IMPROVING ON THE MANAGEMENT OF PEANUT POD ROT

Jason Woodward, Extension Plant Pathologist and Assistant Professor
Texas AgriLife Extension Service, Texas A&M System - Lubbock
Department of Plant & Soil Science, Texas Tech University - Lubbock

Todd Baughman, Agronomist
Texas AgriLife Extension Service - Vernon

Terry Wheeler, Research Plant Pathologist
Texas AgriLife Research - Lubbock

Ronald French, Extension Plant Pathologist
Texas AgriLife Extension Service - Amarillo

Introduction

Peanut pod rot is an increasingly important disease throughout the southern High Plains of Texas. Several pathogenic fungi have been isolated from diseased pods; however, *Rhizoctonia solani* and *Pythium* spp. are most commonly associated with the disease across the region. Historically, *R. solani* has been the predominant pod rotting pathogen; however, the isolation frequency of *Pythium* spp. has continued to increase over the last several years. Differentiating *R. solani* from *Pythium* spp. is difficult to do in the field; however, a proper diagnosis is required in order to develop an effective management strategy. Preventative fungicide applications are currently the primary method used to minimize losses associated with pod rot. Products labeled for the management of pod rot in Texas are limited to Azoxystrobin (Abound 2.08F), or various formulations of metalaxyl (Ridomil). Several factors including the spectrum of activity, method of application, and cost influence the use of these products. Abound is labeled for control of *R. solani* and suppression of *Pythium* spp., whereas, formulations of metalaxyl can be more effective against *Pythium* spp, but have no activity against *Rhizoctonia* or *Sclerotium rolfsii* (southern blight). The objectives of this proposal are to 1) evaluate the performance of Abound and/or Ridomil for control of pod rot, 2) compare classical (morphological) and/or modern (molecular) diagnostic methods for differentiating pod rot diseases, and 3) investigate the role of *Pythium* spp. in pod rot development under conventional and reduced tillage systems.

Materials and Methods

Evaluation of Abound and/or Ridomil applications for control of pod rot: Five fields with a history of pod rot were chosen for this objective. Four to five areas (4-8 rows x 200 ft) in size were flagged within a field and left untreated. Disease severity within untreated areas was compared to adjacent blocks that received fungicide applications. Evaluations were made throughout the growing season and at harvest. Yield and grade information were not collected because of low disease pressure.

Comparison of diagnostic methods for differentiating Rhizoctonia and Pythium: Samples collected throughout the growing season were subjected to microscopic evaluations and plating on nutrient agar for identification of the causal agent. While serological assays are available in the turfgrass industry, we were unable to work out an agreement with the manufacturer to use the kits during the 2009 growing season. PCR methods have also been developed; however, we were unable to perform these techniques due to a malfunction in a piece of equipment required to complete the procedure.

Investigating the role of Pythium spp. in pod rot development under conventional and reduced tillage systems. Microplots (12 in diam) were established at the Texas AgriLife Research and Extension Center in Lubbock. Microplots were artificially infested with two *Pythium* spp. (*P. ultimum* and *P. myriotylum*). Due to the lack of sufficient growing conditions, wheat was unable to be included as a cover crop in this experiment. Treatments (totaling 12) consisted of a non-inoculated control, a non-treated control, and Abound or Ridomil applications applied in 15 or 45 gallons of water. Treatments were arranged in a randomized complete block design with 8 replications. Fungicide applications were applied 75 and 105 days after planting with a CO_2 pressurized backpack sprayer. Whole peanut plants were harvested at three timings to determine the efficacy of the fungicide applications. Fresh root and shoot weights, the number of pods, and disease development (a qualitative measure) were recorded for each sampling date.

<u>Results and Discussion</u>

Evaluation of Abound and/or Ridomil applications for control of pod rot: Very little pod rot was developed in the areas evaluated, and no differences in disease was observed between the treated and non-treated areas. Yield and grade information were not collected because of low disease pressure. These results coupled with previous experiences suggest that pod rot fungicide evaluations should be made using large experimental units ~0.25 to 0.5 acre plots.

