

Scab Initiative News

SCAB: A THREAT TO THE NATION'S FOOD SYSTEM

Fusarium Head Blight, more commonly known as scab, has emerged in recent years as an industry-threatening disease for all classes of wheat and barley in the United States.

Scab has caused economic losses of \$2.6 billion to the nation's wheat crop over the past six years, and \$400 million to the barley crop over the past five years.

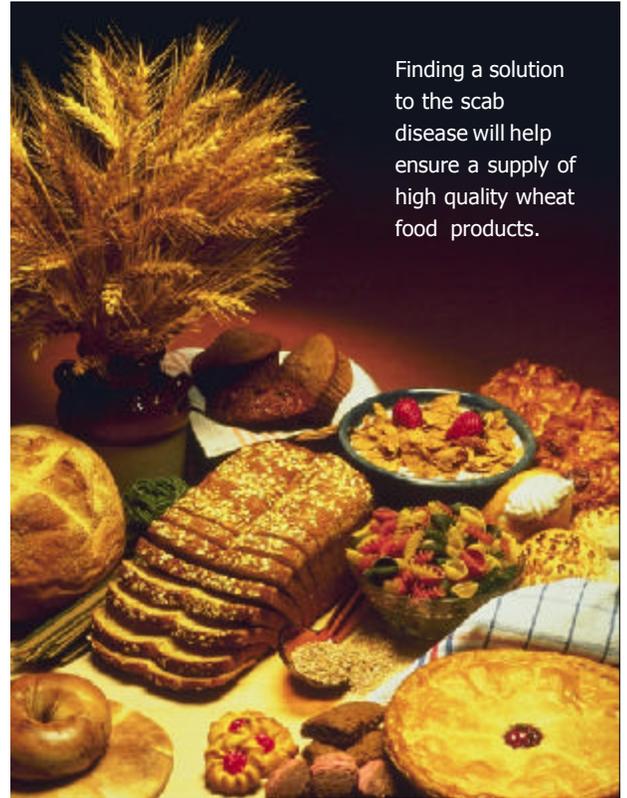
While these losses are alarmingly huge, the problem is amplified to the level of a strategic threat because scab-infected grain is usually contaminated with "vomitoxin" (deoxynivalenol), a toxic metabolite produced when scab invades the developing kernel.

Unchecked, scab represents a profound threat to the nation's food supply and economic environment.

Scab epidemics have substantially impacted the wheat and barley crops in at least twelve states: Indiana, Illinois, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, New York, North Dakota, Ohio and South Dakota.

In the states that produce soft wheat (Ohio, Indiana, Michigan, Illinois, Missouri, Nebraska and others), scab could conceivably eliminate wheat as a viable crop for farmers to produce. Soft wheats are typically used to produce food products such as cakes, pastries, crackers and flat breads.

In the hard wheat production regions of the Midwest U.S. where wheat dominates the landscape, scab threatens the very fabric of America's rural economy. In



Finding a solution to the scab disease will help ensure a supply of high quality wheat food products.

Photo: ARS

ECONOMIC LOSSES DUE TO SCAB 1991-1996

Barley  \$400 Million

Winter Wheat  \$1,166 Million

Spring Wheat  \$1,440 Million

the Dakotas and Minnesota, farmers are going out of business following five straight years of economic hardship due to this disease. Hard wheats are used to produce food products like bread, hamburger buns, pizza crust, macaroni and spaghetti.

Barley production has also been either threatened or eliminated in areas of the upper Midwest where brewers have imposed near-zero tolerance limits for vomitoxin in grain.

NO SILVER BULLET CURE

Just like the fight against cancer, there is no silver bullet cure or overnight solution for the scab disease problem.

That's not to say, however, that a potential solution doesn't exist. It just hasn't been found yet.

Promising leads lay inadequately explored in all areas: crop management (fungicides, crop rotation, etc.), conventional plant breeding (systematic searches for resistance genes are yet to be done), biotechnology

(wheat and barley receive much less attention from the private sector), and post-harvest toxin management.

No one scientist, institution, or even region, has the resources to explore all possible solutions. But together, the scientist in the 15 at-risk states, plus the rest of the ag science community, can mutually leverage their efforts into an unprecedented solution discovery engine.

