



Insects Limited, Inc.

Employee Spotlight



Quinn Kelley
Sales Representative

How long have you been working at Insects Limited?

2 years

What is your favorite thing about working at Insects Limited?

I like how we work as a team towards a common goal. Plus, we're all very close!

What do you enjoy doing when you're not at the office?

Hanging out with my dogs Cooper and Wesley.

How would you describe yourself in three words?

Personable, honest, and dependable

If you could learn to do anything, what would it be?

Become fluent in another language

Where is your favorite place you've traveled to and why?

Kauai, HI because of the perfect weather year-round, and the unbeatable mountain/ocean combination.

What's your favorite sports team?

Indianapolis Colts

What is something about you that might surprise people?

I am a part-time EMT

Vice President of Insects Limited, Inc., Tom Mueller stated, "Having Quinn join our business development team has been extremely helpful. He is introducing great ideas and a new energy to the group. Selling is all about building rapport and trust, which never makes it easy when starting a role like his, but customers are responding well, and he is quickly becoming their "go to" person when they have a question or would like to order."



Ethan Estabrook, BCE

Insect Damage to Grain

Post-harvest loss due to insect infestations has been estimated at around \$1.25 to \$2.5 billion annually in the United States wheat and corn market alone (USDA, 2005). Insect infestations can reduce weight, nutritional value, and overall quality by introducing odor and mold in stored grains.

In this [video](#) we can see the amount of damage that insects can do to stored grain. On the left, we have Lesser Grain Borer (*Rhyzopertha dominica*) damage to wheat and Rice Weevil (*Sitophilus oryzae*) damage to corn on the right. One hundred insects were introduced to the clean grain and stored at 81°F (27°C) and 50% relative humidity over a three-month period. You can see these insects can do a significant amount of damage to grain in just 2 months!

There are several control methods that can be used help reduce and prevent insect damage to grain. An integrated pest management (IPM) program uses these control methods strategically to focus on a long-term prevention of pests and their damage.

- **INTEGRATED PEST MANAGEMENT** – A scientific approach to pest prevention that consists of exclusion, sanitation, monitoring, remediation, and education.
- **SANITATION** – Store grain in clean, insect-free structure with clean surroundings.
- **DRYING** – Maintain low moisture content (12–13%)
- **COOLING** – Maintain low temperatures to below 60°F (16°C)
- **FUMIGATION** – Phosphine at 500 – 1,000 ppm for 72 hours above 70F. Sulfuryl fluoride at 500 – 1,000CT (depending on species of insect) for 24 hours above 80F.

- **GRAIN PROTECTANTS** – Liquid chemical application directly to grain

Lesser Grain Borer *Rhyzopertha dominica*



Description

- Adults are a dark reddish brown, about 3 mm in length.
- Adults have distinct 3-segmented club antennae.
- Adults can fly.

Life history

- Females lay 200-500 eggs over a 4 to 8-month lifespan.
- Females lay eggs within grain kernels.
- Infestation can establish at temperatures as low as 64°F, but development is prolonged.
- Optimum development takes place around 93°F at a relative humidity of 70%.

Damage

- Feeds on nearly all grains especially barley, corn, sorghum, rice, and wheat.
- Grains with round and irregular holes are a sign of infestation by burrowing adults and larvae.
- Can almost complete destruction of product at high densities.
- Infestation can lead to heating and increased moisture levels in grain.

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USDA. 2005. Integrated Management of Insect Pests in Stored Grain and in Processed Grain Products. Annual Project Report: The Biological Research Unit, Agricultural Research Service, United States Department of Agriculture.

Rice Weevil *Sitophilus oryzae*



Description

- Adults have a prolonged head or snout.
- Adults are dark brown with 4 distinct lighter yellowish spots, about 2.5 to 4 mm in length.
- Adults can fly.

Life history

- Females lay 300-575 eggs over a 5 to 8-month lifespan.
- Females individually lay eggs within grain kernels.
- Infestation can establish at temperatures as low as 59°F, but development is prolonged.
- Optimum development takes place around 84°F at a relative humidity of 70%.

Damage

- Feeds on barley, corn, sorghum, rice, rye, and wheat.
- Grains with round holes are a sign of infestation by emerging adults.



Otto Mück, PhD

Case Studies: My Working Experiences in Africa

Otto Mück is a biologist specializing in stored product protection. He is managing director and co-owner of BM Seminar & Consulting Company in Germany. Otto has broad working experience in African countries including three years in Cape Verde, three years in Benin and short-term assignments in about 20 other African countries. The focus of his work in Africa has been training (more than 30 courses on topics such as storage, processing, fumigation, and integrated post-harvest pest management in cereals, pulses, and root and tuber crops). Apart from this, Otto participated actively in national and international conferences on post-harvest issues. He has been involved in R&D project planning, and evaluation and designed national and regional pest prevention and control strategies. He has produced many journal articles, extension leaflets, brochures and posters and is a co-author of several book publications.

