THE EFFECTS OF THE MONTREAL PROTOCOL ON ENTOMOLOGY

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The Montreal Protocol is the first international environmental treaty created to provide a plan to help solve a global problem. The Ozone layer has no boundaries and needs to be protected by everyone one on this planet from man-made bromines and chlorines. The Montreal Protocol has workable solutions to this ozone depletion problem. But the Montreal Protocol is in reality only a 'FUND.' It needs knowledgeable people to solve the problems on a country-by-country basis.

We become engrossed in the everyday struggle to find alternatives to methyl bromide and other serious ozone depleting substances for our particular needs and forget what positive results this noble cause of protecting the stratospheric ozone layer has offered to our professional careers in Entomology and related fields. Just as the effect of Raquel Carson's *Silent Spring* in 1962, people have started talking, asking questions, funding entomological research projects, and motivating corporations to start looking for new uses to old products. The direction of our disciplines and lives of the people in these disciplines have been changed to meet these challenges.

Today, all over the globe, organizations like UNIDO, UNDP, The World Bank, and UNEP are scrambling to solve serious human problems. They have recruited experts in the field of Entomology and related fields to review, demonstrate, investigate and phase-out non-critical uses of the valuable but harmful agricultural substance called methyl bromide.
China, alone, has over 50 projects on-going today.

The challenge for methyl bromide is much different than those challenges with chlorine compounds like CFC's or Freon which were phased-out or replaced in the mid–1990's. Here, a refrigeration system or an automobile was retrofitted with a new chemical or a new piece of equipment. Granted, there were millions of systems to replace and retrofit throughout the world. The efforts of this industry must be commended. However, Freon is the number two most smuggled products into the United States behind illegal drugs. Continued enforcement on this ban is essential.

The problems with methyl bromide are more complex than the chlorines. Soils are very different from one country to another and from one location in a country to another. Wood fumigations in Malaysia are much different than grain fumigations in Zimbabwe that are much different than dried figs and nuts in Turkey. The pests associated with soil takes complex research and laborious demonstration to show positive results on a consistent basis. On one investment project in Malawi over 7,000,000 people work on their tobacco crop. The entire economy of these developing countries may depend on one crop like tobacco. The people in these countries need the export income from this crop. In Malawi over 150,000 people must be trained to replace methyl bromide in seedbeds with a new revolutionary floating tray hypnotic technology. *Entomologists and nemotologists*

are busy fine-tuning each pest management system to work on a consistent basis with various soil types and climates.

Stored product protection will depend on phosphine fumigants, carbon dioxide under high pressure, sulfuryl fluoride, and heat, cold, inert atmospheres, to replace methyl bromide in outbreak situations. The real replacement for methyl bromide will ultimately be not needing to fumigate. Everyone should start looking at why we need to fumigate instead of what new chemical compound can be dusted off the shelf to be patented and developed as the next replacement for methyl bromide in structures and storage. Training people in prevention, monitoring and discrimate uses of control are the future of our industry.

The issue of insect **resistant management** should be reviewed carefully with every new alternative in developing and developed countries. Insect resistance to phosphine will cause more harm in the future than all of the government restrictions combined.

The scientists called upon to write these projects are mostly from university or quasi-government agencies like GDZ in Germany. There are some private individuals that possess the desire, energy, time, and commitment to this environmental protection program that give up time from their work and families to take on these challenges. The monetary rewards are seldom the primary reason for doing this work.
I witnessed in Zimbabwe a 1,000-ton stack of maize, being stored by the government in case of famine that was so severely infested with Maize weevils that they estimated 7% of the grain was lost to rodents and insects after fourteen months in storage. This is food that was grown by hand, transported long distances to central government storage and placed in large stacks only to be destroyed by stored product insects. The lesson in Zimbabwe was not only one to replace Methyl bromide but to prevent the loss of a valuable staple.

These experts have the rewards of meeting new people, experiencing new cultures, new foods, new risks, sharing their experiences with the particular country or industry to help solve this complex problem. Like most experiences in our lives we learn more from these missions than we believe we contributed. I experienced in Cote d'Ivories near Abidjan a man named John Marie Pussard. He managed a 60-hectare live plant business where he used no methyl bromide. We called on Mr. Passaud to ask why he didn't use methyl bromide. He showed me the old worn out soil that contains massive cyst-nematode plant problems for unprotected plants. He showed me something he learned while working in Michigan, USA as a student. He discovered that an artificial substrate from shredded coconuts to plant his plants. They were healthy, nematode free, and methyl bromide free. This was accomplished in rural Africa under less than ideal conditions.

This is **the value** in the Montreal Protocol of which we de not often perceive. The international exchange of ideas is important to help solve this important environmental issue in a timely matter, but the stories and knowledge that is shifted during this short window in history will affect Entomology and people for many years to come.

Funding of projects to survey, research, and demonstrate and phase-out methyl bromide seem plentiful in the developed and developing countries The USDA is providing funds to many universities and organizations searching for viable alternatives to methyl bromide. Entomologists from around the world are searching for specific solutions in solid, structures, storage, and post-harvest applications of methyl bromide. The task looks grim on most days but the whole picture is that given a task, whether it is in an outer space laboratory or a thin layer of ozone in the stratosphere, man can get together to work for a final solution to a solving a problems.

Many people expect the developing countries to offer the developing countries the pre-fabricated and packaged alternatives to methyl bromide. I believe that it will be the demonstration projects and phase-out projects in developing countries that will fill the needs of the developed countries to help offer workable and cost effective solutions. The restrictions on new fumigants are often less time consuming and expensive in these countries. Also, the developing countries more readily ‘buy into’ the United Nations authority because of the many positive experiences they have experienced previously.

In the end, let’s hope that all of these sacrifice will be worth the money, time, and the commitment to a cause that you can’t put in your hand and hold or can’t feel the strength of an unfiltered sun like many do in the southern hemisphere.

But in the end, we all will be better for the changes that are taking place because of the Montreal Protocol... this I am sure.