
TRADE AND POLICY IMPLICATIONS OF THE WHEAT DISEASE KARNAL BUNT

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INTRODUCTION

This paper will discuss the particular case of a wheat disease, Karnal bunt, which many scientists claim is insignificant, but which has numerous trade, economic and regulatory implications. Although the United States was aware of this disease through dealings with other countries, including Mexico, we have learned much more about the disease since its discovery on U.S. soil in March 1996. Since that time, the U.S. views regarding Karnal bunt have changed and our attitude about how this disease should be managed has changed. This, of course, has implications for our grain trade with Canada and Mexico, as well as the rest of the world.

We will discuss briefly what happened in the United States when Karnal bunt was discovered, what we did immediately to maintain our exports, how we have worked with Canada and Mexico on this issue, and a little bit about what the U.S. government is working on for the future.

Karnal bunt of wheat is a disease caused by the smut fungus *Tilletia indica mitra*. It was first discovered in 1931 in Karnal, India and is now common in the Punjab region. The disease is also found in Pakistan, Iraq,

Nepal, Afghanistan, parts of Mexico and the United States. The main effect of extensive Karnal bunt is to reduce yield slightly and cause wheat flour to have a fishy odor, thus reducing the quality of the flour. It poses no risk to humans. Yield and quality losses are considered by many scientists to be minor. Despite this, since Karnal bunt wheat is restricted by many wheat-importing countries and it can have severe impacts on international trade.¹

BACKGROUND OF THE ISSUE IN THE UNITED STATES

Following is a brief chronology of the events and government actions taken after Karnal bunt was first discovered in the United States. On March 8, 1996 the U.S. Department of Agriculture and the Arizona Department of Agriculture announced the discovery of Karnal bunt in Arizona. Efforts were immediately made to quarantine the suspect wheat fields. Subsequently some bunted seeds were found in samples of wheat seed that had been planted in Texas and New Mexico. Fields which had been planted with these seeds were plowed under.

On March 21, the Secretary of Agriculture announced a “Declaration of Extraordinary Emergency” to be able to compensate growers and handlers for losses due to quarantine actions. On March 26, a federal quarantine for Karnal bunt was placed on the entire state of Arizona, and parts of Texas and New Mexico. Later, a few counties in southern California were added to the quarantine. In July 1996, USDA removed areas in Arizona, New Mexico and Texas which do not produce wheat from the quarantine. In October 1996, USDA broke the quarantine areas into “restricted” and “surveillance” areas. Restricted areas included fields that tested positive in a 1996 preharvest survey. Surveillance areas included fields that were associated with contaminated seed or equipment.

In May 1997, APHIS adopted the bunted kernel as the standard to classify a field as regulated. This was opposed to testing for Karnal bunt

¹ Morris R. Bonde, Gary L. Peterson, Norman W. Schaad, Joseph L. Smilanick, “Karnal Bunt of Wheat”. USDA, ARS, published by American Phytopathological Society. 1997.

spores. This step was taken after the discovery of a previously unknown smut that affected ryegrass for which the teliospores looked identical to Karnal bunt teliospores. Accurate identification of the spores and which of the two diseases they represented could only be accomplished by complicated and time consuming DNA testing.

In May 1999, APHIS simplified the regulations on Karnal bunt greatly reducing the size of the area affected by Karnal Bunt in the four states. The regulated area was further reduced in 2000. In May 2001, Karnal bunt was found in an elevator in Young County, Texas. Three other counties in Texas were eventually added to the regulated area. This will be discussed further below.

MEASURES TAKEN TO CONTROL KARNAL BUNT

A whole set of USDA rules were put in place in 1996 regarding movement of wheat, other agricultural products and farm equipment within and out of the Karnal bunt regulated areas. These regulations have changed gradually over time, but significant regulations remain in place. In general, for wheat within regulated areas, a sample is taken at harvest or while in storage. If no bunted kernels are found, the grain is allowed to move to available markets. If one or more bunted kernels are found, an emergency action notice (EAN) is issued and the grain is sealed in a storage facility for approved treatment or disposal. If seed wheat tests negative for both spores and bunted kernels it can be planted in the regulated area, but cannot move out of the regulated area. Equipment used to harvest, transport, or process wheat within a regulated area must be thoroughly inspected, cleaned and disinfected to prevent the possible spread of Karnal bunt outside the regulated area.

