



Agriculture, Life &
Veterinary Sciences &
Cooperative Extension

Update on Cotton Diseases

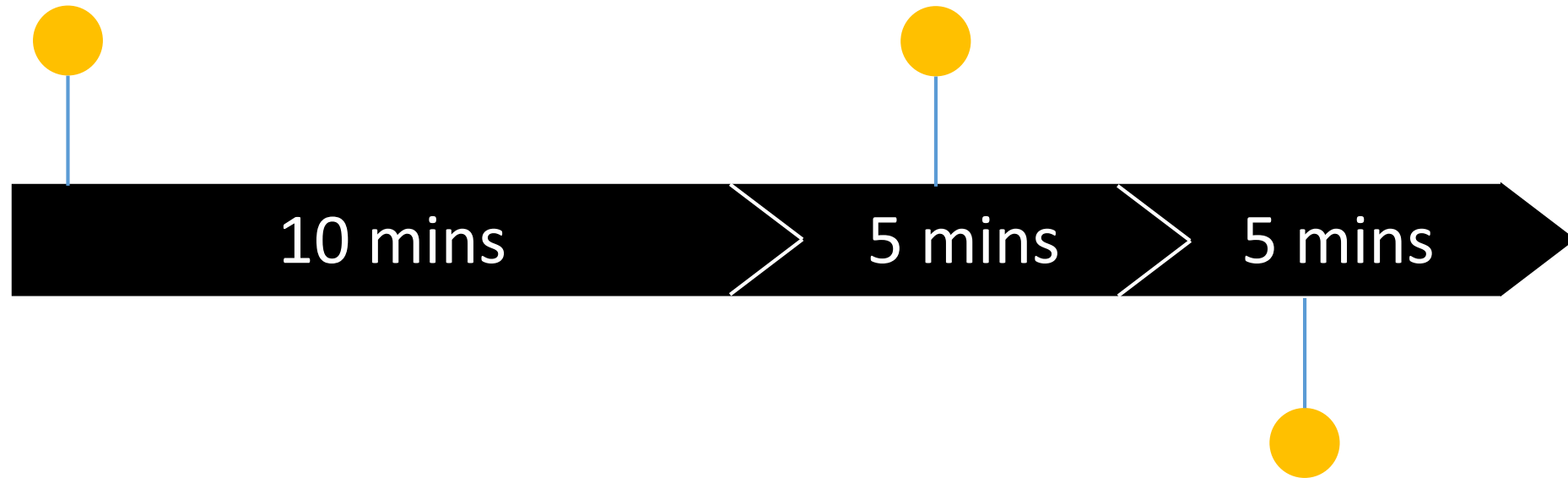
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Fusarium Wilt of
Cotton
FOV4 Survey of
Arizona Cotton

Root knot Nematode
RKN
Meloidogyne incognita



Alternaria leaf spot
Alternaria macrospora
A. alternata



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History of Fusarium Wilt

- Fusarium wilt of cotton first identified in 1892 in sandy acid soil in Alabama;
- Egypt (1902), India (1908), Tanzania (1954), California (1959), Sudan (1960), Israel (1970), Brazil (1978), China (1981), and Australia (1993);
- *Gossypium arboreum* L., *G. barbadense* L., *G. herbaceum* L., and *G. hirsutum* L.
- Common genotypes of FOV caused mild symptoms unless root knot nematodes were present; Resistance to the nematode reduced impact of Fusarium wilt;
- FOV4 causes severe disease in the absence of nematodes

FOV4 is discovered in California in 2001 and quickly spreaded on seed.



