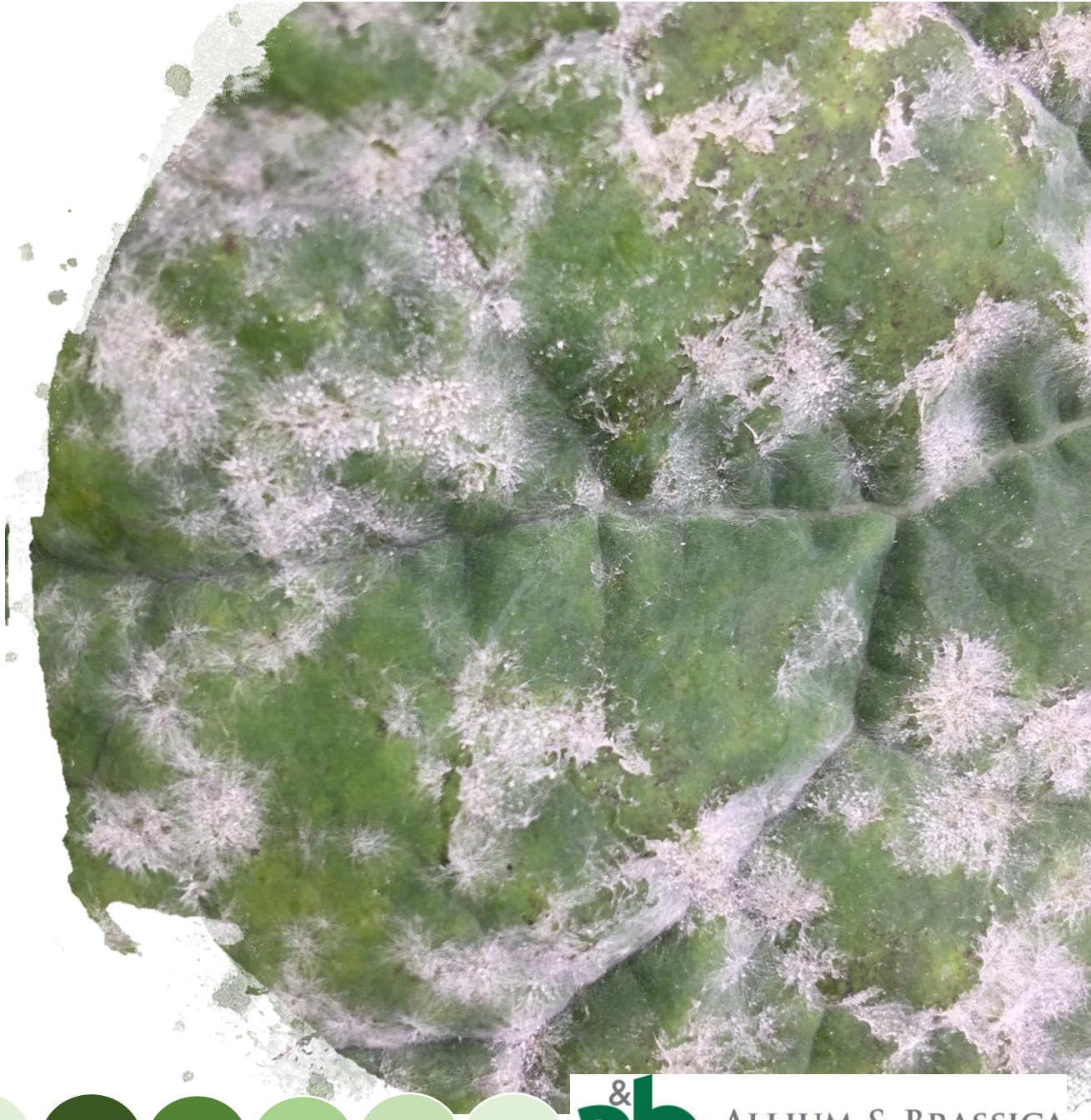
Brassica Leaf Spots

Powdery Mildew (*Erysiphe cruciferarum*)

- Star-shaped, white lesions usually on upper leaf surface
- Lesions usually merge and leaf surface appears dusted with a white powder
- Infection favoured by warm, humid conditions, but disease development occurs best under low RH (July to November)

Powdery Leaf Spot is NOT a leaf spot but most leaf spot fungicides will give some control



