

The future of agriculture: Challenges for environment, health and safety regulation of pesticides

from a presentation made by Louise O. Fresco, Assistant Director-General, Agriculture Department, Food and Agriculture Organization of the United Nations, to the OECD Working Group on Pesticides, Paris, 4 February 2002.

I. Agriculture between the global and the location specific

By its very nature, agriculture is location-specific, and it is this specificity of crops, soils and animals that, over the centuries, has led to the great diversity and richness in agriculture which we see today. The principal change in the 20th century was the Green Revolution, during which all countries experienced a massive increase in yield per unit area and time, owing largely to greater control of production factors. This resulted in a decrease in some of the location specificity that had characterized agriculture in the past and led to a more centralized or "blue print" approach. While the mid-19th century marked the beginning of a more scientific approach to agricultural production with the introduction of fertilizers, it is the 20th century that must be considered the century of science-based agriculture. The 20th century might also be characterized as the "blue print century", in which a more centralized or engineering approach to agriculture, including the setting of production targets, was a principal driver for increased agricultural output.

I believe that the 21st century will be marked by a return to a more location-specific, ecological approach to agriculture. While the public eye is focused on globalization, globalization does not necessarily mean homogenization or centralized control. However, advances in science should allow greater specificity. In addition, there is a strong counter current, driven by both NGOs and civil society, towards maintaining local-specificity. Evidence for this may be found in the increased appreciation of local foods and the fact that globalization is increasingly seen in the context of local issues and not only of global concerns.

The other side of the globalization debate is the fact that inequality and inequity still exist in the world. More than 1,000 million people live on less than one dollar a day, and an estimated 800 million people are hungry. The World Food Summit in 1996 pledged to reduce by half the number of hungry people by 2015. It is clear that this goal will not be met. While there has been success in some countries, the current annual reduction of 8 million people a year will need to more than double to 20 million if the stated goal is to be met by 2015. The movement to reduce hunger will result in a parallel increase in employment and purchasing power and directly impact on trade and the movement of goods around the world.

There is a need to double food production in developing countries, and, some 80 % of this increase will need to be gained from land that is already under production. It is clear that this increased intensification of production cannot be met without chemical inputs. The question is how to avoid the mistakes of the past and to fully benefit from the lessons learned and experience gained to date.

II. Future Trends

In the next decade I foresee a number of trends as a result of globalization:

1. **One of the major economic trends will be downward pressure on cereal prices.** These are projected to stagnate until 2020 despite increased demands. This, coupled with decreasing farm subsidies, will result in a need for greater efficiency at the farm level.
2. **Government is no longer the predominant player in food regulation.** Vertical integration of the food chain has been accompanied by a declining role for government and an increasing role for food retailers and the private sector. At the same time consumer demands - especially for “non-chemically contaminated food”, are expected to boost to some 15-20% the market share of organic food by 2020.
3. **Trends to increased consumption of animal protein, particularly in South East Asia, may be correlated with increased income.** This trend has resulted in greater production of animal products, particularly poultry and swine, at a rate of 12% annually in recent years and has placed increased pressure on cereal markets.
4. **A potential concern associated with the increased production and movement of livestock** (largely swine and poultry) across the world is the transfer of epizootic diseases from animals to humans. The increased trading in livestock and food crops has also resulted in the creation of niche products in off-season markets. However, it also raises a series of trade related questions on market access.
5. **There is a trend to increasing urbanization in many countries** as people are unwilling to remain on the land and to continue to be involved in agricultural production. Agriculture in general is declining in economic importance and hence in public opinion. It is alarming to note that the number of students in agriculture faculties is declining rapidly. The reduced numbers of people involved in agriculture will also be a driver for increased mechanization of farming and raises a new challenge of how to find technologies that are ecologically sustainable, particularly for developing countries.
6. **Increasing public concern regarding food safety** must be met with a massive education programme. One thing that has become clear is that food safety and human health are generally assigned higher priority than the environment in the public mind. It will be interesting to see how this shift away from the traditional focus on calories per hectare will evolve over the next 10 years.
7. **The medicalization of agriculture is expected to continue.** Two examples that come to mind include further investigating the use of nutraceuticals to improve diets and a better understanding of the role of protective factors, found in certain foods such as brassicas, in protecting against certain types of cancer.

This leads me to believe that the sustainable intensification of agricultural production will require a greater reliance on precision agriculture and will be characterized by increased attention to local needs and reduced labour inputs. It will include greater attention to such concepts as fertilizing plants rather than the soil, and a greater reliance on the principles concerning ecological farming systems developed through experience with integrated pest management (IPM). It will also benefit from new sources of information such as that available through global positioning systems including mapping of soils, watersheds and ecological zones and using this globalized information as the basis for local decisions.

III. Modern Technology, especially genetically modified organisms (GMOs)

Agriculture does not take place in a vacuum. There are other trends in the area of research and sustainable development that I would like to briefly consider.