2017, FOV4 was detected on Pima cotton in fields of west Texas

El Paso County

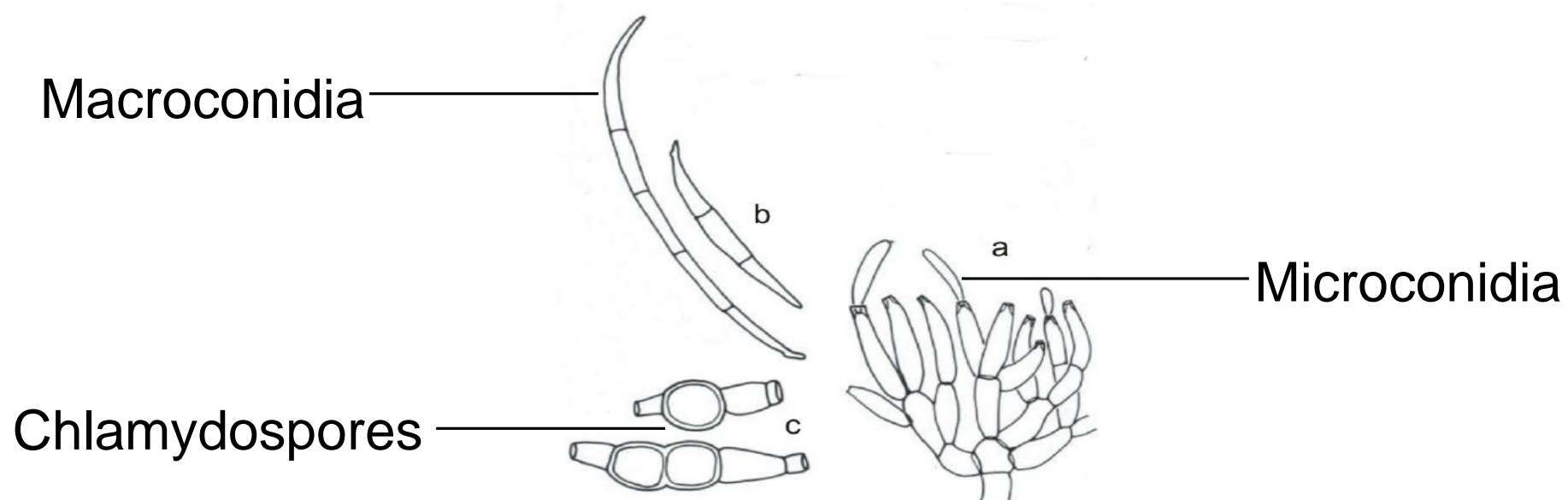


Hudspeth County



Pathogen: FOV4

- Pathogen: *Fusarium oxysporum* f.sp. *vasinfectum* (FOV) race 4
- *Fusarium oxysporum* form species are host specific
- Does not need the presence of nematodes
- Thrives in alkaline soil
- Move by seeds and soil as well as crop residue
- Millions of spores are produced in each infected plant
- Because FOV retains its saprophytic ability, it remains in soil indefinitely, sustaining itself on other crops and weeds



Symptoms

- Damping-off like seedling death
- Plants at 4-6 leaf stage of growth that rapidly wilt and die
- Interveinal and marginal leaf chlorosis and necrosis
- Vascular discoloration
- Poor growth and death

SLIGHT SYMPTOM



SEVERE SYMPTOM



Looking for FOV4 in Arizona Cotton Fields

Surveys

- 2018
 - 165 samples from 7 Counties
- 2019
 - 146 samples from 7 Counties







Root-Knot Nematode (RKN)

Meloidogyne incognita



FOV4 Control

Movement

- seed
- infested soil, and crop residue

Management

- Containment
- Clean seed
- Rotation/reduce inoculum
- Resistant varieties



Thomas Isakeit



Distribution of Root Knot Nematode (RKN)