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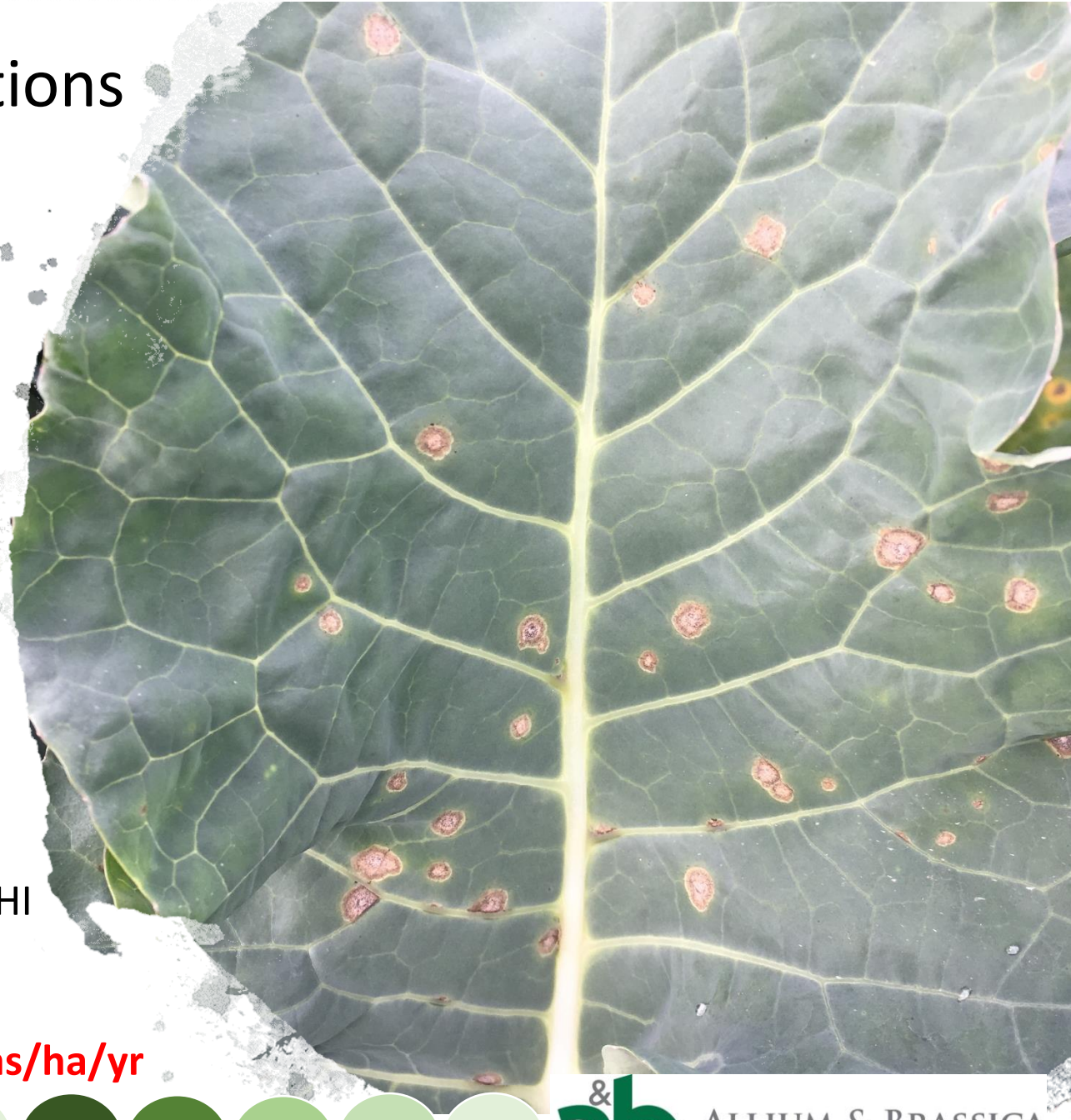
Brassica Leaf Spots – Fungicide Options



Protectant Fungicides

Amistar (Azoxystrobin - AZ) – 2 x 1L/ha, 14d HI.

