Improving International Potato Production

Pests and Pathogens



Pests and Pathogens

Approx. 1/4 world potato crop is lost to pests and pathogens





Challenges current and future

• Keeping ahead in the arms race between host resistance and pathogen

• Ensuring suitable and effective pesticides

Reduced pesticide usage



- June 2008: European Union stricter rules on pesticide usage
- Up to 85% of agrochemical products could become unavailable
- Potato prices could rise by 49-100%

(British Crop Protection Council)



Increasing human populations / cost of food

Climate change

- New pests and pathogens
- Increased survival and / or aggressiveness

Increased globalisation





Plant Pathology Programme

>50 staff: 22 Principle Investigators and 8 PhD students

- Late blight (Phytophthora infestans)
- Cyst nematode (PCN; G.pallida)
- Blackleg / soft rot (Pectobacterium / Dickeya)
- Fungal (tuber blemish) diseases
- Viruses PVY, PMTV, PLRV, TRV



- Virus vector aphids (*Myzus persicae*) and fungi (*Spongospora*)



Aims

• Durable pest & disease control strategies

- Host resistance

- Integrated pest and disease management





Host Resistance

 Discover and characterise novel sources of resistance e.g. in Commonwealth Potato Collection (CPC)

- Identify pathogen proteins (effectors) that trigger and /or suppress plant responses
- Identify plant genes targeted by these effectors and involved in resistant and susceptible responses





Genomics technologies

- Pectobacterium and Dickeya
- Phytophthora infestans
- Potato cyst nematode
- Viruses
- Potato



Type III secreted "effector" proteins













Exploiting transgenic technologies



S. Phureja and durable resistance

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Exploiting Solanum phureja: a unique source of genes for resistance in tetraploid potato





- Pectobacterium
- PVY, PLRV
- Late blight
- Tuber blemish diseases



Climate change



Dickeya dianthicola(Erwinia chrysanthemi)

- Cool climate variant
- Not yet found on potato in Scotland





Integrated pest and disease management

- Mechanisms of pest and pathogen spread, disease development and factors driving evolution and population change
 - Durable resistance
 - Chemical resistance
 - Climate change
 - Rapid diagnostics





Population genetics and epidemiology of *P. infestans* (Potato Council)





Epidemiology of Late Blight



Blue 13

- Overcome resistance of previously resistant cultivars
- More aggressive
- Metalaxyl insensitive



Real time PCR-based diagnostics

• PCN - G. pallida and G. rostochiensis







Summary

- Many challenges ahead
- Genomic technologies
- Develop resistant varieties
- Solanum phureja
- Monitor pest and pathogen populations

Pathology Programme SCRI