Research on genetics is increasingly concentrated in a few countries and/or companies and is characterized by a definite shift away from the public to the private sector. This is paralleled by a shift on the regulatory side to supranational bodies along with some eroding of the national state, as there is more autonomy at regional and sub-national levels. A major challenge will be ensuring that the activities at these different levels are not delinked.

Although agricultural development in the 20th century was characterized by a centralized approach, it was also evident that it was most successful where it was linked with local ecological conditions. A case in point is that an integrated approach to pest management has been shown to be successful. A key reason for this success has been as a result of helping farmers to understand the concept of critical thresholds. The same principles can be applied to water and nutrient management.

There is a need to further consider the role of genetically modified organisms (GMOs) in a broader IPM approach. For example, incorporating the gene for *Bacillus thuringiensis* (Bt) toxin into plants has demonstrated little evidence of risk to human health or the environment. However we must not be complacent and the potential ecological effects of GMOs needs to continue to be monitored. A more important issue than risk at this point is the accessibility of this technology to developing countries, which frequently lack the necessary infrastructure.

The area planted to GMOs has tripled in the last three years. Some 75% of this in developed countries. Most of the work has been focussed on four crop groups – maize, soybean, cotton and canola – and has involved traits relating to pest-tolerance and herbicide-resistance.

What will happen in the next five years ? At present there are up to 500 different crop-trait combinations under field testing, most of which are in Latin America. The major products under development to date reflect the interest of developed countries and involve herbicide-tolerance, pesticide-replacement and shelf-life in horticultural crops. Little of the research underway is relevant to the needs of developing countries.

I am concerned that GMOs will be treated like the Green Revolution: a centralized engineering approach where it is presumed that one solution will fit all the needs rather than considering how they might best be integrated into ecologically based systems of farming in different countries and regions of the world. One possible solution might be to consider the development of an international code of conduct on genetic resources.

A further challenge is how to improve/strengthen cooperation and coordination at the national and regional levels. In order to be fully effective, multilateral agreements such as the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on Persistent Organic Pollutants (POPs) require careful national coordination. The reality is that, in many countries, there is often only poor, if any, inter or intra-ministerial cooperation particularly between ministries of environment and agriculture.

A good example of where such inter-ministerial cooperation might be considered is the OECD work in the area of development with that on environment and agriculture. The experience gained by countries through the OECD Pesticides Working Group would be relevant to developing countries with limited resources and experience.

A principal challenge will be to ensure that these discussions at the national and international level are open and transparent and based on sound science. At present the increased availability of information to countries has both a positive and negative aspect. For example the internet represents a useful tool for information dissemination, but it also represents a potential problem in that the information is lumped together. One sees good science next to nonsense, which readers are not always in a position to distinguish. There is a need for a neutral brokerage of the information available to maintain the credibility of the science

Recent estimates indicate that up to 30% of the pesticides in developing countries are sub-standard. The consolidation of the major pesticide manufacturers, where some 10 companies now control 80% of production, is coupled with a trend to shift production, particularly of older off-patent products, to developing countries. These smaller manufacturers in non-OECD countries may not have the ability to consistently meet established health and safety standards. This potentially creates a new set of problems and the need for greater monitoring of their output – for example pesticides no longer permitted in OECD countries may be used on food, which is then imported (the so-called "circle of poison"). Many developing countries lack the critical mass to carry out appropriate monitoring either of the quality of the pesticides they receive or produce, or of the residues in the food they plan to export.

A key challenge for members of the OECD Pesticides Working Group to consider in planning its future will be how to take the experience gained over the last ten years to other areas. For example: explore opportunities to improve national coordination in order to ensure that the achievements here are carried to other international fora such as the standard-setting processes within Codex Alimentarius and related work under the Rotterdam and Stockholm Conventions. This is particularly noteworthy in the case of Codex as many developing countries consider that they lack the expertise to effectively participate in the standard setting process.

Based on the experience gained, consider developing tools to help countries to work more efficiently and make better use of the existing resources. These could include:

- **development of a range of “easy to use” risk indicators**, in particular ways to combine information on hazard and exposure that provide indications/trends of relative risk over time for individual pesticides or total pesticide use nation-wide.
- **criteria for the identification of chemicals** that should be the subject of targeted environmental monitoring in order to facilitate comparison of monitoring data across countries. These could focus on the potential to persist in the environment, to bioaccumulate or level of toxicity
- **focus on methodologies for conducting lifecycle assessments of pesticides.** This could include promoting integrated policies across production, consumption and disposal consistent with the principles and approaches that characterize IPM.

It is also clear that, at the present time, there is little or no direct link between the work of the OECD Pesticides Working Group and development assistance, even though many of the issues considered by the Working Group are also central to developing countries.

Finally, we need to bear in mind that small countries, small farmers and small companies have small voices. We need to ensure that their voices are heard and that we maintain an open dialogue with them. We are increasingly well positioned to use the global advances in science and technology, such as global positioning systems and genetic engineering, to develop more and better defined strategies for location specific agriculture. Now more than ever we should recognize the need to act globally but to think locally.