APPSA 2nd SCIENTIFIC CONFERENCE

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Diversity and pathogenicity of fungal pathogens associated with atypical blemishes of potato tubers in Lesotho

CCARDESA
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GOVERNO DE ANGOLA

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Introduction

- Microbial pathogens causing superficial tuber skin blemishes significantly impact potato production

- causing severe economic losses
  - ➢ Reduction in yield
  - ➢ Tuber marketable quality

- Some of these blemishes are due to known pathogens, while others are due to unknown causes - known as atypical blemishes.

Objectives

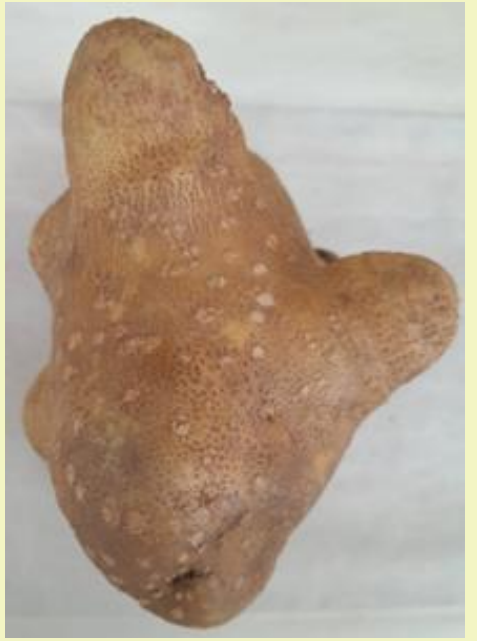
- To determine pathogens responsible for various atypical blemishes on potato tubers
- To diagnose the diseases caused by these pathogens
- To test whether the isolated microorganisms are able to cause atypical blemishes on progeny tubers so as to fulfill the Koch's postulates.

Materials and methods

- Potato tubers showing atypical disease symptoms
- Collected from three field trials conducted on naturally infested soil at the NUL farm at harvest
- 16 isolates were brought to the laboratory for fungal morphological identification and molecular characterization

Atypical superficial potato tuber blemishes showing symptoms where isolates were exercised from








Isolate ID	Disease	Symptoms	Isolate ID	Disease	Symptoms
PEH1; PEH2;	Elephant hide	Corky dark polygonal brown scab lesions	PDR1; PDR2; PDR3; PDR4; PDR5	Dry rot	Sunken and wrinkled brown to black tissue spots on tubers
PEH3	Growth cracks	Corky cracks with elephant hide	PBD1; PBD2; PBD3	Black dot	Several black dots or black sclerotia and brown to greyish blemishes
BLS1; BLS2; BLS3	Black scurf	Small crust like bodies with dark or black sclerotia	PLB1; PLB2; PLB3	Late blight	Rusty, copper brown or purplish flesh discoloration
PUN1		Tuber deformity			

Methodology

- Isolates were purified on PDA medium – visual and microscopic morphological characterization
- Three replications were made for each isolate pathogen
- Microbial characteristics were assesed for each identified pathogen

➢ colony color,

➢ microconidia and macroconidia shape and size,

➢ mycelium growth pattern

Methodology

- DNA extraction for molecular characterization of the fungal isolates was done by rDNA sequencing at Inqaba Biotechnologies in Pretoria, South Africa.

- The ITS region was amplified using ITS1-F (Gardes and Bruns, 1993) and ITS4 (White et al. 1990),
- The translation elongation factor 1α (tef1α) amplified with primers EF-1 and EF-2 (O' Donnel et al., 1998)

- Consensus sequences were deposited in GenBank and showed 99.7% similarity to R. solani AG 4HG I GenBank accession

Results

Fungal pathogen identified	Associated disease	Identification method	
		Morphological	rDNA ITS/ETF
Rhizoctonia solani	Elephant hide	X	
Rhizoctonia solani AG-4	Black scurf	X	X
Phytophora infestans	Late blight	X	
Fusarium oxysporum	Dry rot	X	X
Fusarium longifundum	Dry rot	X	X
Collectotrichum coccodes	Black dot	X	

Pathogenicity tests

- Four representative fungal isolates of each species were used in the pathogenicity tests
- Isolates were proved pathogenic to potatoes as progeny tubers showed diseases symptoms except for the control plants
- The cultivar effect should be taken into account in pathogenicity testing as it affects virulence of pathogens
- There were cultivar differences in susceptibility

Conclusions

- The study provided an insight into the atypical tuber blemishes affecting the potato industry in Lesotho
- Emphasizes the significance of accurate diseases diagnosis and pathogen identification for timely and proper potato diseases management.
- The role played by seed/soil-borne diseases transmission
- The results will enable farmers and extension officers to formulate control strategies against these plant diseases.

Recommendations

- The role played by bacteria, viruses and nematodes in addition to environmental influences in causing atypical tuber blemishes still needs to be investigated.
- Growers must be aware of this potential threat and begin to change their management practices
- Implementation of an integrated disease management approach involving regular monitoring of potato fields for early detection of pathogen symptoms, and use of resistant potato cultivars

Acknowledgements

- APPSA
- CCARDESS
- NUL