

Defending Against Bacterial Spread

KSU study finds 18% of stored-product insects tested positive for bacteria

The backbone of an effective pest management program is sanitation. Pests are generally present in flour mills because of availability of harborages, unlimited food resources, and temperatures

Pest Management



Dr. Bhadriraju Subramanyam

conducive for pest survival and reproduction throughout the year.

Removing conditions that permit pest entry and establishment in mills through sanitary design and sanitation of food materials within and outside equipment deters pests.

Good manufacturing practices highlight the importance of construction features

that minimize or prevent pest access into buildings and maintenance of clean and orderly premises.

In addition, the presence of pests, especially stored-product insects, in finished products intended for domestic or export markets, may be costly because of the value of the lost product due to pest damage, reduced customer confidence, increased cost of control, and/or rejection by the buyers.

Unsanitary conditions in mills sometimes are overlooked in favor of more pressing issues, but it's important to put this problem in perspective.

First impressions are important for auditors, potential customers, and new employees. When an audit is being conducted, or new customers are touring the facility, areas that contribute to potential infestations or that are infested become targets for criticism.

Developing a culture of good sanitation and product quality is hard, when new employees are exposed to dirty and infested mills.

Bacterial Concerns

Pest management is not only important for the reasons mentioned above, but also from a food safety standpoint, because stored-product insects can harbor bacteria.

For example, the lesser mealworm, captured from poultry brooder houses, were reported to contain *Salmonella* spp., *Escherichia coli*, *Micrococcus* spp., *Streptococcus* ▶



Standing The Test Of Time With Quality

Remember when you could call a company and talk to a real & knowledgeable person?
YOU STILL CAN @ 1-800-835-0226!



Elevator Belt & Accessories

BELT • BUCKETS • PULLEYS • BOLTS
SPlicing • SENSORS • LAGGING



Conveyor Belt & Accessories

BELT • IDLERS • FASTENERS
PULLEYS • LACING • FLEXCO



CALL ME

VAN



1850 N. OHIO ST. WICHITA, KS 67214
316-269-1151 • FAX 316-269-3208

email: sales@rbhinc.com www.rbhinc.com

NO, CALL ME



STEVE

"Over 1300 Leg Belts sold in 2002. There must be a reason!"

Parker Schrader Bellows®

FILTERS • REGULATORS • GAUGES
CYLINDERS • ACTUATORS • VALVES
HYDRO-CHECKS • FLOW CONTROL
LUBRICATORS • BLOW GUNS



Lining Materials

- FABRIC BACKED
- EXPANDED METAL-BACKED
- EXPANDED METAL-BACKED CERAMIC

spp., and *Bacillus subtilis*.

The granary weevil from laboratory colonies and grain-handling facilities was identified as a potential reservoir for bacteria such as *Escherichia intermedia*, *Proteus rettgeri*, *Proteus vulgaris*, *B. subtilis*, *Serratia marcescens*, *Streptococcus* spp., *Micrococcus* spp., and members of the *Klebsiella-Aerobacter* group. This beetle has been shown to transfer *Salmonella montevideo* from contaminated wheat to uncontaminated (clean) wheat. Hairy fungus beetle, an insect species associated with stored-grain molds, has been shown to transmit *Salmonella* to broiler chicks.

Recently, research at Kansas State University (KSU) has identified enterococci and aerococci bacteria in eight species of stored-product insects sampled from six feed mills in the midwestern United States. All of the beetle species mentioned have been reported from many feed and flour mills by several researchers.

Study Results

In 2003, from March through Novem-



Granary weevils, like the one above, are among the stored-product insects that harbor bacteria. Photo courtesy of Clemson University.

ber, 298 live adult insects were collected from six feed mills. Insects were individually collected using sterile forceps and placed into sterile plastic vials for transportation and processing at the KSU laboratory.

Between 22 and 65 live insects of the lesser mealworm, flat/rusty grain beetles, small-eyed flour beetle, lesser grain borer, maize weevil, drugstore beetle, red flour beetle, confused flour beetle, and warehouse beetle were sampled directly from mills and product samples taken from those mills.

Insect samples were placed in a refrigerator (39 degrees F) after collection and processed within one to five days.

Bacteria were isolated from individual insects on three bacterial growth media. After the enumeration of colonies, bacterial isolates from insects were screened with eight antibiotics using a diffusion disk assay.

The eight antibiotics, used for treating human bacterial infections, were tetracycline, ampicillin, erythromycin, vancomycin, chloramphenicol, ciprofloxacin, streptomycin, and neomycin. After 24 hours, the zone of inhibition was measured to differentiate resistant, intermediate, or susceptible isolates. Nearly 18% of the 298 insects tested positive for bacteria.

Three bacterial species were isolated from stored-product insects. These species were: *Aerococcus viridans* 3, *Enterococcus gallinarum*, and *Enterococcus faecium*.

This is the first report of isolation of these bacteria from stored-product insects. These bacteria are secondary human pathogens, primarily afflicting immuno-compromised individuals.

The bacteria are medically important because of their ability to develop antibiotic resistance and potential to transfer antibiotic resistance genes to more dangerous pathogens such as *E. coli* or *Salmonella*.

We observed complete or intermediate antibiotic resistance in individual isolates of bacteria to one or more of these antibiotics. Additional confirmation of resistance to certain antibiotics is being reinvestigated before the results can be fully disclosed.

The transfer of bacteria to feed or food by insects is an issue that still needs to be researched.

The transfer of bacteria to feed or food by insects is an issue that still needs to be researched.

Summary

Stored-product insects are cosmopolitan in distribution and occur in feed and flour mills in the United States and around the world. Bacteria associated with these insects have not been well documented or studied.

Based on our observations and previous research, it is a likely conclusion that stored-product insects are of medical and veterinary importance, because they could serve as vectors for antibiotic-resistant bacteria.

Our findings provide additional reasons for having an effective program for managing stored-product insects in mills.

Bhadriraju Subramanyam (Subi) is a professor in the Department of Grain Science and Industry at Kansas State University, Manhattan. He can be reached at 785-532-4092 or bhs@wheat.ksu.edu.

simple, easy operation and so economical!

- Custom designed to meet your requirements
- Various screen sizes down to 70 microns
- Can accommodate multiple separations
- Multiple sections up to 842 square feet



Norvell Smart Sifter



Six-Section Free-Swinging Sifter

- Custom designed to meet your requirements
- Various screen sizes down to 70 microns
- Floor mounted or ceiling suspended
- Can accommodate multiple separations
- Single sections up to 113 square feet



800-653-3147 or 620-223-3110
Fax: 620-223-3115 • e-mail: sales@norvellco.com
www.norvellco.com