

Pomegranate Specialty Crop Block Grant

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Research Update:
2015 Growers Meeting
Gainesville
February 28, 2015

Main Focus Areas

- Disease survey and pathogen identification
- Disease management
 - Field trial 2014
 - Sensitivity tests 2015
- Monitoring pathogen prevalence in flower buds

Pomegranate Pathology

Part 1: Disease survey and pathogen identification

Disease Survey

- Field survey in four locations:
 - Boy Scout Rd, Odessa, FL
 - Edith Delaney Ln, Plant City, FL
 - Hatchineha Rd, Haines City, FL
 - Johnston Rd, Zolfo Springs, FL
- Disease samples collected from leaf, stem, flower, and fruit

Disease Survey (Leaf Symptoms)



Disease Survey (Fruit Symptoms)



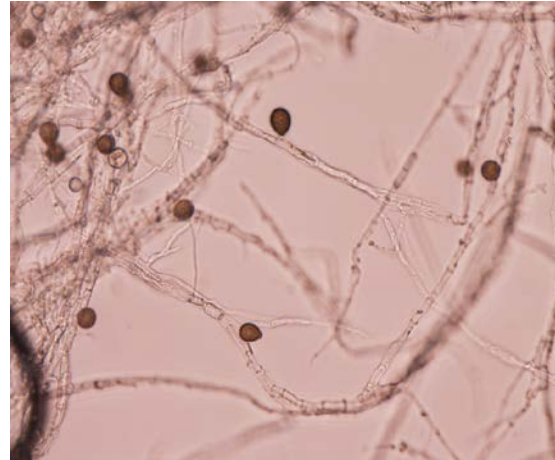
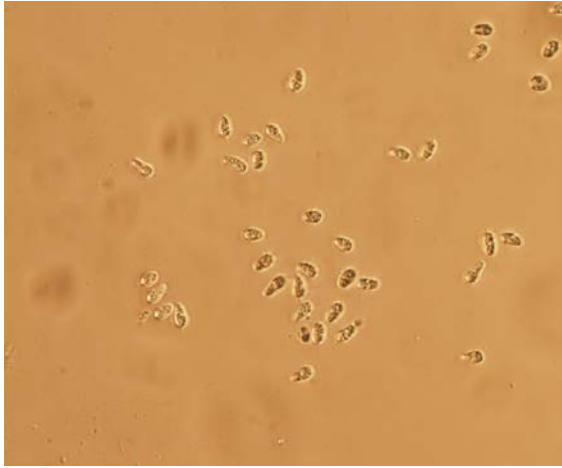
Disease Survey (Stem Symptoms)



Pathogen Identification

- Pathogens were isolated from samples; preliminary ID based on available morphological features (spores/spore-bearing structures).
- Genomic DNA was extracted from all isolations and the ITS region was amplified with ITS1 and ITS4 primers for sequencing.
- Sequences were compared with those in NCBI database and the pathogen was identified based on % identity

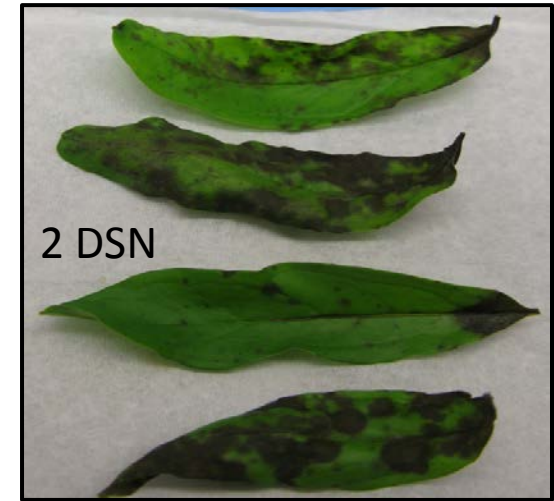
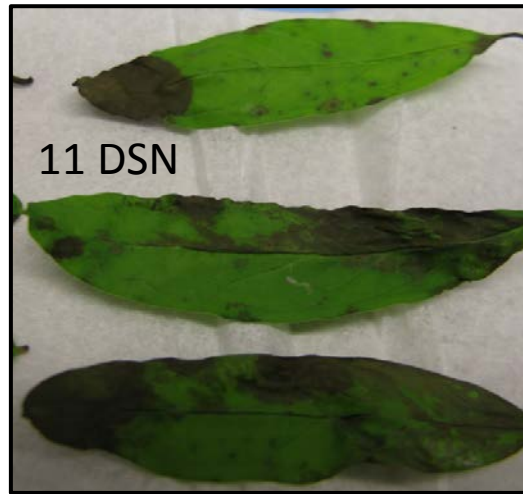
Conidial morphology of isolated fungi



