**Terrence (Terry) L. Kirkpatrick**

Professor, Plant Pathology

Southwest Research and Extension Center

362 Hwy 174N

Hope, AR 71801

Phone: 870-777-9702

Email: tkirkpatrick@uaex.edu

**Education:**

BS University of Arkansas, Animal Science 1975

MS University of Arkansas, Plant Pathology 1978

Ph.D. North Carolina State University, Plant Pathology (Nematology) 1982

**Work Experience:**

Professor/Extension Plant Pathologist IV Univ. of Arkansas 1997-present

Associate Professor/Extension Plant Pathologist III Univ. of Arkansas 1988-1997

Assistant Professor/Extension Plant Pathologist II Univ. of Arkansas 1984-1988

Sr. Nematologist Union Carbide Co. 1982-1984

Research Assistant NC State University 1978-1982

**Current Appointment:**

Research 60% - Extension 40%

**Selected Publications:**

**Refereed Journals.**

 Roberts, P.A., T.L. Kirkpatrick, J.D. Arnett, A.R. Ayers, J.J. Crawford, M.V. McKenry, and J.W. Noling. 1988. Bibliography of U.S. extension and extension-related publications on nematodes. Annals of Applied Nematology 2:121-136.

 Kirkpatrick, T.L. and M. L. May. 1989. Host suitability of soybean cultivars for *Meloidogyne incognita* and *M. arenaria.* Journal of Nematology 21(4S):666-670.

 Wehunt, E.J., A.M. Golden, J.R. Clark, T.L. Kirkpatrick, E.C. Baker, and M.A. Brown. 1991. Nematodes associated with blackberry in Arkansas. Journal of Nematology 23(4S):260-263.

 Kirkpatrick, T.L., D.M. Oosterhuis, and S.D. Wullschleger. 1991. Interaction of *Meloidogyne incognita* and water stress in two cotton cultivars. Journal of Nematology 23:462-467.

 Hanna, H.Y., T.L. Kirkpatrick, D.J. Romaine, and P.R. Vernon. 1993. Improving yield of cucumbers in nematode infested soil by double cropping with a resistant tomato cultivar, using transplants, and nematicides. Proceedings of the Florida State Horticultural Society 106:163-165.

 Hanna, H.Y., P.D. Colyer, T.L. Kirkpatrick, D.J. Romaine, and PlR. Vernon. 1994. Feasibility of improving cucumber yield without chemical control in soils susceptible to nematode buildup. HortScience 29:1136-1138.

 Rothrock, C.S., T.L. Kirkpatrick, R.E. Frans, and H.D. Scott. 1995. The influence of winter legume cover crops on soilborne plant pathogens and cotton seedling diseases. Plant Disease 79:167-171.

 Micinski, S., T.L. Kirkpatrick, and P.D. Colyer. 1995. An improved plant washing procedure for monitoring early season insect pests in cotton. Southwestern Entomologist 20:17-24.

 Henry, R.N. and T.L. Kirkpatrick. 1995. Two new races of *Phytophthora sojae,* causal agent of phytophthora root and stem rot of soybean, identified from Arkansas soybean fields. Plant Disease 79:104.

 Colyer, P. D., T. L. Kirkpatrick, P. R. Vernon, J. D. Barham, and R. J. Bateman. 1998. Reducing *Meloidogyne incognita* injury to cucumber in a tomato-cucumber double-cropping system. Journal of Nematology 30:226-231.

 Walker, N. R., T. L. Kirkpatrick, and C. S. Rothrock. 1998. Interaction between *Meloidogyne incognita* and *Thielaviopsis basicola* on cotton (*Gossypium hirsutum*).Journal of Nematology 30:415-422.

Walker, N. R., T. L. Kirkpatrick, and C. S. Rothrock. 1999. The effect of temperature and the histopathology of the interaction between *Meloidogyne incognita* and *Thielaviopsis basicola* on cotton (*Gossypium hirsutum*). Phytopathology 89:613-617.

 Colyer, P.D., T.L. Kirkpatrick, and W.D. Caldwell. 2000. Root-knot nematode infection of conventional and related transgenic cotton cultivars. J. Cotton Sci. 4:232-236.

 Walker, N. R., T. L. Kirkpatrick, and CS Rothrock. 2000. Influence of *Meloidogyne incognita* and *Thielaviopsis* *basicola* populations on early season disease development and cotton growth. Plant Disease 84:449-453.

 Wrather, J.A., T.L. Kirkpatrick, and G. Stevens. 2002. Site-specific application of aldicarb effects on cotton in a *Meloidogyne incognita*-infested field. Journal of Nematology 34:115-119.