Eradicant Fungicides

Rudis (Prothioconazole) 3 x 0.4L/ha, 21d HI
not kale/collards

Score 250EC (Difenoconazole -DFZ) – 2 x 0.5L/ha, 21d HI

Signum (Boscalid/Pyraclostrobin) **–** 3 x 1kg/ha, 21d HI

Perseus (Fluxapyroxad + DFZ) – 3 x 1L/ha, 14 d HI
not kale/collards

Amistar Top (DFZ + AZ) 2 x 1L/ha, 21d HI

Nativo 75WG (TBZ + Trifloxystrobin) 3 x 0.36kg/ha, 21d HI
not kale/collards

Az restricted to 500g as/ha/yr. DFZ restricted to 250g as/ha/yr

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Brassica Oomycete Diseases

White Blister (*Albugo candida*)

- Widespread on crucifers
- Characteristic disease with chalky, blister like pustules
- Favoured by warm, humid but not wet conditions.
- July to October

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Brassica Oomycete Diseases

Downy Mildew (*Peronspora parasitica*)

- Upper leaf surface shows irregular brown/black areas
- Under surface covered with white to grey fluffy mould
- Favoured by cool, moist conditions (August to November)
- Sporulation occurs at night

Brassica Oomycete Fungicide Options

Protectant Fungicides

Amistar (Azoxystrobin) – 2 x 1L/ha, 14d HI

Eradicant Fungicides

Infinito (Fluopicolide + propamocarb H) – 1 x 1.6L/ha, 14d HI.

SL567a (Metalaxyl-m) – sprouts, cabbage and cauliflower only. 3 x 0.16l/ha, 14d HI.

Revus (Mandipropamid) 2 x 0.6L/ha, 14d HI. **broccoli, cauliflower and sprouts only**

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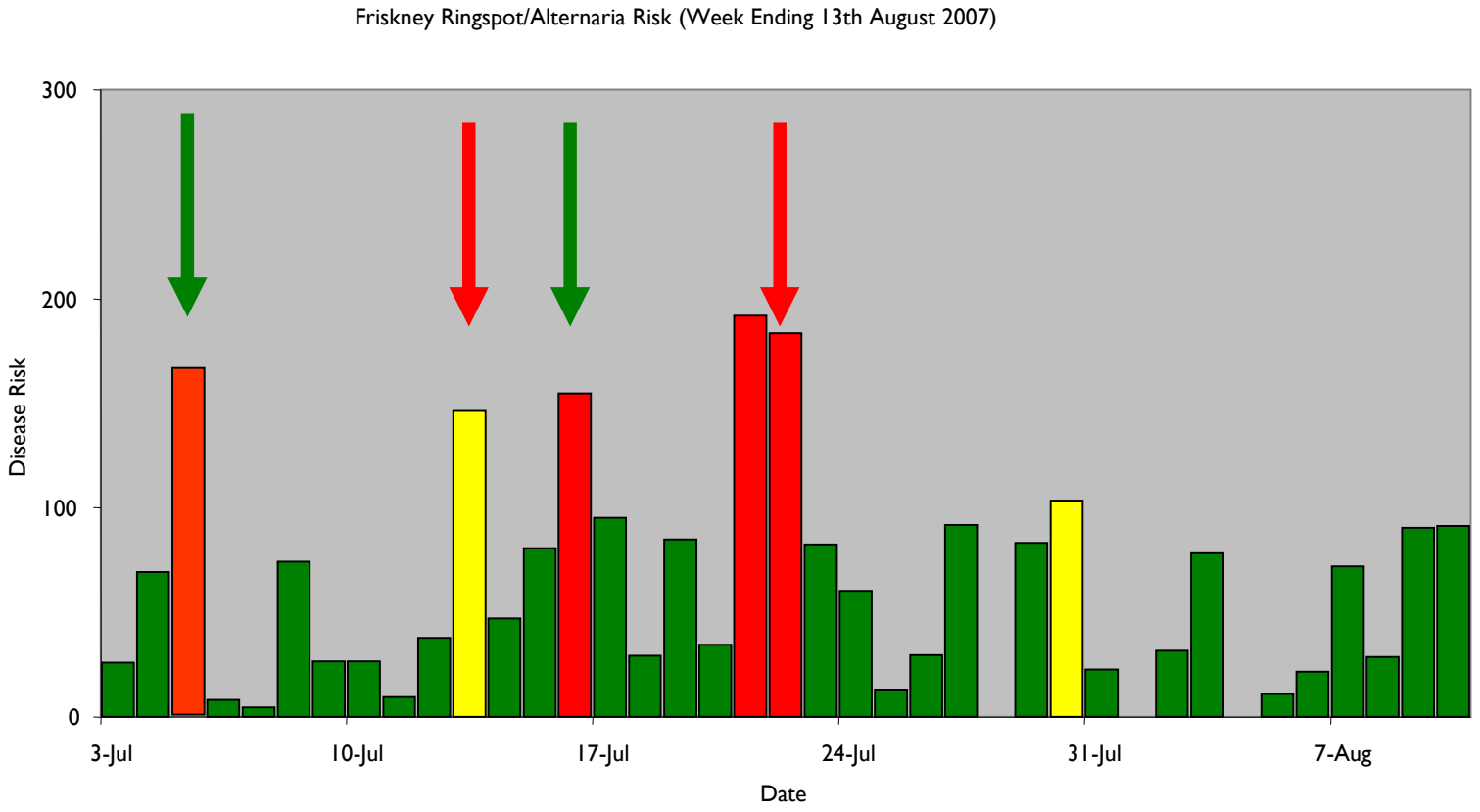
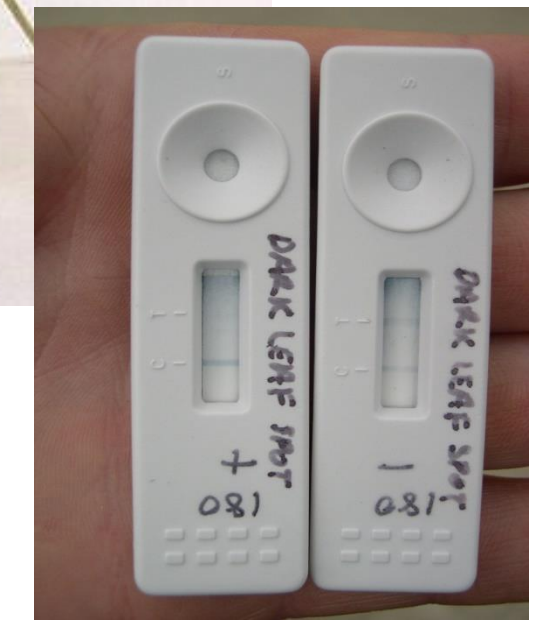
Airborne disease forecasting