In addition to these regulations, USDA decided to initiate an annual National Survey to monitor which areas should remain or be added to regulated areas. USDA's Karnal Bunt National Survey provides information about potential Karnal bunt infections in new areas as well as identifies areas that are free of Karnal bunt. The National Survey covers areas that are not regulated for Karnal bunt in all States that produce wheat.

Samples which are found to have *Tilletia indica*-type spores are tested further for bunted kernels. If bunted kernels are found, USDA will regulate the area. Every year since the harvest of 1996, USDA has compensated producers affected by the fungus. This does not include the 1998-1999 crop season because no wheat grown in the regulated areas tested positive for the disease. Only positive-testing wheat is eligible for compensation.²

MAINTAINING U.S. WHEAT EXPORTS

When Karnal bunt was discovered in 1996, one of the immediate threats was to U.S. export markets. The United States is the world's leading wheat exporter, accounting for one-third of world wheat exports valued at approximately \$US 3.4 billion in 2000. At that time, there were 37 countries which listed Karnal bunt as a quarantine pest. So, from the date of the discovery, APHIS could not officially issue a phytosanitary export certificate for U.S. exports to these countries.

Immediately, the Foreign Agricultural Service (FAS) and APHIS contacted importing countries' plant protection and quality (PPQ) authorities through our agricultural offices overseas to determine what they would accept as language for an "Additional Declaration" on USDA phytosanitary certificates. The majority of countries accepted the following language: "The wheat in this shipment originated in areas of the United States where *TILLETIA INDICA* (Karnal bunt) is not known to occur."

However, several countries did not approve that language and a negotiation on the language had to be pursued. To make matters more complicated, numerous other countries which had never had a Karnal bunt requirement suddenly asked that the United States now provide the additional declaration. However, within a few weeks, export certification issues were resolved for those countries accounting for approximately 98 percent of affected U.S. exports. For several countries, i.e. Chile, Italy, South Africa, certification issues lingered on much longer.

² Taken from APHIS website, www.aphis.usda.gov/ppq/emergency programs.

The domestic actions taken under the Karnal bunt program were all part of the effort to make the additional declaration possible. These actions included testing, restricting movement of grain, seeds and equipment, etc. The ability to continue to provide the additional declaration was also heavily dependent on the United States' ability to conduct a national survey.

A SHORT HISTORY OF THE DISEASE IN MEXICO

As the United States was implementing its Karnal bunt regulations, it was very conscious of the fact that this had happened previously in Mexico. Karnal bunt was first reported in Mexico in 1972. It has been well established in areas in the states of Sonora and Sinaloa in Northwestern Mexico since 1982. The United States implemented a quarantine on all Mexican wheat imports in 1983 due to Karnal bunt. In the early 1990s, Mexico initiated domestic quarantines to prevent Karnal bunt wheat from expanding into free areas such as the Mexicali Valley. Subsequently, Mexico began conducting surveys for Karnal bunt in the Mexicali Valley. Based on four years of negative survey data, in June 1998, the United States published the final rule officially recognizing the Mexicali Valley of Mexico as an area free of Karnal bunt, allowing Mexico to export wheat to the United States from that area.

U.S. RESPONSE TO THE KARNAL BUNT INFESTATION

Mexico

On March 20, 1996, the Mexican government informed the United States that it was closing the border to U.S. wheat imports until USDA/APHIS provided sufficient information so that Mexico could carry out a Karnal bunt risk evaluation. After the relevant information was provided, an agreement was reached on phytosanitary certification for U.S. wheat exports to Mexico. Wheat imports were prohibited from Arizona, New Mexico, California and 4 counties in Texas. Mexico would accept wheat from other areas without an additional declaration, but the wheat must either undergo testing to show it was free of Karnal bunt or undergo fumigation (which was already a requirement). Over time, these testing re-

quirements were dropped. The current certification requires an additional declaration which states that “Wheat grain in this shipment did not originate from Arizona, California, New Mexico and the regulated counties in Texas.”

