Fresh Facts for Industry: Pesticides

Canadians are increasingly health conscious and paying greater attention to diet, exercise and preventative medicine. A growing recognition of the nutritional attributes of fruits and vegetables has resulted in rapidly increasing consumption of fresh produce. Despite these trends, many people are concerned about the safety of eating fresh produce. Media reports abound on the issue of pesticide residues in food. Understandably, consumers react with fear when they read such reports. They wonder if the health benefits of increased consumption of fruit and vegetables are outweighed by the potential risk of ingesting pesticide residues. The answers to these require a good understanding of the Canadian regulatory environment relating to food, and a perspective on making decisions involving risks and benefits.

Regulatory Approval of Pesticides

Few people realize that pesticides must undergo a rigorous regulatory evaluation process by the government before being allowed for use. The proper use of pesticides is monitored through federal government evaluation programs which include residue testing.

Health Canada has the authority, under the **Food and Drugs Act**, for ensuring that all foods are fit for human consumption; that all foods are safe, clean and unadulterated. For pesticides, this responsibility involves, for example, determining the safety and quantity of a pesticide residue that may be present in foods.
Health Canada's Pest Management Regulatory Agency (PMRA) holds the responsibility for providing safe access to pest management tools, while minimizing risks to human and environmental health. Under the authority of the *Pest Control Products Act*, the Agency is responsible for registering pesticides. In collaboration with provincial environment ministries, this responsibility covers the sale and use of substances that claim to have a pest control use including safety to the producer, the consumer, the environment, and product effectiveness.

Before making a registration decision regarding a new pest control product, the **PMRA** conducts the appropriate assessment of the risks and value of the product specific to its proposed use. The risk assessment considers the inherent toxicity, persistence and bioaccumulative nature of the product, while addressing such key concerns as the degree to which humans and the target and non-target environments may be exposed, and the possible health hazards associated with the product. The value assessment may consider whether the use of the product contributes to pest management and whether the application rates are the lowest possible to effectively control the target pest.

Health Risk Assessment

An extensive battery of toxicity studies are required from pesticide manufacturers to determine the nature and extent of the risk posed by a pest control product proposed for use in Canada. Long-term toxicity studies, carcinogenicity studies, reproductive and developmental toxicity studies are examples of the type of data required for evaluating the hazard on human health. Based on the assessment of the toxicity level, an **Acceptable Daily Intake (ADI)** is established. The **ADI** is the amount of the residue that people can be exposed to daily, without causing harm. A large safety margin is applied to the animal toxicity data to determine the **ADI**.

The second component in the evaluation of the pesticide is to determine the amount of residue that may be present in foods to which humans may be exposed. **PMRA** establishes a residue limit for the substance. A chemical residue limit is called a **Maximum Residue Limit (MRL)** for agricultural chemicals. The MRL represents the maximum amount of pesticide residue that might be expected in/on a food commodity when a pesticide is used according to approved label directions. An MRL is established only when the total consumption of the particular residue from all food sources does not exceed its **ADI**. Consideration is given as to how people consume basic foods as well as processed foods, with particular emphasis on the patterns shown by vulnerable segments of the population. For example, the dietary habits of infants, children, pregnant women, and older people are accounted for in the assessment process. Lifetime exposures to chemicals are also considered as a factor.

Assessment of limits is not a one-time process. It requires continual review, and the search for and analysis of new information.

Environmental Risk Assessment

Scientific data on the impact of a pesticide once it enters the environment are part of the information package required to support registration. In addition, provincial government experts and universities may be asked to participate in field trials or some other phase of the pesticide review process.

Value Assessment

Value assessment helps ensure that only those products that make a positive contribution to pest management are registered. This part of the process helps to minimize the risks associated with pest control products by eliminating unnecessarily high use-rates and by ensuring that even products of acceptable risk are approved for use only if their contribution to pest management is significant.

When the three-fold review is completed, the **PMRA** either rejects the application or approves the pesticide for domestic, commercial, or restricted use. Once this "registration" occurs, pesticide use becomes a provincial responsibility. The provinces regulate who may use the pesticide, where it may be sold and the specific conditions of sale. This responsibility usually falls to the provincial ministries of the environment.

Federal registration of a pesticide is renewed every five years. Ongoing surveillance of registered products, advances in analytical methods and improved evaluation processes provide a means to uncover environmental or health concerns, particularly with older products.

Registered pesticides are re-evaluated every 15 years using modern assessment techniques and up-to-date information to determine if they continue to meet current health and environmental standards and whether they remain acceptable for continued use in Canada.

The pesticide approval process used in Canada is one of the toughest in the world and meets or exceeds the health standards established by the **World Health Organization**.