Ringspot, Light Leaf Spot, Dark Leaf Spot, Powdery Mildew

https://www.syngenta.co.uk/brassica-alert





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Broccoli Disease Programme

- Typically no fungicides applied unless for white blister or systemic downy mildew.
- White blister – SL 567a, Signum, Infinito
- Systemic downy mildew

Timing	Product	Rate	Water rate	Comments
4 weeks post plant	Amistar	1 L/ha	300 L/ha	Include a foliar phosphite such as Farmfos/Force
10 -14 days later	Revus **OR** Infinito + Phase II	0.6L/ha **OR** 1.6L/ha	300 L/ha	Before head visible MRSO needed to ensure penetration. 14 day HI

Cauliflower Disease Programme

- Typically no fungicides applied to summer/autumn cauliflower unless for white blister or downy mildew
- White blister – Amistar + SL 567a
- Downy mildew – Infinito or Revus
- Autumn/winter cauliflower

Timing*	Product	Rate	Water rate	Comments
End September	Amistar Top	1 L/ha	300 L/ha	Include appropriate fungicide if white blister/downy mildew present.
Mid October	Rudis	0.4 L/ha	300 L/ha	Include appropriate fungicide if white blister/downy mildew present.

** Guide only adjust to suit crop growth stage/anticipated harvest and disease pressure*

Kale Disease Programme

- White blister – Amistar + SL 567a
- Powdery mildew – Potassium hydrogen carbonate (Karma) 8 x 3kg/ha, 1d HI

Timing*	Product	Rate	Water rate	Comments
Mid August	Signum + NIW	1 kg/ha	300 L/ha	Include appropriate fungicide if white blister/downy mildew present.
Early September	Amistar Top	1 L/ha	300 L/ha	
End September	Signum + NIW	1 kg/ha	300 L/ha	
Mid October	Amistar Top	1 L/ha	300 L/ha	
Early November	Signum	1 kg/ha	300 L/ha	