Comparison of diagnostic methods for differentiating Rhizoctonia and Pythium: On average, samples require ~30 minutes each to properly identify Pythium spp. based on the presence of oospores; whereas, longer time is required to properly identify *R. solani*. These times diminish greatly as the season progresses and kernel colonization becomes evident; however, the effectiveness of fungicides reduces when experiencing these conditions. A minimum of 3 days is required to differentiate *Pythium* spp. from *R. solani* using conventional culturing methods. Use of these techniques as well as serological and molecular methods will continue to be evaluated in the Extension Plant Pathology Peanut Lab.

Investigating the role of Pythium spp. in pod rot development under conventional and reduced tillage systems. No differences in root or shoot weight were observed between the treatments evaluated (Table 11). Peanut shoot weights increased in a linear fashion (data not shown) averaging 70.7, 283.8 and 271.1 g; and 86.2, 163.3, and 279.8 g for sampling date 1, 2, and 3 in the *P. myriotylum* and *P. ultimum* trial, respectively. A similar trend was observed for the root weights where peanut growth was slightly higher from plants inoculated with *P. ultimum* compared to *P. myriotylum*. The number of pods per plant increased throughout the season as well, and differences were observed between treatments for sample date #2 in only the *P. ultimum*. Despite these differences, neither the use of Abound nor Ridomil impacted pod formations. Likewise, the use of fungicides had no apparent effect on disease development. These results suggest that the Pythium inoculum used may not have been completely viable. This is further supported by the fact that disease that developed was superficial, and attempts at re-isolating either *P. myriotylum* or *P. ultimum* from pods exhibiting necrosis where unsuccessful. Information regarding the reaction of commercially available peanut cultivars to pod rot was made in 2009 in several Sclerotinia blight studies; therefore, that will be the direction of our program for 2010 if funding is available.

Table 11. Effect of two *Pythium* spp. on peanut growth and development and disease for three sampling dates

Trial, treatment (rate/A; gal/A)	Shoot weight (grams) Aug. 17	Sept. 16	Oct. 1	Root weight (grams) Aug. 17	Sept. 16	Oct. 1	Pods (#/plant) Aug. 17	Sept. 16	Oct. 1	Disease (0/1) Aug. 17	Sept. 16	Oct. 1
Pythium myriotylum												
Non-inoculated	53.81	229.34	236.58	5.13	11.76	8.01	15.13	45.00	49.88	0.13	0.38	0.13
Untreated control	74.84	321.19	322.29	4.95	15.58	7.99	19.63	74.50	74.13	0.38	0.38	0.00
Abound (24.5 fl oz/A) (applied in 15 gal/A)	86.41	248.69	256.45	6.85	13.63	8.06	21.38	49.75	51.13	0.13	0.25	0.25
Abound (24.5 fl oz/A (applied in 45 gal/A)	64.10	277.45	330.21	4.96	12.10	8.60	15.75	47.88	66.63	0.25	0.75	0.00
Ridomil (1.0 pt/A) (applied in 15 gal/A)	73.63	213.43	234.46	5.49	11.09	7.41	19.00	39.13	44.88	0.25	0.75	0.00
Ridomil (1.0 pt/A) (applied in 45 gal/A)	71.64	412.43	246.39	4.03	12.49	7.70	14.13	74.13	49.50	0.25	0.50	0.00
LSD ($P<0.05$)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pythium ultimum												
Non-inoculated	83.05	143.00	285.68	8.11	5.95	16.36	36.25	62.63	102.50	0.13	0.25	0.50
Untreated control	92.45	158.95	239.71	11.08	6.41	13.90	40.00	71.50	84.13	0.25	0.25	0.25
Abound (24.5 fl oz/A) (applied in 15 gal/A)	87.00	185.19	322.96	6.78	5.80	17.80	31.75	78.13	89.13	0.25	0.25	0.25
Abound (24.5 fl oz/A (applied in 45 gal/A)	101.24	151.06	267.55	7.76	5.73	15.20	37.38	49.38	88.75	0.38	0.38	0.63
Ridomil (1.0 pt/A) (applied in 15 gal/A)	73.13	191.30	276.44	6.81	7.14	12.99	22.50	92.75	98.50	0.13	0.38	0.25
Ridomil (1.0 pt/A) (applied in 45 gal/A)	80.06	150.31	286.18	6.59	5.86	14.24	31.75	52.25	82.88	0.38	0.63	0.13
LSD ($P<0.05$)	NS	NS	NS	NS	NS	NS	NS	27.2	NS	NS	NS	NS