Pathogenicity tests

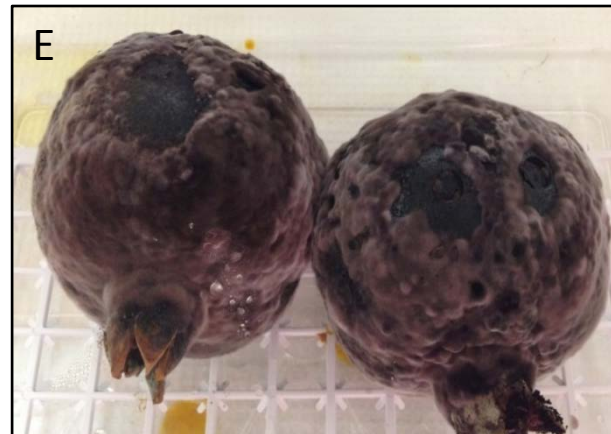
- Pathogenicity tests were carried out on leaves (attached and detached) and fruits (detached)
- Cultivar Azadi was used for attached leaf assays (three trees per isolate) and Don Somner North, Desertnyi, and Vietnam (four leaves per cultivar per isolate) were used for detached leaf assays
- Fruits were obtained from a local market for detached fruit assays (two fruits per isolate)

Pathogenicity test (Detached leaf assays)



3- *Amphilogia* sp; 11- *Neofusicoccum parvum*; 2- *Colletotrichum* sp.; 1- *Phyllosticta elongata* ;
8- *Pestalotiopsis clavispora*

Pathogenicity test (Detached fruit assays)



Pathogenicity tests on fruits; fruits inoculated with A) *Amphilogia* sp B) *Pilidiella granati*, C) *Colletotrichum* sp.1 D) *Colletotrichum* sp. 2, E) *Lasiodiplodia* sp., and F) *Neofusicoccum parvum*

Pathogen Identification (Results)

Pathogen	Plant Part	% Isolation	Pathogenicity ^a
<i>Colletotrichum</i> sp.	Leaf, Stem, Flower, Fruit	29	+ + **
<i>Neofusicoccum parvum</i>	Leaf, Stem, Pedicel	6	+ + **
<i>Amphilogia</i> sp.	Leaf, Stem, Flower	6	+ + **
<i>Pilidiella granati</i>	Stem	3	+ + **
<i>Lasiodiplodia</i> sp.	Leaf, Stem, Pedicel, Fruit	9	+ + **
<i>Alternaria</i> sp.	Leaf	3	+ -
<i>Nigrospora sphaerica</i>	Leaf, Fruit	6	+ -
<i>Corynespora casiicola</i>	Leaf	3	+ -
<i>Epicoccum nigrum</i>	Stem	6	- -
<i>Phyllosticta</i> sp.	Leaf	3	- -
<i>Pestalotiopsis clavispora</i>	Leaf	18	- -
<i>Fusarium</i> sp.	Fruit	6	- -
<i>Nectria mauritiicola</i>	Stem	3	- -

^a + positive on leaves; + positive on fruits; ** aggressive

Pomegranate Pathology

Part 2: Disease Management

(Field trial 2014)