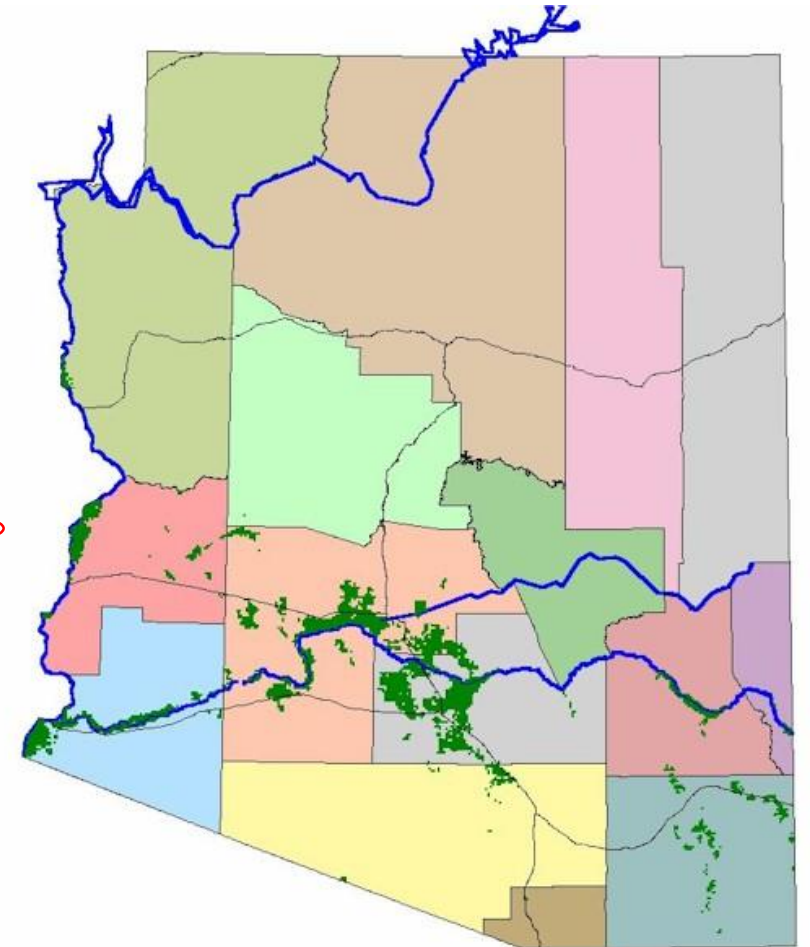
Meloidogyne incognita

Table 1. Occurrence of plant-parasitic nematodes in Arizona cotton fields, by county.

Nematode Genus or Family	Cochise (21)*	Graham (13)	Greenlee (3)	Maricopa (38)	Pima (5)	Pinal (33)	Yuma (20)
Aphelenchus	57**	31	33	34	40	42	55
Other Aphelenchidae	14	0	0	3	20	6	5
Ditylenchus	43	0	0	0	0	0	0
Helicotylenchus	0	0	0	0	20	9	5
Longidorus	0	0	0	3	0	3	0
Meloidogyne	38	39	33	55	0	12	0
Neotylenchidae	10	0	33	50	20	27	55
Pratylenchus	33	54	66	24	60	27	10
Trichodorus	23	0	0	3	0	0	0
Tylenchorhynchus	20	15	0	13	0	24	30
Tylenchus	19	0	0	0	0	0	45
Others	10	0	0	0	0	0	35