 Jackson, T.A., T.L. Kirkpatrick, and J.C. Rupe. 2004. Races of *Phytophthora sojae* in Arkansas soybean fields and their effects on commonly grown soybean cultivars. Plant Disease 88:345-351.

 Koenning, S.R., T.L. Kirkpatrick, J.D. Mueller, J.A. Wrather, J.L. Starr, and N.R. Walker. 2004.Plant-parasitic nematodes in cotton: Production challenges past and present. Plant Disease 88:100-113.

 Robinson, F. R., R. Akridge, J.M. Bradford, C.G. Cook, W.S. Gazaway, T.L. Kirkpatrick, G.W. Lawrence, G.R. Lee, E.C. McGawley, C. Overstreet, G.B. Padgett, R. Rodriguez-Kabana, W. Westphal, and L.D. Young. 2005. *Rotylenchulus reniformis* below plow depth in 20 cotton fields across the southern United States. Journal of Nematology 37: 265-271

Monfort, W.S., T.L. Kirkpatrick, and C.S. Rothrock. 2006. Effects of nocturnal soil temperature and *Meloidogyne incognita* densities on cotton seedling growth and the interaction with *Thielaviopsis basicola*. Plant Disease 90: 519-522.

Cassida, K.A., T.L. Kirkptarick, R.T. Robbins, J.P. Muir, B.C. Venuto, and M.A. Hussey. 2006. Plant-parasitic nematodes associated with switchgrass (*Panicum virgatum* L.) grown for biofuel in the south central United States. Nematropica 35:1-10.

Monfort, W.S., T.L. Kirkpatrick, C.S. Rothrock, and A. Mauromoustakos. 2007. The influence of soil texture and fertility on *Meloidogyne incognita* population density and cotton yield. Journal of Nematology. 39:1-8.

Monfort, W.S., T.L. Kirkpatrick, D.L. Long, and S. Rideout. 2006. Efficacy of a novel nematicidal seed treatment against *Meloidogyne incognita* on cotton. Journal of Nematology 38:245-249.

Starr, J.L., S.R. Koenning, T.L. Kirkpatrick, A.F. Robinson, P.A. Roberts, and R.L. Nichols. 2007. The future of nematode management in cotton. Journal of Nematology 39:283-294.

Monfort, W.S., T.L. Kirkpatrick, and A. Mauromoustakos. 2008. Spread of *Rotylenchus reniformis* in an Arkansas cotton field over a four-year period. Journal of Nematology 40: 161-166.

Toksoz, H., C.S. Rothrock, and T.L. Kirkpatrick. 2009. Efficacy of seed treatment chemicals for black root rot caused by *Thielaviopsis basicola* on cotton. Plant Disease 93: 354-362.

Kulkarni, S.S., S.G. Bajwa, J.C. Rupe, and T.L. Kirkpatrick. 2008. Spatial correlation of crop response to soybean cyst nematode, (*Heterodera glycines*). Trans. ASABE 51(4):1451-1459.

Kulkarni, S.S., S.G. Bajwa, R.T. Robbins, T.A. Costello, and T.L. Kirkpatrick. 2008. Effect of soybean cyst nematode (*Heterodera glycines*) resistance rotation on SCN population distribution, soybean canopy reflectance, and grain yield. Trans. ASABE 51(5):1-7.

Wrather, J.A., G. Stevens, E.D. Vories, T.L. Kirkpatrick, J.D. Mueller, and A. Mauromoustakos. 2010. The use of root galls to determine high-risk zones in cotton fields infested by *Meloidogyne incognita*. Crop Science 50:2575-2579.

Sayler, R.J., Courtney Walker, Fiona Goggin, Paula Agudelo, and Terrence Kirkpatrick. 2012. Conventional PCR detection and real-time PCR quantification of reniform nematodes. Plant Disease 96: 1757-1762.

Ma, J., T.L. Kirkpatrick, C.S. Rothrock, and K. Brye. 2013. Effects of soil compaction and *Meloidogyne incognita* on cotton root architecture and plant growth. Journal of Nematology 45:112-121.

Ma, Jianbing, J. Jaraba, T.L. Kirkpatrick, and C.S. Rothrock. 2013. Effects of *Meloidogyne incognita* and *Thielaviopsis basicola* on cotton seedling growth and root system morphology. Phytopathology 104: 507-512*.*

Jaraba, J., C.S. Rothrock, T.L. Kirkpatrick, and K. Brye. 2013. Soil texture influence on *Meloidogyne incognita* and *Thielaviopsis basicola* and their interaction on cotton. Plant Disease 98:336-343*.*

Overstreet, C.O., E.C. McGawley, A. Khalilian, T.L. Kirkpatrick, W.S. Monfort, W. Henderson, and J.D. Mueller. 2014. Site-specific nematode management – success stories in the U.S. Journal of Nematology 46:309-320.