Fungicide Trials

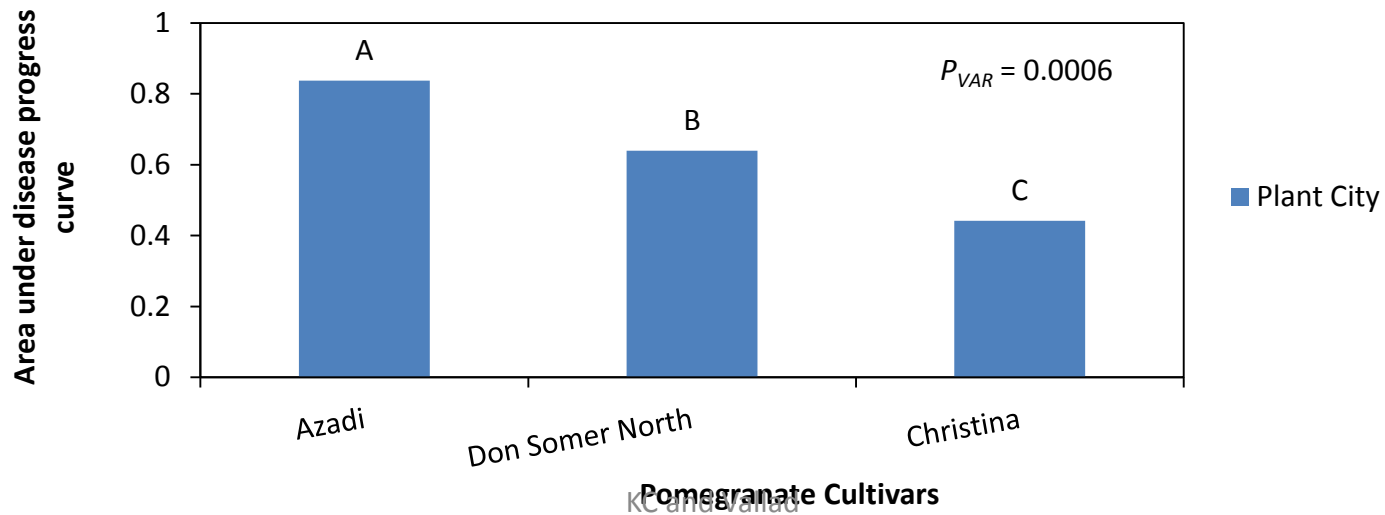
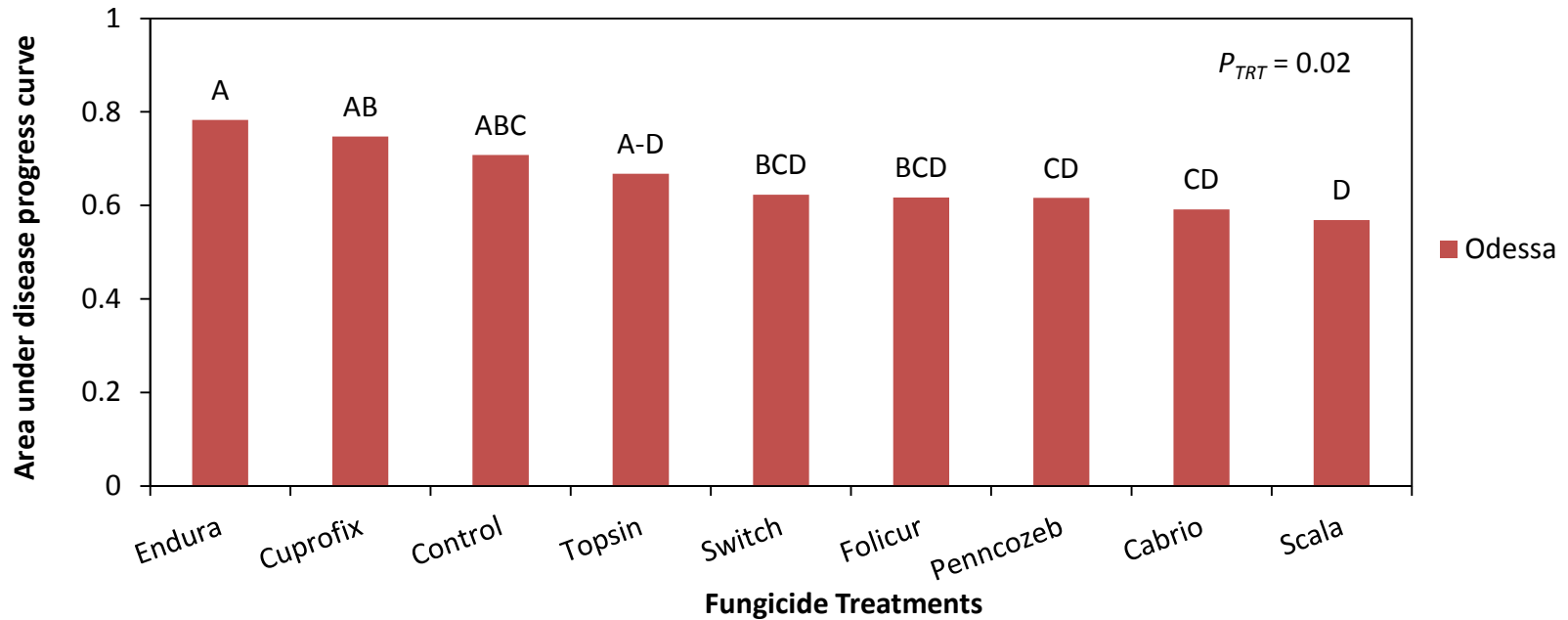
- Fungicide trials at two locations:
 - Boy Scout Rd, Odessa, FL
 - Edith Delaney Ln, Plant City, FL
- Sprayed two times with eight different compounds at three weeks interval