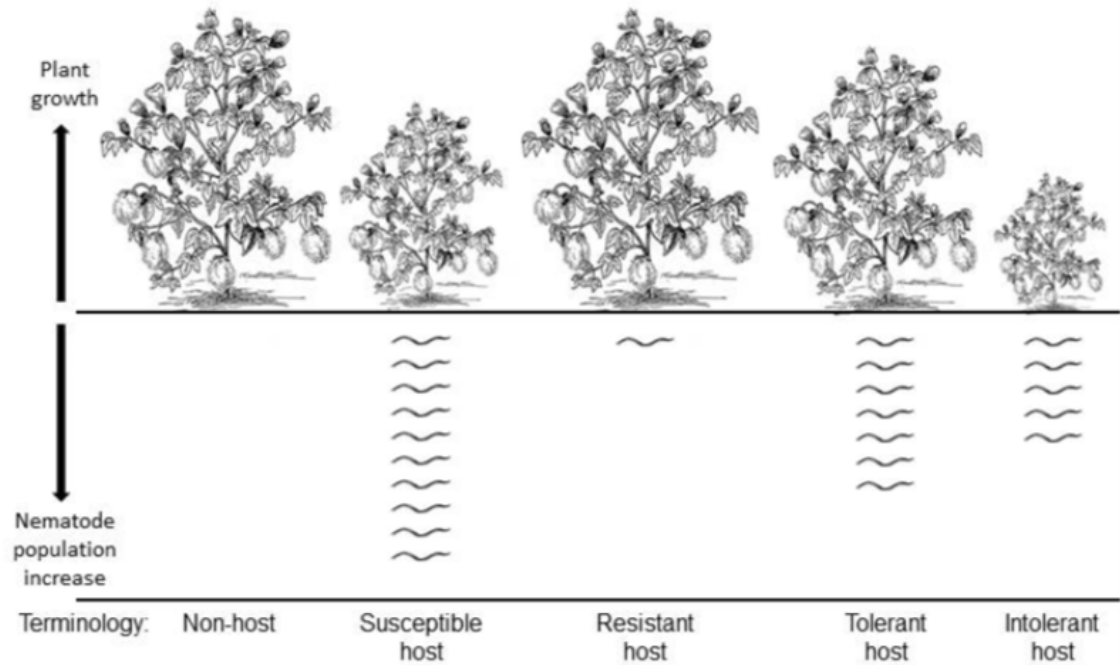
* Number of townships sampled

** Percent of samples in which the genus of nematode was detected.

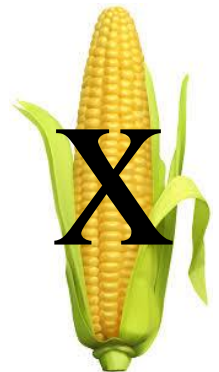
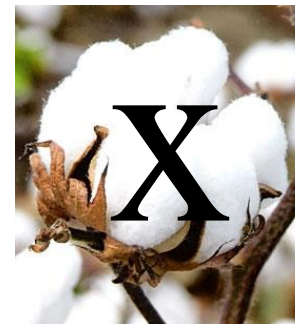


McClure *et al.* 2000, 133 township in 7 Counties

Rotation with a Non-Host Crop



Modeled after McKerny and Roberts



Fall nematode population density damage thresholds: 50-100 individuals per 100 cm³ soil

Cotton Cultivars with Resistance to RKN

Moderately Resistant (1 gene)	Resistant (2 genes)
ST 4946 GLB2	PHY 417 WRF
PHY 320 W3FE ^a	PHY 427 WRF
PHY 367 WRF ^a	PHY 480 W3FE
PHY 430 W3FE ^a	DP 1354 NRB2RF
PHY 440 W3FE ^a	DP 1558 NRB2RF
PHY 487 WRF	DP 1747 NRB2XF

Cotton variety trial: evaluate field performance and RKN population in soil

Nematicides Registered for Use in Cotton

Trade Name	Active Ingredient	Mode of Action	Signal Word	
AgLogic 15GG	Aldicarb	Cholinesterase inhibition	Danger	Telone II, Vapam, and K-Pam
Velum Total	Fluopyram + imidacloprid	SDHI enzyme inhibitor	Caution	
Avicta	Abamectin	Inhibit nerve transmission	Danger	AgLogic, Velum Total
Aeris	Thiodicarb + imidacloprid	Cholinesterase inhibition	Caution	
COPeO Prime	Fluopyram	SDHI enzyme inhibitor	Caution	Avicta, Aeris, COPeO, NemaStrike, VOTiVO, BioST
NemaStrike ST	Tioxazafen	Mitochondrial translation inhibitor	Caution	
VOTiVO	<i>Bacillus firmus</i> I-1582	Repels nema and affect motility	Caution	Vydate C-LV
BioST Nematicide	<i>Burkholderia</i> spp. A496	???	Caution	

