



Karnal bunt disrupts wheat marketing

In a worse-case scenario, Karnal bunt fungus could cost Southern California growers up to \$77.6 million in production expense and lost profit, according to a recent UC study.

After it was confirmed on March 8 that contaminated wheat seed from Arizona had been planted in Imperial and Riverside counties, the federal government quarantined all wheat growing areas in the two counties – 129,238 acres or about 6,000 square miles. The quarantine also encompassed Arizona, four counties in New Mexico, and two counties in Texas.

Trade is the primary concern, according to Lee Jackson, statewide small-grains specialist based at UC Davis. “It could affect grain exports because 22 countries have restrictions against importing wheat contaminated with Karnal bunt,” Jackson says.

Major export markets for desert durum wheat are Italy, Venezuela, Costa Rica, Algeria, Morocco and Tunisia. Currently only Italy is accepting desert durum that has tested negative for Karnal bunt. Other countries do not want to accept any risk of introducing a new fungus to their own wheat production.

Smut fungi invade kernels and convert them to masses of small black spores, which emit a fishy odor. Feeding studies have revealed no adverse health effects, but consumers can begin to taste and smell the fishiness at infection levels at or above 3%.

The fungus could create serious problems for U.S. wheat exports, valued at \$4.9 billion for 1995. California exports an average of 300,000

metric tons of wheat annually. At current wheat prices of about \$170 per ton, the export value is about \$60 million. Riverside and Imperial counties account for 17% of the state’s 780,000 acres of wheat planted this year.

Since Karnal bunt symptoms can only be seen in mature grain, and because disease incidence is usually very low, fields in the quarantine area are being sampled by the California Department of Food and Agriculture prior to harvest and assayed for the presence of fungal spores. The disease is named for Karnal, India, where it was first seen.

As of June 18, more than 106,000 acres of wheat in Imperial County had been sampled. Of these, 12,480 tested positive: 9,000 acres in the Bard / Winterhaven area and 3,480 in the Blythe area of eastern Riverside County. Specifically, a composite sample representing 41 acres in the Bard / Winterhaven area tested positive for spores, Jackson said. In the Blythe area of Riverside County, 3,480 acres (of 14,455 sampled), had tested positive as of June 18. Both hard red wheat and durum wheat have tested positive in the Blythe area.

Karnal bunt, also called partial bunt, is caused by the fungus *Tilletia indica* Mitra. Unless the infection is severe, the symptoms are not conspicuous, Jackson says. Symptoms first appear at the soft-dough stage, an early stage of kernel development, as blackened areas surrounding the base of the kernel and extending up along the crease. The fungus usually affects only a portion of the kernel and a few kernels per seed head, according to Gerald Holmes, Imperial County plant pathology farm advisor. One solution to unpalatable grain, says Holmes, is to blend bunted grain with healthy grain so it can’t be detected in end-products.

Karnal bunt affects common wheat and to a lesser degree durum wheat, triticale and related species. It is difficult to estimate losses caused by Karnal bunt because it can reduce seed quality, but usually minimally affects grain yield. However, indirect costs are incurred in preventing its spread while losses in marketing opportunities arise because of its presence.



Gerald Holmes

Samples of wheat are being taken during harvest to test for Karnal bunt.

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Growers are having difficulty selling any wheat grown in the quarantined area, according to Robert Kallenbach, a Riverside County farm advisor. Even if wheat from a quarantined area tests negative for Karnal bunt twice, USDA requires millers to heat treat mill-run by-products after processing to kill potential spores. (When wheat is milled, it produces flour and mill-run by-products, which are normally used in cattle feed.) Although USDA will cover the cost of heat treatment at \$35 per ton, some mills prefer not to deal with wheat that requires the special handling.

Kallenbach has been assessing risk with Holmes, Jackson, independent statistician Carol J. Adams, UC Berkeley agricultural economist Jerome Siebert and UC Riverside entomologist Thomas Perring for the UC Institute for Desert Agriculture. They estimate there is a one-in-a-million chance of the following scenario: a sample testing falsely negative twice, then surviving processing and being fed in by-products to livestock, then passing via manure to a field, resulting in an outbreak of the disease. Heat treatment further reduces the risk to 1 in 5 million.

"Heat treatment of the mill-run is unnecessary if you look at the new risk assessment of transmitting the disease," Kallenbach says. "I think it's an acceptable risk when you consider that it causes no human health hazards."

Infected wheat can only be sold to a feed yard within the quarantined area. However, uninfected grain that was refused by mills has been shipped to feed yards too. Kallenbach notes, "There are not many feed yards here in the desert. The ones we have will become saturated with grain soon, and this will become an even greater problem as we see more infected grain come in from harvest."

In May, frustrated growers dumped about 200 tons of wheat on a K-mart parking lot to draw attention to their plight. USDA has announced that growers and handlers would be eligible for compensation, "based on the actual difference between the contracted price and the price at which they can market the infected wheat."

Because of the quarantine, the UC experts estimate growers in Imperial and Palo Verde valleys will fail to realize profits ranging from \$47 to \$162 per acre and will lose an average of \$471

per acre in production costs.

Desertwide, they estimate revenue losses — funds already spent to grow and harvest the grain — could reach \$57.8 million. Compounding the economic crisis is the larger number of acres of wheat planted this year by growers anticipating greater returns due to the best market conditions in more than two decades.

Total potential loss is estimated at \$77.6 million for the Palo Verde and Imperial valleys, but this is not likely to occur. "Growers are selling their wheat and making a profit so far," Holmes says. "However, they are not selling it quickly, nor at the open market price. Growers are probably selling their wheat at \$0.50 to 1.00 less per hundred weight than they would under normal (nonquarantined) conditions."

In climates where cool, moist conditions occur regularly, Karnal bunt is difficult to control. Fungicidal seed treatments provide control of seed-borne inoculum but do not eradicate the disease when applied to infected seed because the spores are well protected by the pericarp, or fruit coat. Fumigating wet contaminated soil with methyl bromide can reduce the ability of spores to germinate by more than 98%, Jackson says, but the cost is prohibitive on a commercial scale.

"To prevent the spread of Karnal bunt into previously unaffected areas," Jackson says, "use of disease-free seed is essential." The movement of farm machinery and soil from contaminated fields is also being restricted.

County composite samples are also being tested in the other 32 wheat producing counties of the state. A nationwide survey is also being conducted.

— Editor



Gerald Holmes

Karnal bunt fungi invade kernels and convert them to masses of small black spores, which emit a fishy odor.

Copies of the UC Institute for Desert Agriculture's report, "Likelihood Of Karnal Bunt Spread From Wheat Harvested In The Imperial And Palo Verde Valleys Of California" can be obtained free of charge by calling Robert Kallenbach at (619) 921-7884 or Thomas Perring at (909) 787-4562.