Trt	Trade Name	Rate (per acre)	Trt	Trade Name	Rate (per acre)
1	Cabrio	16 oz	5	Endura	12.5 oz
2	Switch	11 oz	6	Penncozeb	1.5 lb
3	Scala	18 fl oz	7	Cuprofix	3 lb
4	Topsin	1.5 lb	8	Folicur	8 fl oz

Fungicide Trials

- Two cultivars were sprayed in Odessa, FL
 - Granada, and Gissarki Rozovyi
 - Three replications per treatment per cultivar
 - Two trees per replication
- Three cultivars were sprayed in Plant City, FL
 - Azadi, Christina, and Don Somner North
 - Two replications per treatment per cultivar
- Trees were rated weekly for six weeks using The Horsfall-Barratt Scale

Fungicide Trials



Pomegranate Pathology

Part 2: Disease Management

(Fungicide sensitivity tests 2015)

Fungicide Sensitivity tests

- Four pathogens were tested for sensitivity
 - *Lasiodiplodia* sp.
 - *Neofusicoccum parvum*
 - *Colletotrichum* sp1
 - *Colletotrichum* sp2
- Three isolates of each replicated three times

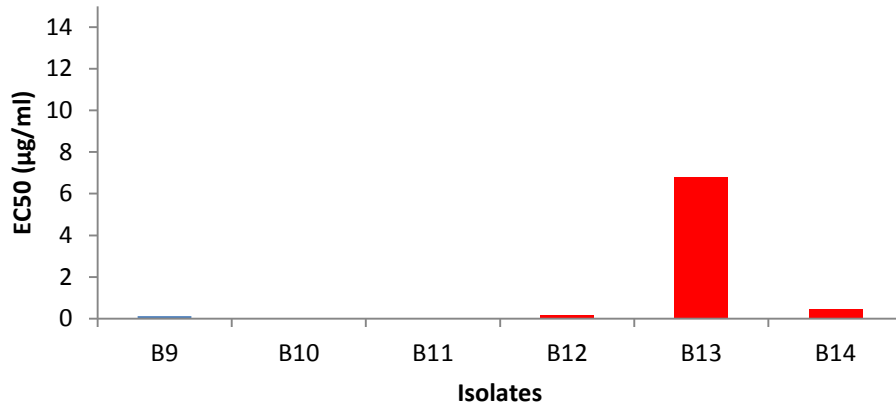
Fungicide Sensitivity tests

- Seven compounds were tested
 - 5 concentrations (100, 10, 1, 0.1, 0.01 $\mu\text{g/ml}$) of AI vs control
 - EC_{50} for each compound was calculated

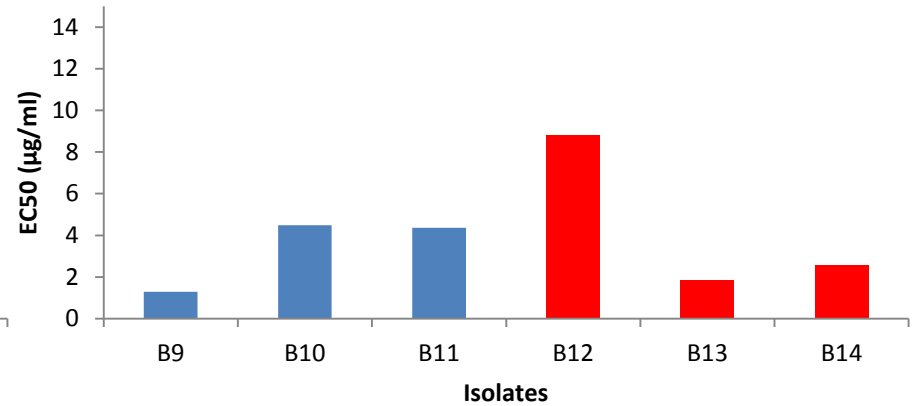
Trade name	Active Ingredient
Cabrio	Pyraclostrobin
Penncozeb	Mancozeb
Scala	Pyrimethanil
Folicur	Tebuconazole
Topsin	Thiophanate-Methyl
Cuprofix	Copper compound
Endura	Boscalid

