

The Role of Alternate Hosts in the Epidemiology of *Ascochyta* Blight of Chickpea in Reduced Tillage Cropping Systems in the Pacific Northwest

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Project Objectives:

Objective 1. To quantify *Ascochyta rabiei* infection of wheat and other alternate hosts grown in rotation with chickpea in rotational, minimum tillage or direct seeding cropping systems.

Objective 2. To develop a specific PCR primer to detect and quantify *Ascochyta rabiei* infection of wheat and other hosts

Keywords: host specificity, rotation, inoculum, alternate host

Statement of the Problem

In US Pacific Northwest cropping systems, wheat is typically grown in rotation with barley and/or legumes. Pathogens which cause disease on grasses do not generally cause disease on legumes and this specificity forms the basis for rotations as a disease control strategy. If pathogens have a wide host range and are able to colonize all hosts in the rotation, inoculum will build up resulting in high levels of disease and economic losses. The wheat-chickpea rotations used in the PNW are thought to reduce initial inoculum of the *Ascochyta* blight pathogen of chickpea. However, artificial inoculation studies indicate that the fungus may have a much wider host range than previously thought including wheat. If the pathogen can colonize and/or reproduce on wheat, this may provide a potential mechanism for the buildup of initial inoculum and a means for the pathogen to "bridge" across all crops in the rotation.

Zone of Interest: high rainfall zone - annual cropping systems

Abstract of Research Findings:

To date, two greenhouse inoculation experiments have been performed. These experiments were designed to test the hypothesis that *A. rabiei* originally isolated from chickpea is able to infect and colonize host plants other than chickpea. A second experiment was designed similarly except that the source isolates were obtained from hosts other than chickpea. Results from both experiments clearly demonstrate that *A. rabiei* can infect and colonize wheat without causing any obvious disease. At this point, we do not know how the fungus penetrates the plant or if it is able to extensively colonize wheat as an endophyte or latent pathogen. These questions will be addressed during the coming year. These experiments have also demonstrated that *A. rabiei* can infect other legume species such as alfalfa and lentil in addition to chickpea, also without causing any obvious disease. How the fungus penetrates these other legume species is also not understood. Our preliminary data indicates that *A. rabiei* has a wide host range and this may have important implications for the management of *Ascochyta* blight of chickpea, particularly chickpea grown in reduced tillage agroecosystems in rotation with wheat.

Results and Interpretation:

Table 1. Summary of greenhouse trial 1, addressing the potential of local crops other than chickpea to support growth of *A. rabiei*.

Inoculated Plants	<i>A. rabiei</i> isolate	Isolate source
	CAB-02-12	California
Dwelley chickpea	EV-00-3	Evans Farm, Genesee, ID
Madsen wheat	EV-00-22	Evans Farm, Genesee, ID
Crimson lentil	SCH-00-20	Schaefer Farm, WA
Austrian winter pea	SCH-00-22	Schaefer Farm, WA
Alfalfa	SPL-00-41	Spillman farm, Pullman, WA
	SPL-00-42	Spillman farm, Pullman, WA
	SPL-00-55	Spillman farm, Pullman, WA
	SF1-00-12	Silflow Farm, Genesee, ID

A. rabiei isolates inoculated on these 5 host plants were known to vary in AFLP and microsatellite genotype as well as in virulence on chickpea. California isolate CAB-00-12 is highly virulent on chickpea, and was used as a positive control for pathogenicity assays. Chickpeas begin showing lesions within one week of inoculation. Other crops developed a few small lesions at a slower pace, but generally appeared healthy and unaffected by the inoculations. *A. rabiei* was re-isolated from all chickpea and wheat treatments thus far and from some of the inoculated alfalfa and lentil. These re-isolated fungi are being cultured to confirm identification of isolates and several isolates retrieved from wheat and lentil will be inoculated onto chickpea to test their continued pathogenicity. Therefore, it appears that *A. rabiei* can infect and colonize several plant species in addition to chickpea without causing any obvious disease symptoms.

Table 2. Summary of greenhouse trial 2, addressing the potential of *A. rabiei* isolated from plants other than chickpea to infect chickpea or other common rotation crops.

Inoculated Plants	<i>A. rabiei</i> isolate	Isolate source
	CAB-02-12	Chickpea, California
Dwelley chickpea	AR265	Alfalfa, Pullman, WA
Madsen wheat	AR 240	Tumble pigweed, Cameron, ID
Crimson lentil	AR28	Wheat, Genesee, ID
	AR639	Lentil, Pullman, WA
	AF 40	Faba bean, Lebanon

*In addition, where possible the isolates of Trial 2 were also inoculated onto their original host plant, i.e. AR265 was also inoculated onto alfalfa, AF 40 was also inoculated onto Faba bean.

This trial is in process. Only chickpeas currently show lesions. Isolates AF40 and AR639 appear the most virulent on chickpea, while AR265 and AR240 caused little or no effect on most plants.