Canada

After the discovery of Karnal bunt in the United States in March, 1996, an agreement was worked out in April on how U.S. wheat exports to Canada would be handled, including U.S. wheat that transits through Canada to be exported. First of all, wheat from Arizona, California, New Mexico and Texas was prohibited. Wheat that was destined for Canada from other states needed an additional declaration that the grain was free of Karnal Bunt based on official laboratory examination in the United States. It was also agreed that ships carrying U.S. grain which were not stopping at Canadian ports, or stopping only to be topped off with grain, could move through the Great Lakes/St. Lawrence Seaway system without meeting Canadian import requirements. The final category was wheat which was loaded into U.S. vessels but then off-loaded into Canadian elevators for future export. The USDA/Grain Inspection Packers and Stockyards Administration (GIPSA) was required to take a sample of the grain and provide negative testing results to the Canadians.³

Requirements in relation to Canada have eased since 1996. Wheat is still prohibited from Arizona, New Mexico, California and Texas. Now an additional declaration that “The grain originated in an area free of *Tilletia indica* on the basis of official surveys” must accompany shipments.

What Has Been Learned About Karnal Bunt Since 1996?

Research had been done on Karnal bunt in India, Mexico and other countries which the United States used and began making public 1996. As well as prior research, the United States initiated some of its own research. Through this public familiarization and through further research we have learned much more about the disease than was known previously.

³ USDA, APHIS, Phytosanitary Note, April 5, 1996.

These are some of the major points to keep in mind which affected how USDA regulated the disease. Karnal bunt is spread mainly by the planting of infected seeds. Infection occurs during the flowering stage of the host plant. The ideal conditions for infection are cool weather, rainfall and high humidity at the time of heading of wheat. In other words, much of the infection rate depends on having the right condition in a particular year. In soil, the spores may be able to survive as long as 5 years. Spores can be carried on a variety of surfaces- -plants, seeds, soil, elevator, building, farm equipment, tools and vehicles.⁴

Karnal bunt seldom results in significant economic losses to wheat in the field. Typically, the disease causes less than 1 percent loss in production.⁵ However, Karnal bunt affects flour quality if more than 3 percent of the grains are bunted. The fungus does not produce any toxic compounds in leaf and stem tissue or in the seed that pose health risks when consumed. The American Phytopathological Society has taken the position that Karnal Bunt is of little agronomic significance and should not be regulated.

Discovery Of Karnal Bunt In Texas In 2001

In May 2001, USDA confirmed that wheat in an elevator in Young County, Texas tested positive for Karnal bunt. Further tests in the region found harvested grain with Karnal bunt that originated in 3 other adjoining counties. These four counties are approximately 125 miles outside of the areas previously regulated for Karnal bunt. This was the first time since 1997 that Karnal bunt was detected outside of a regulated area. APHIS added these four counties to the regulated area. USDA halted grain movement, began traceback surveys, and tested surrounding fields for the fungus to prevent the spread of the disease.

Since this most recent outbreak of Karnal bunt in the United States, USDA has only received inquiries from one wheat importing country- -

⁴ USDA, APHIS website, www.aphis.usda.gov/ppq/emergency programs.

⁵ Cunfer, Barry M. et al., *Karnal Bunt Tilletia (Neovossia) indica*. The University of Georgia. Cooperative Agricultural Pest Survey Program Publication. GACAPS0297-1, 1997.

Canada. It seems that the majority of wheat importers are confident in the regulatory system that USDA has in place.

Current and Future U.S. Strategy Regarding Karnal Bunt

In November 2001, APHIS sponsored a workshop in Oklahoma City, Oklahoma to gather information that would enable APHIS to develop a strategy for dealing with Karnal bunt in the future. The objective was to bring government and industry stakeholders together to discuss methods to reduce the threat to livelihoods of producers and handlers currently and in the future, while at the same time maintaining our export markets. The complexity of Karnal bunt issues became clear since stakeholders and scientists consider the disease insignificant, while major wheat importing countries continue to regulate Karnal bunt as a quarantine pest. USDA now has the task of ensuring wheat exports meet importing countries regulations while minimizing program impacts on U.S. producers and handlers.