Fungicide Sensitivity tests (Results)

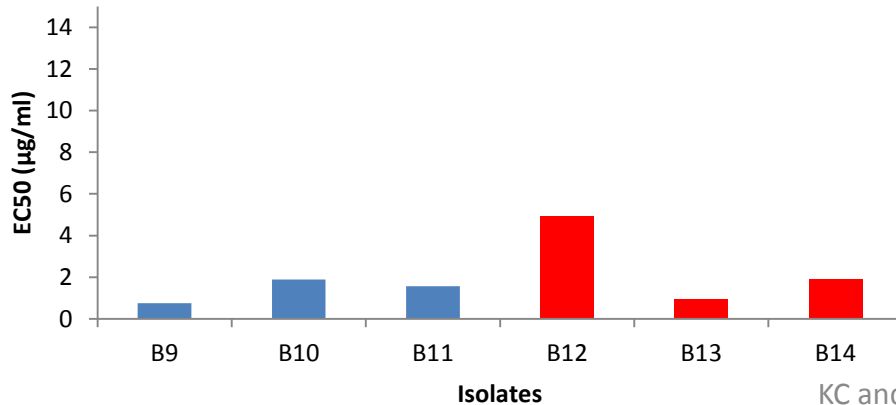
Cabrio



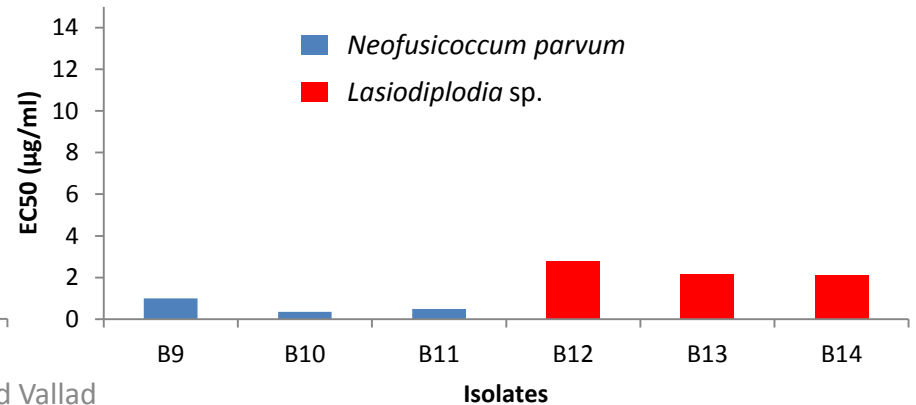
Penncozeb



Scala



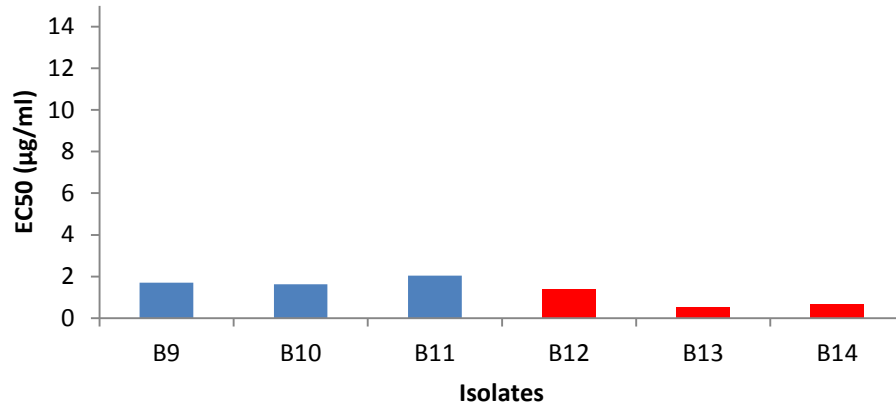
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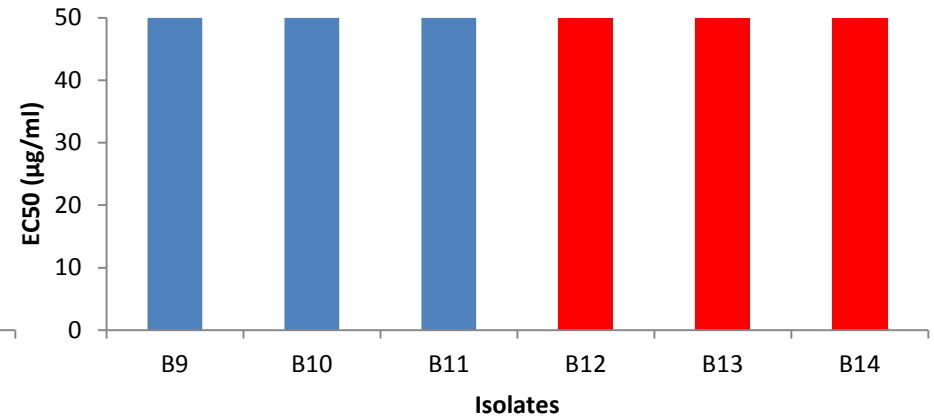
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Fungicide Sensitivity tests (Results)