The nation's top ag research scientists recently put their heads (and their collective research programs) together under the umbrella of the U.S. Wheat and Barley Scab Initiative. The Initiative's goal is simple: Develop as quickly as possible, effective control measures that minimize the threat of scab to the producers, processors, and consumers of wheat and barley.

The Initiative is guided by a Steering Committee that includes growers, farm organizations, food processors (like millers, pasta manufacturers and brewers), scientists (from land grant universities, USDA and private companies), and consumer groups.

According to Rick Ward, Michigan State University Plant breeder who co-chairs the scab initiative steering committee, this level of cooperation among the research community, growers, consumers and processors is unprecedented. "This level of involvement alone makes a loud statement about the seriousness of this problem," he says.

The scab initiative's approach to solving the disease problem cuts across geographic and political boundaries, and forges public-private partnerships, says Ward. "With adequate funding, this collaborative approach gives us our best shot at overcoming this devastating disease."

SCAB BASICS

Fusarium head blight, or scab, is caused by the fungal pathogens *F. graminearum*, and *F. poae*.

The scab spores survive from one year to the next in crop debris that is left on top of the soil to prevent erosion. Even if the crop debris is buried by plowing the field, scab spores are not totally destroyed.

When it rains a lot during the growing season, the scab spores splash up onto the maturing wheat or barley plants, and the infection begins. These head infections (as they are called) result in yield and quality losses because the kernels become shrunken and discolored. Sometimes, diseased heads do not form any kernels, resulting in what farmers call blank heads.

The diseased grain is a food safety concern because the scab produces toxins such as vomitoxin (Deoxynivalenol) that are harmful to swine and other animals that may consume contaminated grain.

Currently there is no cure for the scab disease. There are no wheat or barley seed varieties that are resistant to scab, nor are there any safe, reliable chemical control options, or farm management practices to control the disease.



Scabby vs. Normal Wheat Kernels

AG RESEARCH RETURNS BIG ON INVESTMENTS

At a recent USDA Ag Outlook Conference in Washington D.C., Agriculture Secretary Dan Glickman pointed out the importance of publicly funded research. Citing a government report to quantify the contribution of publicly funded research to the growth in U.S. ag productivity, Glickman said that from World War II on into the 1990's, public investment in ag research has been responsible for three quarters of all growth in U.S. ag productivity.

In addition to the increases in profitability research has given

farmers, the report also says that consumers get a big return on their investment in the form of lower food costs. As farmers produce more, often at less expense, prices come down, and consumers spend less of their dollar on food.

That's the good news, said Glickman: the not-so-good news is that funding for agricultural research has stagnated since the 1970's. "My budget folks at USDA say that since 1985, research funding in real terms has declined by 15%. The potential consequences of this slow leak extend far beyond economics."



Photo: ARS

RESEARCH INITIATIVE WILL REQUIRE PUBLIC FUNDING

“Most people assume the U.S. already has a system in place to respond in a coordinated and efficient manner to this kind of threat. In fact, we are only just learning how to bring the enormous research capacity of the country to bear on truly national issues as complex as scab,” says Dr. Rick Ward, wheat breeder at Michigan State University and co-chair of the Scab Initiative’s steering committee.

“To properly carry out the national multi-disciplinary,

multi-institutional research effort will require significant capital infusion,” says Tom Anderson, Barnesville, MN farmer who co-chairs the Steering Committee with Ward.

“We were successful in urging Congress to provide \$1 million for scab research this year (FY98),” says Anderson. “These public dollars are funding continued research efforts across the nation through the Agricultural Research Service. But, “he says, “to do the job right, more funding is needed.”

The Scab Initiative is urging Congress to appropriate \$5.2 million for each of the next five years beginning in FY99 to effectively step-up research programs through-

THE SCAB INITIATIVE’S RESEARCH APPROACH

The Scab Initiative has appointed nine research leaders to chair its technical advisory subcommittees. These leaders will be responsible for coordinating research within their area, and reporting progress back to the full steering committee. To adequately carry out the necessary research, each subcommittee has been assigned a preliminary budget, pending research funding approval by Congress.

Epidemiology/ Pathology

Area Leader: Pat Lipps, Ohio State University
Proposed annual budget: \$800,000
Goals: Expand and integrate scab epidemiology and crop management research to develop scab forecasting systems; identify sources of inoculum; and better understand the impact of regional farm management practices.