As a result of this workshop, USDA is now putting together a strategic framework for dealing with the U.S. Karnal bunt program. The framework includes issues about trade management, compensation, pest risk assessments, best management practices, research and economic impacts among others. A major objective of the strategy is to change the quarantine status of Karnal bunt in the United States and internationally from a quarantine pest to a “regulated, but non-quarantine pest” as defined by International Plant Protection Convention (IPPC). This would essentially allow the movement of wheat other than for seed to be deregulated in the United States.

WHAT ARE THE POLICY LESSONS LEARNED FROM THIS CASE STUDY?

First, there is no substitute for a thorough scientific evaluation of pest risk before setting phytosanitary import requirements. A lot of the problems the United States has faced with Karnal bunt were the result of prior limited research on the disease that hindered an adequate risk assessment of Karnal bunt when U.S. import requirements for the disease were first introduced. Scientific information on the disease threat from Karnal

bunt was limited or hard to find 20 years ago. However, U.S. officials knew it was not present in the United States, but it was present in Mexico, and the simplest way to avoid any threat to U.S. wheat was to ban imports from countries with the disease. The fact that this approach was urged by U.S. wheat growers, and that U.S. imports of Mexican wheat were small at the time, made it an easy step to take for U.S. regulators. However, the seriousness with which the United States treated this disease no doubt influenced other countries' regulations -- regulations which are now confronting the United States, within Mexico, and elsewhere.

Second, openness and transparency pay off in the long run. USDA has received some criticism from domestic interests for publishing on the internet every little detail of the Karnal bunt outbreak in 1996 and beyond. Producers and handlers in the regulated areas felt that the trade problems the United States encountered immediately after the outbreak were increased because of the publicity generated by USDA's information dissemination campaign. The fact that eleven new countries were added to list of those requiring Karnal bunt certification seemed to confirm that. However, in the long run, the openness displayed by the United States with its trading partners on the steps being taking to contain the disease and, most importantly, protect the integrity of the Additional Declaration have paid off. The fact that there was little or no concern expressed by wheat importing countries when the new Karnal bunt outbreak occurred in 2001 seems to indicate that a high level of confidence exists among U.S. trading partners in the ability of the United States to assure the plant health safety of its exports.

Third, good lines of communication and working relationships between countries' plant health and trade policy officials are vital. When Karnal bunt was found in the United States in 1996, U.S. PPQ and trade officials had to negotiate alternative phytosanitary certifications with 48 countries. In some of the larger U.S. markets with large volumes of trade at stake, the ability to pick up the phone and discuss the issues involved with counterpart officials in other countries facilitated the quick reestablishment of trade. This was true with both Canada and Mexico. While market conditions at the time were conducive to resolution of the certifica-

tion issues, the ability of U.S. officials to complete negotiations and re-open 98 percent of the affected trade, encompassing more than 30 countries, between March 8 and mid-April 1996 was made easier because of the pre-established relationships.

Fourth, changing the pest risk status of Karnal bunt in the United States and internationally will be long and difficult. It will require a simultaneous effort in international scientific fora like the North American Plant Protection Organization (NAPPO) and the International Plant Protection Convention (IPPC), combined with bilateral discussions with countries that have Karnal bunt concerns. It will also require continued research on this disease to demonstrate convincingly the geographic limits of its viability and its lack of significant risk to wheat production in areas where it is viable. The completion of an internationally recognized pest risk assessment will be a key component of this work. In the mean time, pressure to complete this process in a more timely fashion will continue to be applied by a U.S. wheat industry anxious to get out from under the burden of quarantine regulations.

Finally, North American cooperation in the effort to internationally deregulate Karnal bunt will be in each country's interest. The benefit to Mexico is in reduced potential barriers to its wheat exports. For Canada, the benefits are in the removal of the risks to its wheat sector that now exist as long as this disease is considered significant and remains on the continent. Should further major outbreaks of the disease in the United States force the U.S. government to abandon its regulatory program and allow unrestricted movement of Kb wheat and associated equipment throughout the country, Canada could find itself in much the same position as the United States 20 years ago when the disease became widespread in Mexico.

In summary, Karnal bunt has every appearance of being a minor disease of wheat from an agronomic point of view. Its potential economic impact, however, is anything but minor.

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USDA, APHIS. website: [www.aphis.usda.gov/ppq/emergency programs](http://www.aphis.usda.gov/ppq/emergency%20programs).