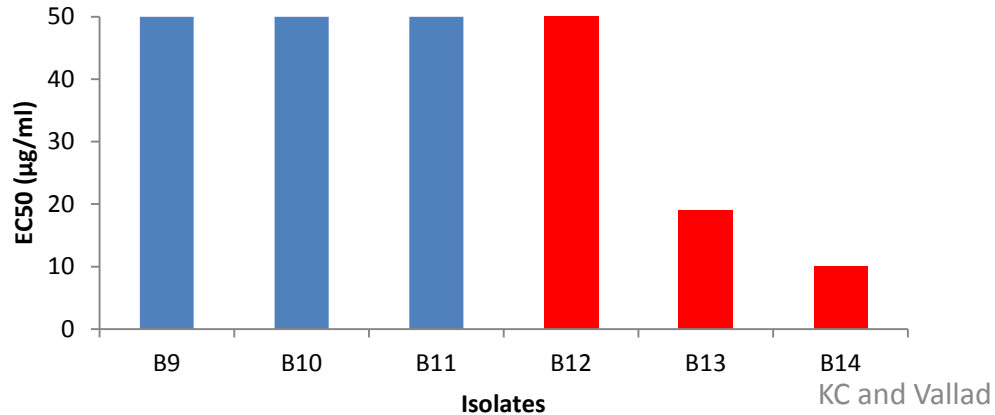
Topsin



Cuprofix



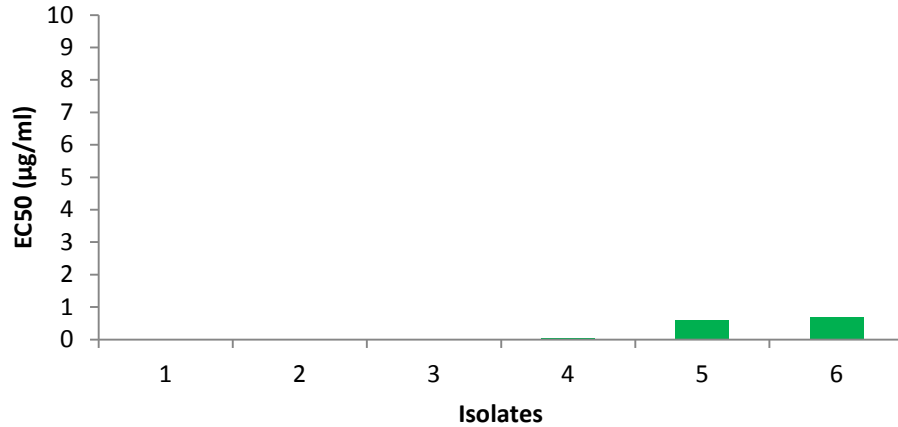
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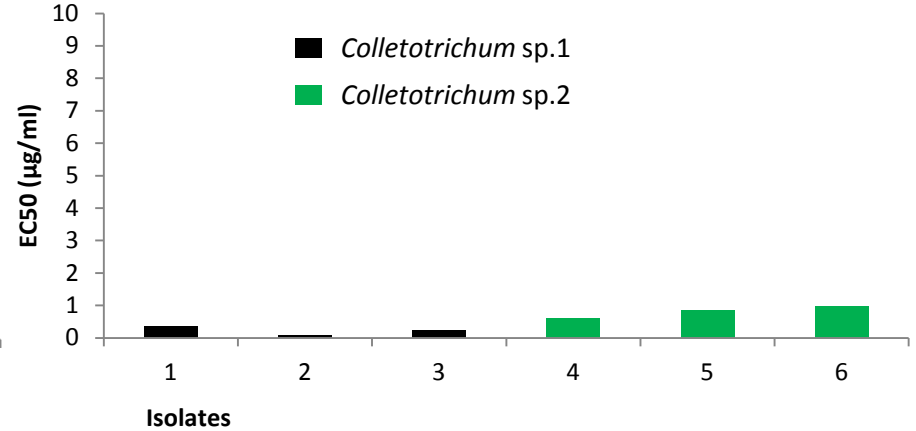
■ *Neofusicoccum parvum*
■ *Lasiodiplodia sp.*

