Crop Protection Products Key to National Food Security in Sri Lanka

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22 May 2012

Sri Lanka is self-sufficient in rice production, which is one of its staple foods and the country has enough vegetables for domestic consumption. In terms of national food security, a consistent supply of quality food is necessary for the country's economic development and political stability.

Enhancing Agricultural Productivity and Food Security

Agriculture productivity in Sri Lanka has shown remarkable growth in the last six decades. In 1948, its total population was only 6 million though the country imported about 60 percent of its total rice requirement. Today, Sri Lanka's population is 21 million and it produces a surplus of 1 million metric tonnes (MT) of rice on cultivated land only two-fold the hectarage of the late 1940s. This accounts for a 10-fold increase in rice production during last six decades. This remarkable growth was achieved through the genetic improvement of rice varieties; usage of quality seed, fertilizers and crop protection products; expansion of irrigation facilities; farm mechanization; advancement in extension education and post-harvest technologies; and establishment of favourable government policies, such as fertilizer subsidies and fixed prices. These advancements also led to increased productivity in all other agricultural commodities, including vegetables, fruits, flowers and field crops, particularly maize.

Crop Protection Products and Agricultural Productivity

Crop protection products, also known as pesticides, include herbicides, insecticides and fungicides. Their job is to control pest problems in the field, preventing economic losses. Farmers fully realize the value of pesticides with sustained, increased productivity. Without the use of pesticides, agricultural productivity has been shown to drop by 50-80 percent. Therefore, pesticides are integral agricultural inputs that help ensure national food security.

Potential Risks Versus Returns of Crop Protection Products

Even though several global organizations provide regulatory guidance for crop protection products to ensure environmental, food and human safety, there are counter arguments against them. A classic example is the first commercial pesticide DDT. Since 1945, DDT and other insecticides have prevented the premature death of at least 7 million (some say as many as 500 million) people from insect-

transmitted diseases. In fact, the inventor of DDT received the Nobel Prize in 1948 for his discovery. But later, research revealed that persistence of DDT in the environment is very high and it is biologically magnified (accumulated) in food chains, resulting in adverse effects on humans and other organisms. In 2000, a global treaty agreed to ban or phase out DDT along with 12 other chemicals identified as persistent organic pollutants. However, the treaty allows 25 countries to continue using DDT to combat malaria until safe alternatives are available. The benefits versus the risks of crop protection products must be carefully considered for all situations in any country.

Crop Protection Product Development

Pesticides are registered for widespread use all over the world. Very few commercial crops exist without them. More than 95 percent of their active ingredients are synthetic molecules. Irrespective of usage, many natural and synthetic molecules are hazardous to varying degrees, depending on their toxicity profile. However, the hazard may not translate to risk with low exposure. As such, research-based organisations that develop crop protection products carry out comprehensive studies on the potential impact of these products on humans, other mammalians, living organisms in target environments, crops, soil, and water as well as their long-term fate in the environment. To maintain the accuracy and uniformity of such studies, experiments are performed at internationally accredited laboratories under universally accepted test protocols developed by the Organisation for Economic Co-operation and Development (OECD). Based on the results of such studies, regulatory authorities establish hazards and evaluate the risks of proposed product uses. They then decide whether to allow the use of each pesticide in certain countries or territories. In addition, global regulatory authorities continuously evaluate the findings of pesticide research, reviewing the registration status of products from time to time. Thus, crop protection products are highly regulated on a global basis, going through stringent evaluation before being approved for commercialization in any country.

Crop Protection Product Registration

Pesticides are not manufactured in Sri Lanka, rather imported. To import such products, local registration is required. A strict registration process is maintained by Sri Lanka's Registrar of Pesticides (ROP) in its Department of Agriculture (DOA). Its regulatory principles are 1) products not registered and used in the country of origin will not be considered for registration in Sri Lanka, 2) a strong justification of the "need of a given product" is required from DOA researchers, 3) the efficacy of each product has to be proven through a series of local trials conducted by the DOA or relevant institutions managed by both researchers and farmers, 4) the submission of the detailed composition of each

product and authentic copies of reports on toxicological and environmental studies are mandatory and 5) approval from the DOA's Pesticide Technical Advisory Committee is only granted upon the evaluation of all submissions. Moreover, an approval must be obtained from the ROP for each crop protection product that the registrant wants to import. When a Food and Agriculture Organization (FAO) specification for an active ingredient exists, then it should be met because it helps manage potential hazards from poor quality manufacturing.

In addition to pesticide registration, the packing, marketing, distribution and sales of crop protection products are also highly regulated by the ROP. In addition, the crop protection industry encourages the responsible use of pesticides by farmers through knowledgeable and trained field staff. Such information sharing helps optimize farmers' use of pesticides at minimal volume. However, the number of people involved in such extension education is not adequate compared to the demand for knowledge.

Crop protection products are only introduced after they undergo extensive studies on their persistence in the environment and potential hazards from residues on food. Based on these studies, rates of pesticide use and pre-harvest intervals are recommended. Potential health hazards can be minimized by strictly following such recommendations. Further, the proper identification of field problems, correct selection of crop protection products and accurate method of application are important to minimize health and environmental hazards. Currently, Integrated Pest Management (IPM), which is a component of an Integrated Crop Management System, is the most wildly accepted practice. With such management, the chemical control of pests would be the last resort.

Chronic Kidney Disease of Unknown Etiology

Recently, a group of Sri Lankan scientists claimed that chronic kidney disease of unknown etiology (CKDu) reported in some parts of the country is due to arsenic poisoning, which comes from crop protection products used in nearby fields. However, these claims have not been validated by scientific research or by the scientific community. Further, the group has not scientifically justified why the disease is reported only in some parts of the country and not in all areas where the crop protection products are being used.

Researchers at the University of Peradeniya and Kyoto University in Japan launched in 2008 a case-controlled, epidemiological study on heavy metals in environmental water, drinking water, rice and Ayurvedic drugs. The results showed no differences in levels of heavy metals, such as cadmium,

between people with and without CKDu, demonstrating that environmental pollution with heavy metals is very unlikely to be a cause of the disease. (For more details, go to http://hes.med.kyoto-u.ac.jp/SriLanka/index-e.html.)

Moreover, none of the crop protection products used in the Sri Lankan areas in question contains arsenic or heavy metals as an active ingredient. However, during pesticide manufacturing, there is a possibility of trace contamination by heavy metals and metalloids like arsenic that naturally occur. Trace levels of these substances can be present in raw materials used in pesticide formulations. This possibility is not just limited to crop protection products – any raw material with elemental origins used in electronics and other industrial chemicals are susceptible.

Further, there are various hypothetical risk factors for CKDu, such as high fluorine levels in drinking water, frequent use of aluminum cooking utensils, use of Ayurvedic drugs, snake bites, family history of diabetes, cadmium in soil, algal toxins and more. There are many other areas in the world where the pesticides in question in Sri Lanka have a long history of use without any evidence of similar rates of occurrence of CKDu.

While it is vital for the plant science industry to be sympathetic to the health and environmental concerns in Sri Lanka, it is also important to note that trace amounts of heavy metals in the environment have been well-documented as far back as 1972 in an Australian CSIRO report (www.publish.csiro.au/samples/ManaginArsenic%20Sample.pdf).

CropLife Sri Lanka fully supports furthering the collective understanding on how to best regulate crop protection products, determine analytical methods for detection of pesticides, define certified laboratories and enforce controls that address local concerns. Scientists, regulators, health authorities and industry experts need to collaborate to implement and communicate answers to questions about crop protection products.