Liu, Z., T. Griffin, and T.L. Kirkpatrick.2014. Statistical and economic techniques for site-specific nematode management. Journal of Nematology 46: 12-17.

Liu, Zheng, Terry Griffiin, and Terry Kirkpatrick. 2015. Spatial econometric approaches to develop site-specific nematode management strategies in cotton production. Precision Agriculture 16: 587-600*.*

**Books and Book Chapters**

 Kirkpatrick, T.L. and C.S. Rothrock, Eds. 2001. Compendium of Cotton Diseases, Second Edition. APS Press. St. Paul, MN. 77 pp.

 S.H. Thomas and T.L. Kirkpatrick, 2001. Root-knot nematodes. *In*: T.L. Kirkpatrick and C.S. Rothrock, eds. Compendium of Cotton Diseases, Second Edition. APS Press. St. Paul, MN.

 Mueller, J.D., A. Khalilian, W.S. Monfort, R.F. Davis, T.L. Kirkpatrick, B. V. Ortiz, and W.G. Henderson, Jr. 2010. Site-specific Detection and Management of Nematodes. *In:* Precision Crop Protection – The Challenge and Use of Heterogeneity. E.C. Oerke, R. Gerhards, G. Menz, and R.A. Sikora, eds. Springer Publishing Co.

 Woodward, J.L., T.L. Kirkpatrick, and C.S. Rothrock, Eds. 2017. Compendium of Cotton Diseases, Third Edition. APS Press. St. Paul, MN. *In press*.

 Thomas, S.H. and T.L. Kirkpatrick. 2017. Root-knot nematodes. *In:* J.L. Woodward, T.L. Kirkpatrick, and C.S. Rothrock, eds. Compendium of Cotton Diseases, Third Edition. *In* *press.*

**Students Completed (Major Advisor).**

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| --- | --- | --- | --- |
| Name | Degree | Date | Current Employment |
| Tammy Field | Ph.D. Plant Science | 1997 | Unknown |  |
| Tamra Jackson | M.S. Plant Pathology | 1999 | Faculty, U. Nebraska |  |
| Nathan Walker | Ph.D. Plant Science | 1999 | Faculty, Okla. State  |  |
| Scott Monfort | Ph.D. Plant Science  | 2005 | Faculty, U GA |  |
| Amy Thomas | M.S. Plant Pathology | 2006 | Faculty, So. Arkansas U. |  |
| Josh Still | M.S. Plant Pathology | 2007 | Technician, U. of Arkansas |  |
| Gus Wilson | M.S. (General Agriculture) | 2007 | Co. Agent, AR |  |
| Leslie Hooker | M.S. Plant Pathology | withdrew |  |  |
| Juan Jaraba | Ph.D. Plant Pathology (co-advisor) | 2010 | Agronomy Dept. Head,  Universidad de Córdoba |  |
| David Mosley | M.S. (General Agriculture) | 2010 | Technician, U. of Arkansas |  |
| Brad Runsick | M.S. (General Agriculture)  | 2012 | Co. Agent, AR |  |
| Hannah Gray | M.S. (General Agriculture) | 2012 | High School Teacher, AR |  |
| Jianbing Ma | Ph.D. Plant Pathology | 2013 | Research Scientist, Monsanto |  |
| Mia Gentry | M.S. Ag Education (co-advisor) | 2013 | Instructor, So. AR U.  |  |
| Amanda Greer | M.S. Plant Pathology | 2013 | Co. Agent, AR |  |
| Juliet Fultz | M.S. Plant Pathology | 2015 | Ph.D. candidate, Clemson U. |  |

Grants and Funding (since 2000).

 **Competitive Grants:** Including USDA/CSREES (IFAFS); NRCS (CIG); USDA/ARS

 (RAMP); NSF (SBIR/STTR); USDA (SARE): **Total Amount = $2,666,617.**

 **Commodity:** Including United Soybean Board, Cotton, Inc., Arkansas Soybean Promotion Board, Arkansas Corn & Grain Sorghum Board: **Total Amount =**

**Extension Program:**

Supervisor, Arkansas Nematode Diagnostic Laboratory

Coordinator, Arkansas Soybean Variety Disease Screening Program

Coordinator, Learning Laboratory for Horticultural Crops

Responsible for County Agent Education and Training in Nematology – all crops

 Responsible for County Agent Education and Training in Cotton and Horticultural Crops Diseases