Plant Breeding and Uniform Nurseries

Area Leaders: Rick Ward, Michigan State University; Anne McKendry, University of Missouri; Jackie Rudd, South Dakota State University; Herbert Ohm, Purdue University; Richard Horsley, North Dakota State University
Proposed annual budget: \$2,500,000 for plant breeding and \$112,500 for uniform nurseries
Goals: Strengthen and expand on-going plant breeding efforts which are currently hampered by inadequate funding.

Fungicide/Crop Management

Area Leader: Marcia McMullen, Plant Pathologist, North Dakota State University
Proposed annual budget: \$375,000
Goals: Develop a fungicide application technology research network to develop and deploy alternative spray systems to boost effectiveness of available fungicides; seek out alternative fungicide formulations; and

develop effective chemical control strategies.

Food Safety/ Toxicology

Area leader: Pat Hart, Michigan State University
Proposed annual budget: \$1,000,000
Goals: Establish a food safety and post-harvest management network to assure proper food safety through testing programs.

Germplasm Introduction

Area Leaders: Rick Ward, Michigan State University; Anne McKendry, University of Missouri; Jackie Rudd, South Dakota State University; Herbert Ohm, Purdue University; Richard Horsley, North Dakota State University
Proposed annual budget: \$200,000
Goals: Develop four coordinating centers (one each for the spring and winter bread wheat regions, one for durum and one for barley) to ensure that all plant breeders have access to all possible sources of favorable genes.

Information Hub/ Communications

Area Leader: Rick Ward, Michigan State University
Proposed annual budget: \$137,500
Goals: Develop a research and outreach information network to maximize the exchange of information among scientists and reduce duplication of efforts in all research areas.

Transformation

Area Leader: Olin Anderson, USDA-ARS
Proposed annual budget: \$500,000
Goals: Explore all opportunities for a novel, engineered gene approach to eliminate or reduce scab damage to wheat and barley.



Olin Anderson



Pat Hart



Richard Horsley



Pat Lipps



Anne McKendry



Marcia McMullen



Herbert Ohm



Jackie Rudd



Rick Ward



out the nation's land-grant university system and the USDA's Agricultural Research Service.

"The federal government is losing substantial tax revenue because of the scab problem," says Anderson. "Investments in research that lead to a solution to the scab disease problem will repay themselves many times over through increased tax revenue and economic activity."

THE SCAB INITIATIVE'S APPROACH IS ALREADY PAYING DIVIDENDS.

Unprecedented national communication and coordination has been achieved in the twelve months since the Scab Initiative was launched. The first national scab forum in November of 1997 brought scab researchers from the east and west together for the first time.

Scientists are communicating within and among disciplines in unprecedented ways, leading to greater impact of individual efforts. Unification of the disparate industry sectors has led to increased levels of mutual understanding and problem identification.

FOR MORE INFORMATION

For more information on the U.S. Wheat & Barley Scab Initiative, including information on how you can become involved, refer to the Initiative's website at:

www.scabusa.org

Or, contact Rick Ward, Associate Professor, Department of Crop and Soil Sciences, Room A382 Plant and Soil Sciences Building, East Lansing, Michigan 48824, Ph: 517-355-2231, e-mail: wardri@pilot.msu.edu

U.S. WHEAT & BARLEY SCAB INITIATIVE STEERING COMMITTEE MEMBERS

Wheat millers: Art Loeffler, MI

Wheat growers: Mike Ellis, KY; Rick Vallery, SD; Tom Anderson, MN

Barley growers: Doyle Lentz, ND; Gerald Lacey, MN

Durum growers: Lawson Jones, ND; Maynard Satrom, ND

Seed industry scientists: Bill Lasker, Pioneer; Jack Berg, Monsanto

Fungicide scientist: Novartis representative

Wheat breeder: Rick Ward, MI

Pasta representative: Tim Dodd, Dakota Growers Pasta Co.

Consultant: Chris Bowley, KY

Barley breeder: Richard Horsley, ND

Barley pathologist: Ruth Dill-Macky, MN

Wheat pathologist: Greg Shaner, IN

Toxicology/Food Science: To be announced

Brewers: Mike Davis, American Malting Barley Assn., and Gary Hanning, Anheiser-Busch

Ag Experiment Station Director: Ian Gray, MI

Committee Co-Chairs: Rick Ward, MI, and Tom Anderson, MN

U.S. Wheat & Barley Scab Initiative

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