My contribution to the [14th Fumigants & Pheromones Conference](#) is based on experiences collected during three years of work in the Cape Verde Islands, three years in Benin, and repeated short-term assignments in about twenty other African countries over a period of more than thirty years.

My first lesson was that there is a lot to learn from Africa. Post-harvest protection in Africa is much more complex than anywhere else and pests are by far not the only problem - everything starts from knowledge and attitude. Knowledge of suitable storage structures and protective measures against insect pests has a long tradition (which is gradually disappearing nowadays). All over Africa elaborate granaries made of natural materials such as banco, straw, and others can (or could) be found which provide(d) excellent micro-climatic storage conditions. Pest control relied widely on natural

substances such as ashes, oils, and botanicals derived from different plant parts. Their effect has been proven scientifically in many cases and led even to the development of commercial products such as neem preparations which have been registered for multiple purposes in many countries.



Traditional granary in Nigeria

Changes in harvest, storage, handling, drying, processing and transportation procedures and techniques during the last decades have posed plenty of challenges that remain unsolved to a large extent. To name just a few: unsuitable warehouses, the poor state of roads, inadequate means of transportation, and misuse of insecticides and fumigants. My contribution provides examples of such problems and some proposals for solutions. Special case studies include cereal banks which most often did not work for economic and/or technical reasons and the impressive success story of biological control of the Larger Grain Borer across the African continent.

On an industrial scale, major post-harvest challenges are related to poor infrastructure and deficits in logistics, lack of focus and coordination in control efforts,

inadequate knowledge of pest behaviour and damage, and possibilities of targeted integrated control. This point is also illustrated in case studies presented in my contribution to the [conference](#).



Rice transportation in Burkina Faso

Decades of practical work in Africa taught me that investment in infrastructure and equipment is required together with enough funds to maintain and modernize existing facilities but the essential component is training and education. Experiences from dozens of seminars and workshops have shown that only knowledge and insight on all levels from the small-scale farmer to policy makers, and from workers to managers of large-scale facilities can induce sustainable improvement of the current situation. This has been the priority of our work conducted by BM Seminar in Africa and beyond. And it has been worth the effort!

Fumigants & Pheromones

Insects Limited, Inc.



Tom Mueller

Learning from Others and the Intangible Benefits of Attending Conferences

“The mark of a well-educated person is not necessarily in knowing all the answers, but in knowing where to find them.” Author, Douglas Everett

It is human nature to think we know all the answers, especially people from the United States. Humbling yourself enough to realize you don't is quite a battle. Knowing this is the reason we all need to incorporate the word “education” into our company and personal Core Values. Because we at [Insects Limited](#) emphasize that we must learn from others around the world to be the best at what we do, Pat Kelley and I made the investment to travel to Pisa, Italy during the first week of September to attend a conference on the management of stored product pests, specifically insects.



Tom Mueller and Pat Kelley of Insects Limited attending IOBC – 12th Conference of the Working Group – Integrated Protection of Stored Products in Italy September 2019

Education is an investment. It does pay dividends even if we cannot put an exact dollar amount to the return on that investment. With education as a Core Value, it is company policy to attend practical and scientific conferences throughout the world. Meeting individuals that have put in the work and positioned themselves as experts has come in quite handy throughout the years. Knowing other experts in our field is like being able to “phone a friend” for that million-dollar question. I have

been fortunate enough to have those “friends” right down the hall to get the answers when I am stumped, and if they don't know the answer, they certainly know someone who will.



IOBC Group in Italy

Education does not stop when we finish school and it does not stop when we leave the conference. It can't. We should all have that list of books we are reading, and the number of titles on that list should be getting longer, not shorter. Many of these experts are constantly working toward publications. Read them. Looking for industry experts from which to learn? Attend a conference or two, introduce yourself, exchange contact information, and communicate.

The experts are not trying to keep their hard work and experiences to themselves. They want to share what they have found. You just need to ask.

On a side note, attending international conferences allows you to visit places you might not otherwise visit. For us, the week started with an attempt to fight off jetlag by visiting the city's Cathedral Square before registration. The square is the location for the Tower of Pisa, and it really is leaning. The tower truly is remarkable. The square is clean, and it was great seeing

tourists enjoying the warm day by touring the different sites. My favorite part, however, was seeing all the tourists pretending to “hold up” the tower. We all have a friend that has visited the tower and taken this classic picture.



To view the 12th Conference of the IOBC/WPRS Working Group “Integrated Protection of Stored Products” program details, click [here](#).