Fungicide Sensitivity tests (Results)

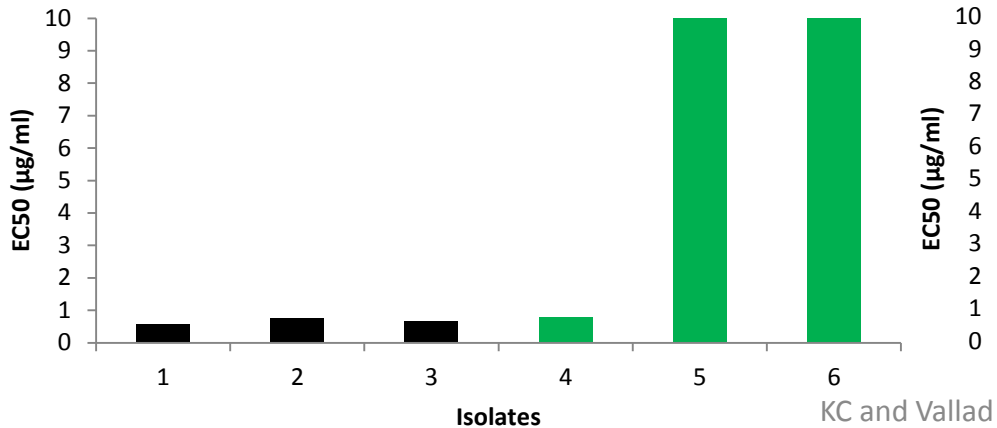
Cabrio



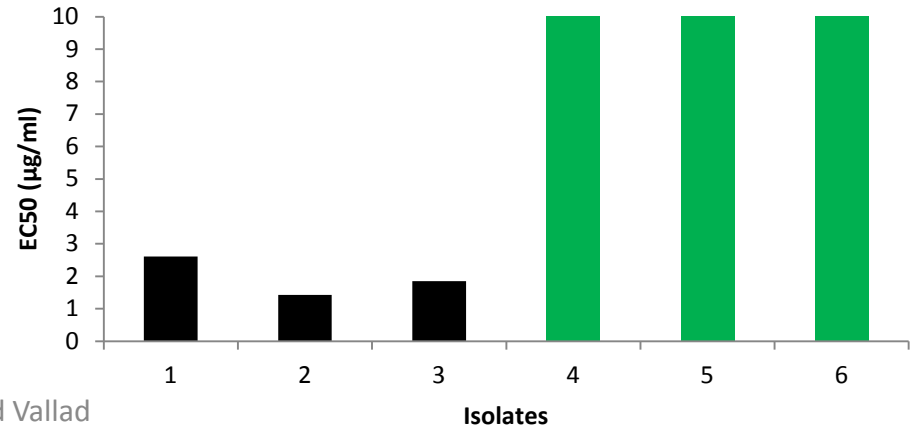
Folicur



Topsin

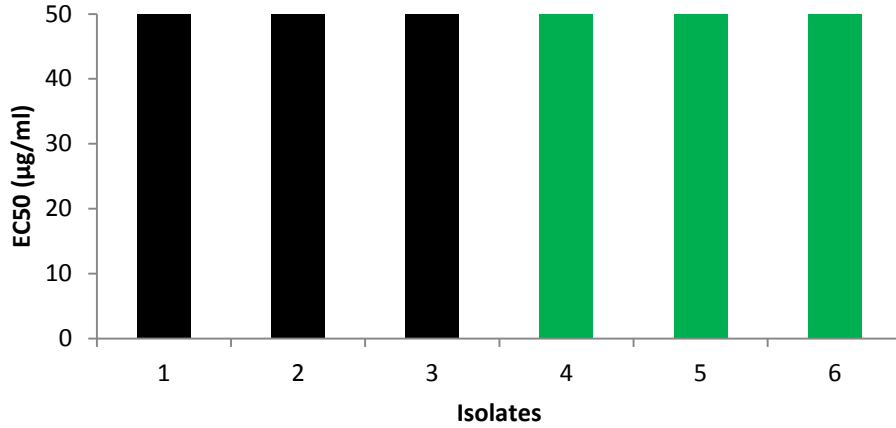


Scala

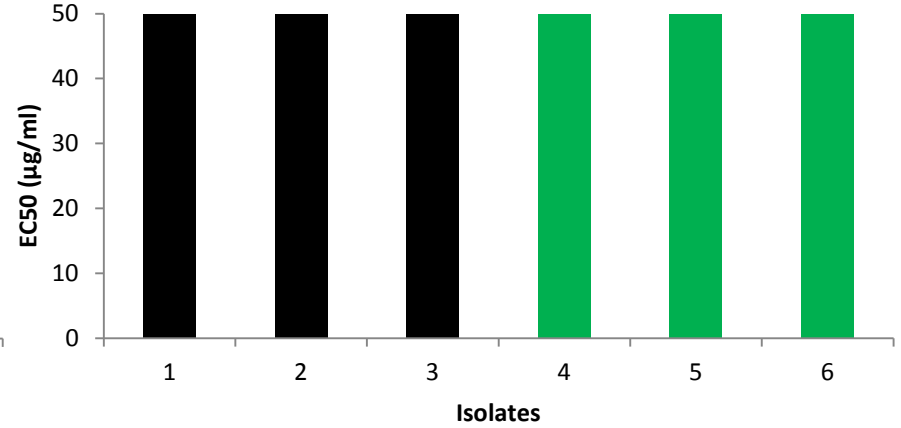


Fungicide Sensitivity tests (Results)

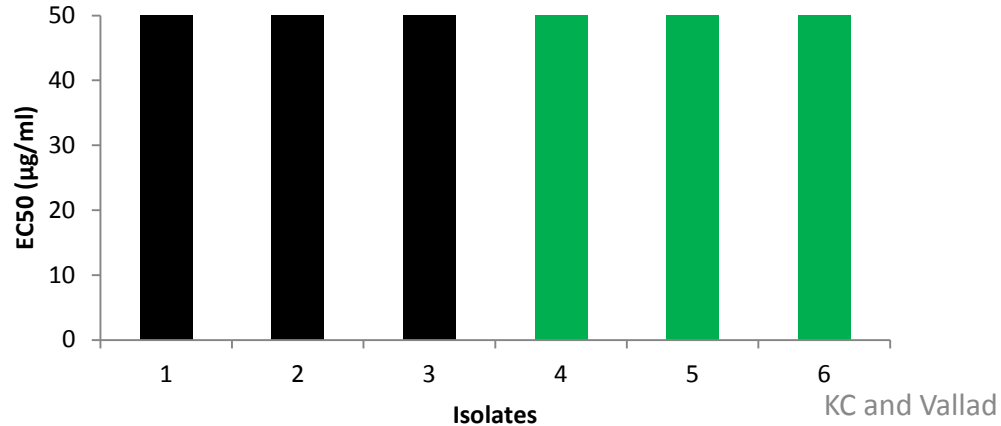
Penncozeb



Cuprofix



Endura



■ *Colletotrichum* sp.1
■ *Colletotrichum* sp.2

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Pomegranate Pathology

Part 3: Monitoring pathogen prevalence in flower buds

Monitoring pathogen prevalence in buds

- Flower buds were collected on late January 2015
- Buds on six different stages of flowering were tested for presence of pathogen

Monitoring pathogen prevalence in buds



Monitoring pathogen prevalence in buds



Results



Results



Results

Pathogen	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
<i>Amphilogia</i> sp.	X	X	X	X	X	X
<i>Colletotrichum</i> sp.	X		X	X	X	X
<i>Lasiodiplodia</i> sp.				X	X	X
<i>Alternaria</i> sp.	X	X	X	X	X	X
<i>Aspergillus</i> sp.			X		X	X
<i>Pestalotiopsis clavispora</i>	X	X	X	X	X	X
<i>Phyllosticta</i> sp.						X

Summary

- Six pathogens were identified as very aggressive on pomegranate fruits and leaves. Among these five were frequently isolated.
- Five compounds (Cabrio, Scala, Topsin, Folicur, and Penncozeb) were effective against pathogens in Botryosphaeriaceae family.
- Two compounds (Cabrio, and Folicur) were effective against *Colletotrichum* sp. These tests need further verification.
- Flower buds are infected in very early stage suggesting early application of fungicides.

Acknowledgements

- Dr. Bill Castle
- Ms. Cindy Weistein, Ms. Lisa Strange, Ms. Martha Sutherland
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