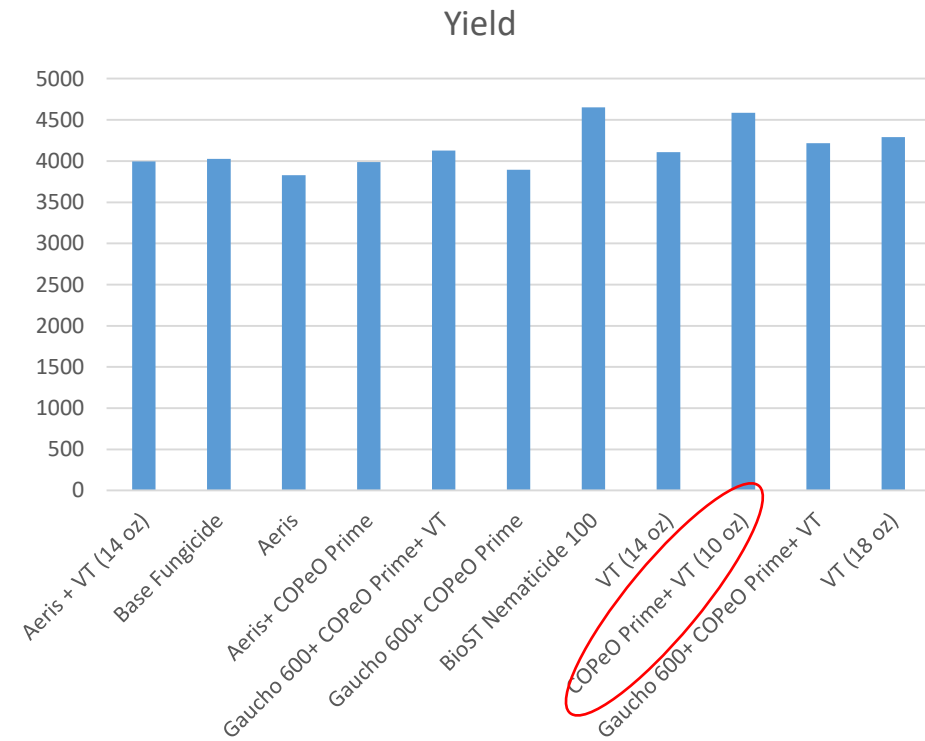
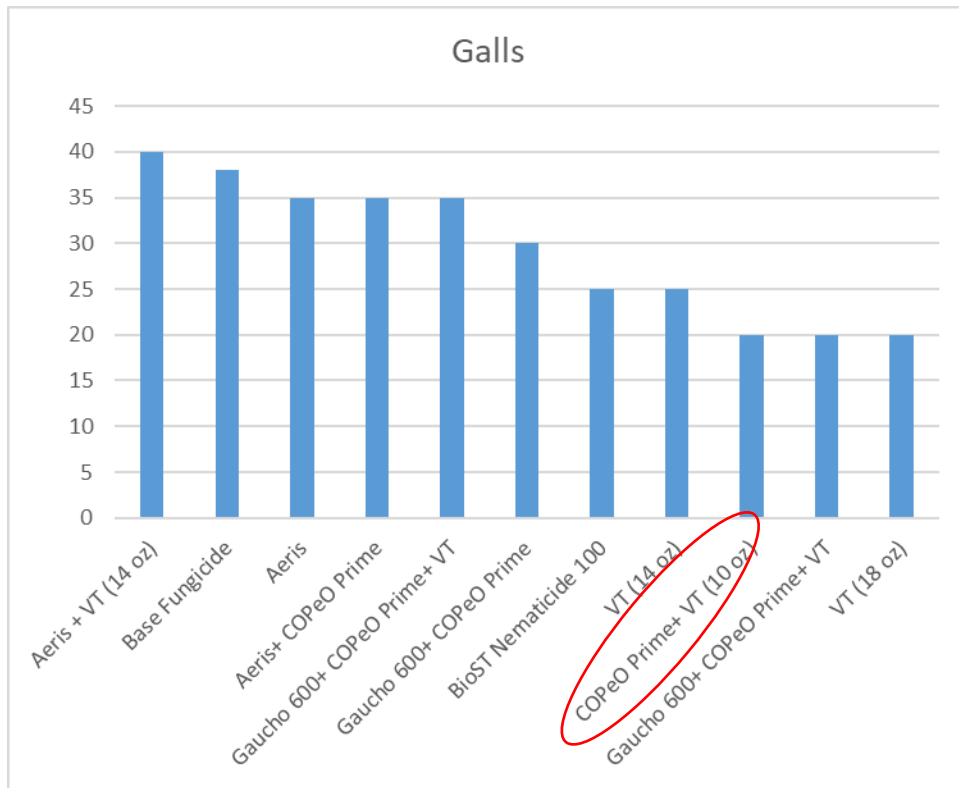
National Cotton Council, Nematode Research and Education Committee