 Provide Agent Support for Grower Education in Nematology and Plant Pathology

 Develops Educational Programs & Materials in Nematology for Consultants and other CES clientele

 Conducts an aggressive applied research and demonstration program statewide

Dr. Kirkpatrick has coordinated the Arkansas Nematode Diagnostic Laboratory (ANDL), our statewide diagnostic facility since it was moved to the SWREC in 1995 from campus. Under his direction, the laboratory went from processing less than 1,000 samples annually, most of which were from soybean fields, to a current level of ca. 4,000 samples for growers and Division researchers annually in a diversity of crops. He expanded the ANDL to include routine assay for pinewood nematode detection for the timber industry, white tip nematode assay from rough rice, and nursery stock assay that are required for phytosanitary certification by the Plant Board. His laboratory is also an APHIS-certified facility and provides assays for certain out-of-state entities for alfalfa, garlic, and pinewood nematode. The ANDL publishes an annual report of activities periodically and provides numerous educational opportunities for agents, students, and the general public each year via tours of the facility and invited presentations. Since 1995, the ANDL has been a fee-based service. Cost-recovery income to support the service has averaged $25,329 per year for the last 5 years.

Dr. Kirkpatrick initiated an annual program for laboratory, field, and greenhouse screening of new soybean cultivars for resistance to major diseases in the state in 1990. This program, the Arkansas Soybean Cultivar Disease Resistance Screening Program, remains the most extensive screening program of its kind in the southern U.S. and currently evaluates about 350 cultivars and advanced lines for various nematodes and diseases. Dr. Kirkpatrick has been successful in obtaining extramural support for this program over the years through grants from the Arkansas Soybean Promotion Board and fees from private industry that use the service. Results support the soybean cultivar selection computer program (SOYVA) and are the basis for a large portion of the annual Soybean Update that assists growers in selecting appropriate cultivars. Funding total for the last 5 years has been approximately $610,000.

Dr. Kirkpatrick provided both formal and informal education and teaching support for the Extension Service, the College, and the Department of Plant Pathology. He routinely provides educational presentations, in-service training, and workshops in nematology/plant pathology for county agents and various constituent groups statewide. During the past 5 years, he has been invited to provide 25 talks directly to growers, 6 consultant workshops, numerous in-service training sessions for agents, and 28 presentations at regional or national commodity meetings including the Beltwide Cotton Conferences and the National Cotton and Rice Conservation Tillage Conference. He also regularly responds to agent requests for assistance with grower problems, and averages 20 on-farm trouble-shooting visits each year to work directly with agents and their growers. More formally, he is a member of the Graduate Faculty and routinely shares his expertise with graduate students in plant pathology and related disciplines. Since 2007, he has served as the major advisor for 4 M.S. and 2 Ph.D. candidates in plant pathology and 4 M.S. students in the AFLS non-thesis program. He also has served or is currently serving on advisory committees for 10 students in plant pathology and entomology.

Because of his joint appointment with the Agricultural Experiment Station, Dr. Kirkpatrick has been able to directly impact both Arkansas agriculture and the disciplines of nematology and plant pathology. He has maintained an aggressive applied research program in cotton, corn and soybean that includes numerous on-farm demonstrations. He maintains an annual evaluation program for new nematicides and new uses of existing products in field crops and oversees the annual soybean cultivar disease screening program. Field testing and demonstration trials located statewide provide the basis for nematode control recommendations in cotton, corn, and soybean for Arkansas growers. In addition, much of the research that is conducted by his graduate students is of an applied nature, and results have been widely used by growers and agents in Arkansas and surrounding states. His applied research program has garnered both national and international attention as evidenced by his invitation to speak in numerous international, national and regional settings. A highlight of his effort has been his being invited to teach workshops in nematology in Xingjiang Provence, China (1996) and Mato Grossa, Brazil (2010), and to survey cotton fields and teach Australian growers about nematology in Queensland and New South Wales, Australia (2003).

**Extension Program Highlights:**

 First report of soybean stem canker in Arkansas, 1984. This became the basis for the initiation of the Arkansas Soybean Cultivar Disease Resistance Screening Program in 1990.

 First statewide Wheat Disease Alert Network, 1985. Developed by Dr. Kirkpatrick and Dr. Marc Hirrel at Monticello to alert county agents and growers to the development of wheat diseases in Arkansas during the spring months. Also used by plant pathologists in surrounding states.

 Discovered a highly virulent strain of anthracnose on grain sorghum that devastated the crop in Southwest Arkansas, 1987. Yield losses were 50% in some fields. In 1987, initiated a sorghum variety screening program in cooperation with Pioneer and Texas A&M University that led to the discovery of several high-yielding resistant hybrids.

