

Annex A5.2: Break out session 2: Major diseases on vegetables, control and bottlenecks

	Control strategies currently used when problem	IPM alternatives	Bottlenecks	Additional comments
Fungi				
<i>Plasmidiophora brassicae</i>	crop rotation, lime nitrogen, resistant varieties	soil indexing	resistance likely to break down; monitoring may be costly; resistance not stable	
<i>Hyaloperonospora parasitica</i> (<i>Peronospora parasitica</i>)	ventilation, irrigation, fungicides in raising houses, resistance	biofumigant seed meals, vegetable oils	cultural practices in nurseries; new biocontrol products costly and efficacy may be partial (one product under registration)	Low risk definition is not available yet might be a bottleneck for registering biocontrol products
<i>Albugo candida</i>	chemical treatment, resistance	cultural practices	cultural practices not effective, not convenient, resistance only partial and variety choice limited	
<i>Phytophthora brassicae</i>				
<i>Botrytis cinerea</i>				
<i>Alternaria brassicae</i> and <i>brassicicola</i>	chemical treatment, resistance, DSS	cultural practices	resistance available?; changing growing practices not convenient; Fungicides are effective and solves problem, should be used in conjunction with forecasting	
<i>Mycosphaerella brassicicola</i>	fungicides, forecasting, resistance	cultural practices	fungicides are effective and should be used in conjunction with forecasting; resistance only partial; DSS services may be costly	Resistance only partial is not a bottleneck in FR; unknown resistance backgrounds may mean that resistance breaks down sooner: resistance in Brussels sprouts is limited
<i>Verticillium longisporum</i>				
<i>Erysiphe cruciferarum</i>	chemical control, resistance	vegetable oils, biofumigant seed meals	fungicides are effective, limited number of partial resistant varieties; new products only partially effective and require extra effort from grower	
<i>Sclerotinia sclerotiorum</i>	fungicides, rotations, forecasting, Coniothyrium minitans	cultural practices, soil steaming and disinfection	soil steaming and disinfection very expensive, biocontrol extra cost; fungicides need to be used with forecasting; no host resistance; risk of fungicide resistance	
<i>Rhizoctonia solani</i>	rotation and seed treatments with fungicides	biofumigation, biocontrol, glasshouse seedlings	biofumigation and biocontrol expensive	
<i>Leptosphaeria maculans</i> (<i>Phoma lingam</i>)	fungicides	cultural practices, biocontrol	tillage is costly, only partial solution, biocontrol only partial solution at best; fungicides used for other foliar pathogens will have effect on Phoma	
<i>Pyrenopeziza brassicae</i>	fungicides, resistant varieties	cultural practices	limited information about resistant varieties and variability in pathogen, ploughing is costly; fungicide resistance problems	
<i>Stemphylium</i> sp. (brown spot)		cultural practices		
Bacteria				
<i>Xanthomonas campestris</i> pv. <i>campestris</i>	hygiene crop rotation, disease free seed, irrigation control, resistance	soil steaming, hot water seed treatment	resistant varieties unknown or may not be stable (and therefore not suitable for marketing); Soil steaming and hot water treatment very expensive, cultural practices do not solve the problem; very difficult to produce disease free seeds;	
<i>Pectobacterium carotovorum</i> soft rot	partial resistance			
<i>Pseudomonas fluorescens</i> and <i>viridiflava</i>	cultural practices; partial resistance for broccoli		very difficult to control and only partial resistance	
Viruses				
Cauliflower mosaic virus	aphicides, rotation and removal debris	resistant varieties, destruction of plant material and weeds	cultural practices will constrain growing practices in some situations, resistant varieties limited in availability; destruction extra work for grower and not fully effective	
Turnip mosaic virus				
Beet western yellows = Turnip yellows virus				
Nematodes				
<i>Heterodera schachtii</i>				
<i>Meloidogyne</i> sp.				
Weeds	rotation, false sowing, tillage, mechanical, herbicides		cultural practices not always fit with growing system and only partially effective; mechanical weeding less convenient and more expensive, resistant weeds can be a future problem	

Main driver for uptake IPM measures is the loss of pesticides

Maintaining resistance (resistance breeding) may be a challenge across all Brassica vegetables

Chemical pesticides will contribute much less in the future in terms of solving current problems

Areas of many Brassica vegetables so small that they cannot justify registration of pesticides any more

Challenge to reach high level of reliability of IPM methods

Tendency for higher delay between treatment and harvest (because of residue issues) - new products needed

Storage diseases?

Biocontrol products in field performance? Use in combination with conventional pesticides