

# Organic Stored Product Protection – Why, how, and for whom?

Cornel Adler, Agnès Ndomo-Moualeu, Christina Müller-Blenkle

Julius Kühn-Institut, Institute for Ecological Chemistry, Plant Analysis and Stored Product Protection, Berlin

Email of corresponding author: [cornel.adler@jki.bund.de](mailto:cornel.adler@jki.bund.de)

All we produce in agriculture will be harvested at one point and used as food, feed, or for other purposes. It is a principle in nature that all plants and plant parts are broken down by organisms. Durable parts of plants or plant products after harvest are called stored products. If stored products are attacked we call the attackers stored product pests. However, we should perhaps change our perspective and call them indicators for poor stored product protection.

According to the FAO (2011), man loses about one third of stored products between harvest and consumption. Projected onto grain and 2014, losses in Germany alone amount to billions, while research is done by three scientists alone. In industrialized countries, a lot of these losses occur due to the waste of food, in tropical climates there is often less waste but no protective winter and insects are developing all year round.

In Germany, stored product protection became a topic for science after World War I, because the devastation had caused hunger. After World War II, chemical plant protection promised to solve all problems, even in stored product protection. But today the consumer does not want any residues in food or animal feed. The last new stored product protection chemicals, pyrethroids were invented in the 1970s. Is organic protection a future for all plant protec-

tion? Perhaps not completely, but the tendency is clear: less hazardous, more sustainable techniques are wanted.

In stored product protection, solutions are customized to the particular situation. A good start is to avoid the establishment of pests by an optimized structural design. Hermetic storage, cooling, drying, sanitation, and sufficiently sealed packages are important preventive measures. If prevention failed, an infestation needs to be detected as early as possible. At present we run a project on acoustic detection that may detect single insects in a grain mass, perhaps even give the species and stage. This would help to use biological control, like parasitoids early on. We also test the orientation of insects by smell and try to develop lures that copy dried fruits, nuts and grain. Other modern devices for pest detection are cameras scanning surfaces and attached computers comparing shapes to identify pests. We could even use automated laser guns to control pests (and make Lara Croft unemployed).

For control we use extreme temperatures, milling, carbon dioxide at ambient or high pressure, anoxic atmospheres at ambient or high temperatures, biological control or other techniques. There is a lot of high-tech available, but little has been implemented yet because stored products were cheap, - too cheap. This changes now, and we better be prepared!