 Established the first Plant Disease Clinic at the SWREC in 1984. This was the only disease clinic in the state until 1989 when the need for a more central location was recognized. Chaired a committee that developed the plans for the centralized, statewide Plant Disease Clinic now housed at the UofA.

 Initiated the Arkansas Soybean Cultivar Disease Screening Program in 1990.

 First report of an interaction between *Thielaviopsis basicola* and the root-knot nematode on cotton, 1995. Demonstrated widespread incidence in Arkansas cotton fields; significant yield loss, and resulted in changes in recommendations for seedling disease and nematode management.

 Relocated Arkansas Nematode Diagnostic Laboratory to SWREC under Extension responsibility, 1995.

 Founding member of the National Cotton Council Nematode Survey & Education Committee. Served as Arkansas representative 2000-2010.

 Founding member of the Site-Specific Nematicide Delivery working group – included research & Extension specialists from Arkansas, South Carolina, Louisiana, and Missouri – to explore the potential for using precision agriculture technology to improve efficiency of nematicide delivery. Resulted in development of a site-specific nematicide applicator and two Federal competitive grants totaling $1.9 million (2001-present). Currently being tested in grower fields statewide.

 Founding member, Arkansas Working Group for Introduced Plant Diseases, 2006. We won the Extension Excellence Issue Team Award.

 Developed a course in plant nematology, 2002. A major constraint of the AFLS-MS (non-thesis) degree program, which is heavily used by our county agents working toward a MS has been a lack of biology-focused courses available to them off-campus. I developed Plant Nematology (PLPA 6303) in cooperation with Dr. Robbins on campus, and we offered this course via distance education to off-campus as well as on-campus students. This course is offered every other year and continues to provide our agents with a technical, biology-based course opportunity.

 Initiated the Learning Laboratory concept, 2012 to assist growers and county agents in learning 9and teaching) fundamental production practices for certain horticultural crops.

**Last 5 years: Extension Publications = 10; Extension Presentations = 125.**

**International Activities (career):**

* I was one of three faculty members of the University of Arkansas invited by the Chinese Ministry of Agriculture to review the cotton pest management research program of Xinjiang University in western China. We met with grower groups, university personnel, and administrators in several other cities as well as at the main campus in Urumqi (August 17 - September 2, 1997)
* I was invited by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) and the Australian Cotton Seed Distributors (CSD) to survey the cotton production areas of Queensland and New South Wales to determine if plant-parasitic nematodes were an economic threat to Australian cotton. In cooperation with Dr. J.D. Mueller, Clemson University, we sampled numerous fields in the two states and extracted and identified the nematodes at the Australian Cotton Research Institute in Narrabri, NSW (February 10 - March 4, 2003.
* I was invited by Syngenta to meet with industry personnel, consultant groups, and growers in Brazil to teach them how to develop nematode management strategies for soybean and cotton. I organized and conducted workshops for growers and crop consultants on nematode management in Rondonopolis and Cuiaba in Mato Grosso (January 28 - February 2, 2010).
* I was invited by CSIRO to work with various grower groups and coops on managing reniform nematodes throughout Queensland and New South Wales. These workshops were held in Theodore, Toowomba, and Narrabri (October 25 - November 7, 2014).
* I was invited to Brazil by Syngenta to discuss current disease and nematode management strategies using seed treatments for soybeans and cotton. I met with growers and industry personnel on two farms in Mato Grosso and with Syngenta representatives in Sao Paulo. I also toured Syngenta's Seed Care institute in Holambra and gave a seminar (July 2 - July 10, 2016).

**Professional Growth and Service:**

 Co-Editor, Compendium of Cotton Diseases, 3rd Edition (current)

 Member, Plant Management Network Focus on Cotton Steering Committee (current)

Chair, Website Committee for Organization of Nematologists of Tropical Americas

 Editor, Annals of Applied Nematology, 1999-01

 Member, Society of Nematologists (SON); served on various committees including Extension

Member, American Phytopathology Society (APS); served on various committees including Nematology

Nematology Committee Member, APS, 2001-04

Cotton Disease Council, Secretary, 1989-91; Chair, 1991-93; Steering Committee 1988-95

**Awards:**

**Researcher of the Year 1999**, Arkansas Assoc. of Cooperative Extension Specialists

**Extension Excellence Issue Team Award, 2006** – Arkansas Working Group for Introduced Plant Diseases (soybean rust response).

**Citation of Special Recognition, 2012,** Organization of Nematologists of Tropical Americas, for improvement of the ONTA website

**Unit Team Extension Excellence Award, 2012** – Crop Sciences Blog Team