

## A Constant Fight Against New and Rare Diseases

The old saying “What you don’t know won’t hurt you” certainly does not ring true with emerging and exotic diseases, whether they are maladies of people, animals, or plants.

Agriculture loses billions of dollars annually to plant diseases, such as head blight of wheat, gray leaf spot in corn, and fire blight of apple, as well as threats to animals such as bovine virus diarrhea and porcine reproductive and respiratory disease.

Scientists, growers, and livestock producers have played a vital role in gaining the upper hand against most of these diseases because they’ve had time and experience to develop strategies, vaccines, and cures to combat them. But there are no such advantages for coping with recently discovered or emerging diseases. And, frankly, that’s a scary thing.

During the past 10 years, emerging and reemerging pathogens have become a major health concern. On average, a new, emerging disease of animals or plants appears every year. These diseases are caused by previously unidentified pathogens or are new manifestations of known diseases. Known diseases can reemerge after long quiescent periods or on introduction of a new pathogen into a plant or animal population in a never-before-affected geographical area.

Modern agricultural practices based on efficient, intensive management and on animals and plant germplasm of narrow genetic diversity provide environments that create greater risk of severe disease outbreaks. Globalization of trade, increased movement of people and goods between countries, and changing weather patterns provide new opportunities for emergence and spread of diseases such as transmissible spongiform encephalopathies, avian influenza, and citrus canker.

That’s why newly identified afflictions of plants and animals raise immediate red flags at ARS. Thoughts quickly turn to how costly, destructive, or deadly a new disease may be—and to how it can be stopped or even eradicated.

As employees of the U.S. Department of Agriculture’s chief scientific agency, ARS scientists understand the importance of quickly gaining the advantage in the fight against each and every one of these diseases. They know that timely and effective control strategies are needed to maintain a safe food supply, avoid economic disruptions, and maintain consumer confidence in the ability of national and state governments to handle animal- and plant-disease emergencies.

The challenges are plentiful. Disease agents ensure their survival by always changing, so new diseases in new settings are occurring all the time. But an ever-watchful eye, combined with cutting-edge technology, can mean the difference between being caught off guard and being able to respond quickly and correctly.

With plants and animals, the ARS focus is on minimizing or preventing establishment of pathogens in the United States. This will best ensure that commodities and crops produced here will be of high quality for domestic consumption and of high international marketability. In addition, developing germplasm or production stock with increased disease resistance, as well as more sustainable and environmentally friendly control strategies, will provide U.S. farmers and producers with practical solutions. Developing effective control strategies for diseases that have reservoirs of infection in both domestic and wild animal populations requires greater understanding of the mode of pathogen transmission and maintenance in alternative hosts.

For plants and animals alike, the keys to protection lie in achieving new, faster, and more accurate detection and identification of unknown pathogens, along with integrated control strategies and pathogenicity studies to determine host range and virulence.

This issue of *Agricultural Research* magazine focuses on exotic and emerging diseases of plants and animals. In it, you will find articles on efforts to combat such diseases affecting a variety of plants, including soybeans, corn, beans, and black raspberry. There’s also an update on Dutch elm disease.

Some of the articles pertain to emerging and exotic afflictions of livestock and poultry. And one story focuses on construction, well under way, of a center in Ames, Iowa, that will house three key USDA laboratories dedicated to the overall fight against diseases of animals, including emerging diseases. One of these laboratories is ARS’s National Animal Disease Center. (See page 20.)

It would take many more magazine pages to cover the entire gamut of ARS’s efforts against plant and animal diseases. A major part of this includes scientists’ efforts to find new pathogens, characterize them, determine what agriculturally important species they can infect, and then develop preventive measures or treatments.

But what is presented here will give readers a good idea of the level of concern and dedication ARS has in regard to this vital, front line of defense that protects the nation’s economically important agricultural assets.

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