Objective: evaluate the impact of seed-applied and soil-applied nematicides in cotton

- 15 days after planting
Stand count, vigor
- 45-60 days after planting
Gall counts per root system
Percent root system galled
Gall rating (0-5)
- At harvest
Seed cotton yield



2018 RKN Infection Ranking & Yield Response



Alternaria Leaf Spot/Blight



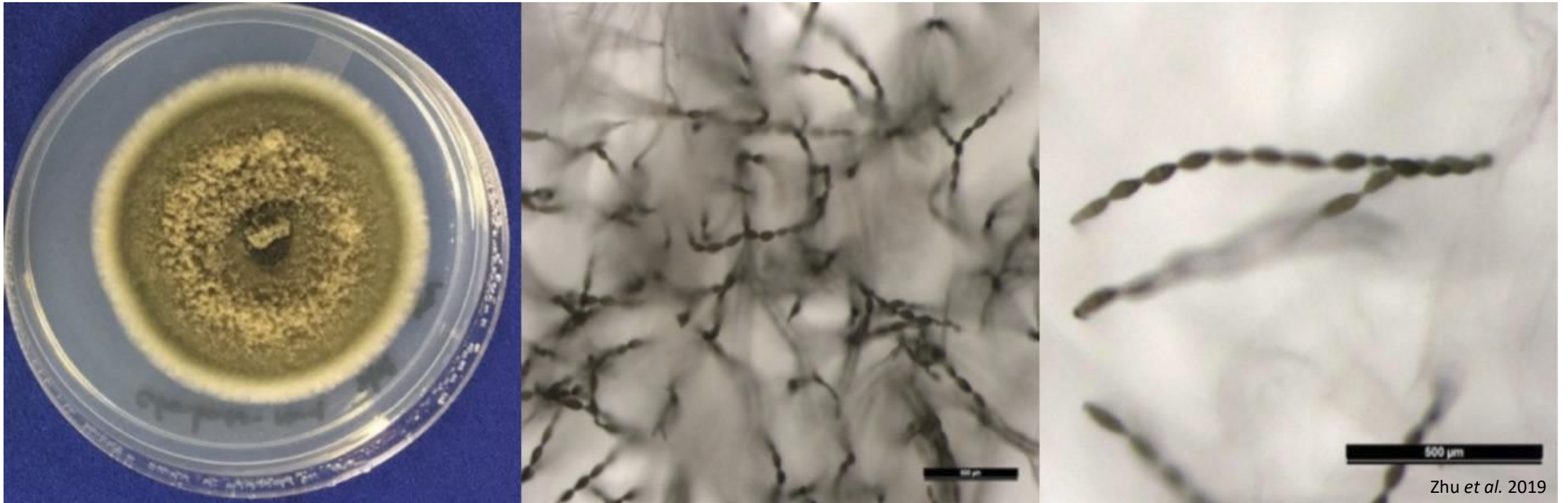


Pima varieties
DP359RF
PHY881RF



The Fungal Pathogens

Alternaria macrospora
A. alternata



Symptoms



Initial symptoms:
Small circular lesions that may expand up to half an inch. Margins of lesions have a distinct purple color

Lesions may coalesce, turn dull gray and crack, exhibiting a shot-hole appearance

Severe defoliation



Disease cycle

- Survival: in the infected crop debris as dormant mycelium
- Dispersal: the secondary spread is mainly air-borne conidia
- Favored by high humidity, intermittent rains and moderate temperature of 75-82F

Host range

Gossypium barbadense is more susceptible than *G. hirsutum*

Impact on yield

10%-15% in AZ (1987)

25%-60% in other parts of the world

Management

- Reducing plant stress and insuring proper soil fertility, especially with potassium, can reduce disease severity
- Remove and destroy the infected plant residue
- Fungicide spray in preventive manner: Headline and Quadris





Acknowledgements

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ARIZONA COTTON RESEARCH AND PROTECTION COUNCIL



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Thank You!

Questions?

