Chapter 6

Karnal Bunt

Karnal bunt is a fungal disease that affects certain types of cereal grains such as wheat. The disease develops during the growth phase of the plant and not during post-harvest storage or transportation. However, it can cause potentially serious problems for shipowners and charterers. Many countries prohibit the importation of wheat that is known or, in some instances, is suspected to be affected by Karnal bunt. This can cause lengthy delays to ships while a solution is found for the disposal of the cargo. Definitive identification of the spores of the specific fungus that causes Karnal bunt in a consignment of grain requires specialised and time-consuming test procedures, which can take up to two weeks to complete.

Karnal bunt was first described in Karnal, India in 1931. It has now been identified in all of the major wheat producing regions of India, Pakistan, Iraq and Afghanistan and is also well established in north-western Mexico. More recently, it has also been found in durum wheat from Arizona. Following this discovery, a flurry of surveys and inspections was carried out, resulting in quarantine measures being imposed in the state of Arizona and in counties in New Mexico, Texas and California.

While the disease is not particularly damaging in terms of yield loss, it can cause significant reductions in grain quality. The spores of the infecting fungus
are believed to present no health risks to consumers through infected grain or grain products, but wheat containing more than 3% of ‘bunted’ kernels is commonly considered to be unfit for human consumption. This is because flour produced from wheat containing a significant number of bunted kernels may have a distinctive odour.

Karnal bunt is also known as partial bunt. The fungal organism responsible for the disease is *Tilletia indica*. Spread of the disease occurs by the microscopically small spores of the fungus being distributed by wind and then infecting the host plant during flowering and heading. Symptoms become visible only as the grain matures. Bunted kernels can be very difficult to detect in the field, particularly in cases of mild infection, because normally not all plants in the crop are affected. Bunted kernels, however, each contain millions of spores of the fungus, which means there is potential for further spread.

There are other types of bunt, such as common bunt (sometimes known as ‘stinking smut’), which is prevalent in parts of Europe and is caused by a related fungal organism. However, these other types of bunt differ in that infection is spread by spores in the soil, rather than by the wind. This means they can be controlled relatively easily by pre-treatment of the seed with suitable anti-fungal dressings. In EU countries, however, a ban has been imposed in recent years on the application of traditionally used seed dressings of proven effectiveness. This has been held responsible for some resurgence in the incidence of common bunt in certain parts of Europe.

Karnal bunt is much more difficult to control and there is no effective solution as yet.

A number of countries, particularly those in which wheat is a crop of major importance, look extremely critically upon the importation of wheat that is known or suspected to contain kernels affected by Karnal bunt and they regard the disease as a quarantine pest. By early 1997, some 50 countries had adopted phytosanitary measures to prevent the importation of wheat affected by Karnal bunt.

Some countries accept US wheat from quarantined areas if it is certified that the wheat has tested negative for *Tilletia indica* by laboratory analysis on both pre-harvest and pre-shipment samples. Other countries, for example Mexico, require methyl bromide fumigation prior to discharge of the cargo.

It is impossible for ships’ representatives to detect, by visual inspection at loading, whether a cereal grain cargo is contaminated with diseased kernels specifically affected by Karnal bunt. However, if during loading of a grain cargo any unusual odour is detected that may or may not be due to the presence of substantial amounts of grain severely infected with Karnal bunt, the bill of lading should be claused. Other than that, the only realistic course of action open to shipowners wishing to protect their interests as far as possible is to insist
on the provision of a certificate, from an authoritative source in the country of exportation, that unequivocally confirms that the cargo is free from Karnal bunt.

It may be advisable for shipowners to avoid carrying cargoes of wheat originating from countries where Karnal bunt is known to be prevalent. This applies particularly to cargoes destined for countries known to adopt a particularly severe approach to the importation of wheat from affected countries.

When a ship has discharged a cargo known to be affected by Karnal bunt, depending on future trading patterns, it may be necessary to carry out sterilisation treatment of the relevant holds to destroy the viability of any residual spores. The following sterilisation treatments are claimed to be effective:

- Wetting all surfaces to the point of run-off with a solution of 1.5% sodium hypochlorite and water and letting stand for 15 minutes. Thereafter, the surfaces should be thoroughly washed down to minimise corrosion
- applying steam to all surfaces until the point of run-off so that a critical temperature of about 80°C is reached at the point of contact
- cleaning with a solution of hot water and detergent under a pressure of at least 2 kg per sq cm (30 pounds per sq inch) at a minimum temperature of 80°C
- fumigating with methyl bromide at a dosage of 240 kg per 1,000 m³.