Monitoring Pesticide Residues

The **Canadian Food Inspection Agency (CFIA)** is responsible for monitoring agricultural and industrial chemical residues in foods. For pesticide residues, enforcement action is based on **sections 4 (1)(a) and (d) of the Food and Drugs Act**, which states: "No person shall sell an article of food that (a) has in or on it any poisonous or harmful substance and (d) is adulterated." While a food may be in violation of any of the five sections in Part 4, for pesticide residues the restriction most often used is the prohibition against the sale of "adulterated" food (4(d)). **Section B 15.002 of the Regulations** defines a food as being adulterated if:

- it contains any pesticide or derivative in excess of the established MRL, OR
- where no MRL is established, the pesticide may not be present in an amount exceeding 0.1 parts per million.

The Canadian Food Inspection Agency (CFIA) states:
The **monitoring** phase is designed to gather data and provide information on the occurrence of chemical residues in a predefined sampling population of fresh fruits and vegetables. The information from monitoring is obtained through random samples of produce that appears normal. This phase is conducted to detect potential violations. If the samples are found to be in violation of established MRLs, the product is put under the directed phase.

The **directed** phase is conducted to confirm presumptive positive results and identify suspected problems. This phase targets a specific commodity to collect and analyze samples from five shipments. If all five samples are found to be in compliance with Canadian maximum regulatory limits, the product is returned to the monitoring list. However, if *any one* of the five samples are found to be in violation with the MRL, that product is placed under compliance status.

The **compliance** phase is implemented to remove contaminated product from the marketplace. Regulatory action is always directed at a specific source, such as the grower or shipper. The specific commodity is removed from the marketplace until at least five shipments are tested at a recognized laboratory at the expense of the grower or shipper. If all five samples are found to be in compliance with Canadian maximum regulatory limits, the compliance status will be removed and the product will be placed under the monitoring phase.

When violations are found, the **CFIA** initiates enforcement action. Depending upon the degree of hazard involved, this could involve a written warning, removal of food from retail outlets, seizure of stocks, rejection of imports, or legal prosecution.

Compliance of Domestic Fresh Fruits and Vegetables: In 2008-2009, a total of **5 595** tests for pesticides were performed on domestic fresh fruits and vegetables. No residues were detected in **4 231** of the tests (**75.62%**). There were **1 350** positive test results that were compliant with Canadian standards (**24.13%**). There were **14** positive results that exceeded Canadian standards and were identified as violations (**0.25%**).

The overall compliance rate for pesticides in domestic fresh fruits and vegetables was **99.75%**.

Compliance of Imported Fresh Fruits and Vegetables: For Imported Fresh Fruit and Vegetables **16 571** tests were performed in 2008-2009. No residues were detected in **12 164** of the tests (**73.41%**). There were **4 208** positive results that were compliant with Canadian standards (**25.39%**).

There were **199** positive results that exceeded Canadian standards and were identified as violations (**1.20%**). The overall compliance rate for pesticides in imported fresh fruits and vegetables was **98.80%**.

The **CFIA** will continue its residue monitoring program to provide further assurance of the safety of our supply of fresh produce. In addition, the **PMRA** conducts residue monitoring as part of its program to determine if pesticide manufacturers and end-users (producers) are meeting the conditions of registration.

Evaluating the Risks

The potential for harm is present in all aspects of daily living. In particular, it must be understood that no human diet can be free of risk. What must be evaluated is the degree of risk involved in our food, and analysis of that risk in terms of potential benefits. Dr. Bruce Ames of the University of California has identified numerous natural compounds in our traditional diet that are carcinogenic to rodents. Plants develop their own poisons (natural pesticides) to fight off disease.

Consumers must learn to assess the risks inherent in our food supply. A crucial factor to remember is that the dose makes the poison. Excess intake of vitamin A can create toxic effects, yet a reasonable intake of this nutrient is essential for health. An Ad Hoc Panel on Pesticides and Cancer, convened by the National Cancer Institute of Canada, sat to examine the possible contribution of pesticide exposure to the development of human cancer. The Panel concluded that it was not aware of any definitive evidence to suggest that synthetic pesticides contribute significantly to overall cancer mortality. The Panel also concluded that it did not believe that any increased intake of pesticide residues associated with increased intake of fruits and vegetables poses any increased risk of cancer.

References

- Canadian Food Inspection Agency – Fresh Fruits and Vegetables – Food Safety – *Fresh Fruit and Vegetable Chemical Residue Sampling Program* http://www.inspection.gc.ca/english/fssa/frefra/safsal/cheme.shtml
- Canada. Laws. Statutes. *Food and Drugs Act*. RSC, 1985.
- Canada. Laws. Statutes. *Pest Control Products Act*. RSC, 1985.
- Ames, B.N., 1989, in *Important Advances in Oncology*. V.T. De Vita, S. Hellman, and S.A. Rosenberg, Eds., J.B. Lippincott, Philadelphia, p. 237-245.
- Ritter, L., *Report of a Panel on the Relationship between Public Exposure to Pesticides and Cancer*, *CANCER*, Nov. 15, 1997, Vol. 80, No. 10, p. 2019-2033