INSECT RESISTANT PACKAGING FOR PROTECTION OF PROCESSED FOODS

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Processed foods are generally shipped and maintained in some sort of package. These packages may be large multiwall paper bags shipped to other countries as part of an aid program or may be in the form of a box of breakfast cereal. All have one thing in common, that is, they are susceptible to infestation by a host of invading insects. Manufacturers are very concerned with their foods. Not only do the packaged commodities represent a high value because they have gone through the expense of growing, harvesting, processing, packaging and transportation, but they represent consumer good will and ultimately profits.

With the present climate of consumer awareness no pesticides are generally allowed to be incorporated into packaging materials. If a package becomes infested the only treatment available is fumigation with phosphine or methyl bromide. With the development of resistance to phosphine and other problems coupled with the impending loss of methyl bromide no suitable alternatives exists for protecting packaged commodities. The development of insect resistant packaging may provide an effective and acceptable alternative.

Packaging is a system with the objective of protecting the product against various hostile environments including insects. The package is designed to protect the product from the point of manufacture to the point at which it is finally consumed. This process often means that the package will have to provide this protection for up to several years. Unfortunately there is no perfect package or package treatment that will provide the protection needed for all products under all conditions. Packages are usually tailored to fit the product being protected. What the product is, how long it must be protected and what factors are involved, including the economics of delivering a high quality product to the consumer, must be considered.

Most stored product pests are cosmopolitan. Products can become infested at any point in the marketing channel. Infestations generally occur in warehouses where they are often stored for long periods, frequently under less than ideal conditions. Some products are more likely to become infested than others. These products are often the source of infestation for other products. Dry pet food is often the source of infestation. Most are packed in multiwall paper bags that are generally not insect resistant without improvements in seals and closures. Food may also become infested during shipment in trucks, railcars and ships as well as during storage at the retail level.

Seals and closures can often be improved by changing glue patterns or the type of glue used. Generally a glue pattern that forms a complete seal with no channels for the insect to crawl through are the most insect resistant. Insect resistance can also be improved by overwrapping the packages with a material such as oriented polypropylene films. In order

to maximize the effectiveness of overwraps they should fit tightly around the package. When overwraps are sealed insects can often gain entry at the folded flaps. If the overwrap is tight the insects will be restricted in their movement around the package which will reduce the chances of infestation.

Another means of preventing insect infestation is through the use of odor barriers. In this case the odors are prevented from escaping from the package, resulting in the package being "invisible" to the potential invading insects. This method has been used with success in breakfast cereal packaging. However, any flaw in the package will negate the odor proof qualities of the package. Studies by the author showed that when odor barriers were used to protect a commodity only those packages with flaws in the seams became infested.

Studies on non-insecticidal methods of insect proofing packages were conducted at the USDA ARS Stored-product Insects Research and Development Laboratory in Savannah, GA since 1989 and since 1995 at the US Grain Marketing Production Research Center in Manhattan, KS. The procedures used are not complex, but have been highly effective in developing and improving packaging for insect resistance.

Packaging studies have been conducted on a variety of commodities. In cooperation with a number of food manufacturers, dry pet foods, breakfast cereals, baby foods, rice products, military rations and raisins have been studied to improve the packaging. The results have generally been good. One company has reported that complaints due to insect related problems have been reduced 40% and a major cereal producer uses odor barriers to prevent infestations.

The increased restrictions on pesticide use and the reduction or elimination of sanitation programs at various points along the distribution chain have made the development of insect resistant packaging of considerable importance to both the consumer and the manufacturer. The consumer is assured of a good, insect free food and the manufacturer is protected against loss of good will and from frivolous lawsuits arising from insect infestations in consumer size packaging.