** Guide only adjust to suit crop growth stage/anticipated harvest and disease pressure*

Brussels sprouts Disease Programme

- White blister – SL 567a
- Powdery mildew – Potassium hydrogen carbonate (Karma) 8 x 3kg/ha, 1d HI or swop Amistar Top for Perseus

Timing*	Product	Rate	Water rate	Comments
End July	Amistar Top	1 L/ha	300 L/ha	Include appropriate fungicide if white blister present.
Mid August	Rudis	0.4 L/ha	300 L/ha	
Early September	Signum + Activator 90 (NIW)	1 kg/ha 0.2 L/ha	300 L/ha	
Late September	Nativo 75WG	0.36 kg/ha	300 L/ha	
Mid October	Rudis	0.4 L/ha	300 L/ha	
Early November	Amistar Top	0.4 L/ha	300 L/ha	

** Guide only adjust to suit crop growth stage/anticipated harvest and disease pressure*

Cabbage Disease Programme

Storage cabbage

Timing*	Product	Rate	Water rate	Comments
End July	Signum + NIW	1 kg/ha	300 L/ha	Include SL 567a if white blister present.
Mid August	Rudis	0.4 L/ha	300 L/ha	
Early September	Nativo 75WG	0.36 kg/ha	300 L/ha	
Late September	Rudis	0.4 L/ha	300 L/ha	
Mid October	Signum + NIW	1 kg/ha	300 L/ha	
Early November	Rudis (if needed!)	0.4 L/ha	300 L/ha	

Autumn/winter cabbage

Timing*	Product	Rate	Water rate	Comments
Early September	Amistar Top	1 L/ha	300 L/ha	Include SL 567a if white blister present.
Late September	Nativo 75WG	0.36 kg/ha	300 L/ha	
Mid October	Rudis	0.4 L/ha	300 L/ha	
Early November	Amistar Top	1 L/ha	300 L/ha	

Brassica Bacterial Diseases

Xanthomonas (*X campestris pv campestris*)

- Predominantly seedborne and spread during propagation.
- Characteristic yellow V shaped lesions occur from the leaf edge. Veins within the lesion turn black.
- Infection favoured by warm, wet conditions

Control – Predominantly cultural : nutrition, variety selection, rotation and separation. Strobilurin/triazole mixes can reduce disease incidence by keeping leaves healthy

Brassica Bacterial Diseases

Spear Rot (*Pseudomonas flourescens*)

- Mainly problematical in June and September/October.
- Infected areas start off with flowerbuds yellowing. Followed by browning of tissue and characteristic smell.

Control – Predominantly cultural : nutrition, variety selection, rotation and separation.

Brassica Soil-borne Diseases

Clubroot (*Plasmodiophora brassicae*)

- Affects all crucifers and cruciferous weeds ie. Shepherds Purse, Charlock.
- First symptoms are plants wilting usually in discrete areas.
- Upon lifting affected plants the roots are swollen and distorted.
- Resting spores are tough and remain viable for 20 years.

Control – Predominantly cultural : Varietal resistance, rotation, improve drainage, lime to pH 7.5, Limex & Perlka (calcium cyanamide)

Brassica Virus Diseases

Three main diseases:

- **Turnip Yellows (TuYV)** – most significant. Largely symptomless but can cause significant yield loss
- **Turnip Mosaic Virus (TuMV)** – reasonably common, obvious symptoms (circular irregular symptoms on leaves).
- **Cauliflower Mosaic Virus (CaMV)** – relatively rare
- All aphid transmitted largely by *M. persicae*

Control – rotation and separation, good hygiene, prompt control of aphids both in field and propagation.

Brassica Virus Diseases

Turnip Yellows Virus (TYV) can cause severe stunting of plants.

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Brassica Virus Diseases

Turnip Yellows Virus (TYV) can cause ‘tipburn’ symptoms in stored cabbage.

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Brassica Virus Diseases

Turnip Mosaic Virus (TuMV) can cause cigar-burn internally on stored cabbage

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Brassica Storage Diseases

Botrytis Grey Mould, Phytophthora

Control – Predominantly cultural : Good hygiene, careful handling, correct storage temperatures.

In the UK we drench with **Serenade ASO** after harvest. 600ml/tonne in 20L water.

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