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Biosecurity, trade and plant pathology

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The establishment of the World Trade Organisation (WTO) and trading rules set out in many of its agreements, particularly the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), has led to significant changes in the relationship between biosecurity and trade. These changes have had a major impact on the roles and responsibilities of plant pathologists, who are likely to become involved in contentious trade disputes involving plant health issues or in incursion response no matter what their specialty — extension pathologist, epidemiologist or molecular biologist. Biosecurity is taken to include all the institutions and processes involved in protecting our natural ecosystems, crops, livestock and humans from exotic pathogens. A country must have such institutions and processes if it is to gain the trading benefits made possible by WTO.

I will summarise the nature of these institutions and processes, focussing briefly on incursion response, and then examine the key issues arising from the WTO requirements for biosecurity and trade.

The essential institutional framework includes international bodies, especially the WTO, the International Plant Protection Convention (IPPC), the Codex Alimentarius Commission (Codex) and the Office International Des Eqizooties (OIE). These bodies are responsible for international policy and legislation. Similarly, there are national policies and legislation developed by institutions within each country. Clear and transparent legislation and policy are crucial to the effective implementation of biosecurity measures. Effective implementation also depends on a minimum of administrative units with clear lines of responsibility and efficient communication, internally and externally. My perceptions are that the administrative structures in many countries are too complex, leading to slow decision-making in times of emergency.

The research and extension infra-structure is equally important to the implementation of biosecurity measures. It is a crucial component of surveillance and diagnostic capability, incursion response and pest risk analyses. However, in many countries, there has been a decline in resources allocated to these areas. In particular, plant disease herbaria including culture collections and DNA reference libraries are seriously under funded. In most countries there is a shortage of taxonomists.

Within the national institutional framework we can identify a number of key processes: (1) pre-border protective measures, (2) border protection, (3) research, extension and surveillance, (4) incursion response and (5) risk analysis and trade.

Pre-border measures include reliance on phytosanitary certificates issued by other countries. This is the first line of defence against incursion of exotic pathogens with agricultural products. Border protection organisations have been strengthened in some countries, partly as a result of the foot and mouth disease outbreak in the United Kingdom, and partly as a result of concern over bio-terrorism. In Australia, for example, there has been a significant increase in funding for staff for border checkpoints, high-tech surveillance equipment and sniffer dogs. Border protection and surveillance is a particularly challenging and difficult task for countries with long land borders or archipelago nations such as Indonesia. In contrast, island nations like New Zealand and Australia have benefited from their geographic isolation. Unfortunately, the advent of air travel and fast cargo ships has made such island countries more vulnerable to incursions of exotic pathogens.

Research and extension agencies working in close cooperation carry the responsibilities for pest and disease surveillance, incursion response and herbaria. There needs to be close cooperation between these agencies and those responsible for border protection. The actual administration structures vary from country to country. The response to an incursion is determined by the nature of the pathogen, its geographic spread at the time of detection and the feasibility and cost–benefit analysis of a potential eradication program. These factors are similar, irrespective of whether an incursion is accidental or deliberate. Surprisingly, in Australia and some other countries, governments are

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becoming less willing to fund eradication programs. For example, a cost-sharing arrangement between Australian governments and plant industries is presently being negotiated. As plant pathologists, we have a responsibility to better inform political leaders and the community of the public benefits of government funding for incursion response.

New diseases can cause yield losses that can threaten the viability of an industry, as well as regional communities and national economies through the flow-on effects. A new disease may also adversely affect the export status of a crop from a plant health perspective. Indeed such an effect on export status may represent the greatest impact of a new disease. This effect must be considered in the cost–benefit analysis. New diseases may also be a threat to natural ecosystems, another facet of the cost–benefit analysis. The legal challenges to the eradication of citrus canker in Florida illustrate the problems that arise when good science encounters an ill-informed urban community and judicial system. Such problems are further complicating incursion response.

The recent response to the incursion of black Sigatoka disease of bananas in the Tully area of north Queensland, Australia, provides a valuable example of an incursion response. The incursion response involved three phases: (1) an intensive surveillance program, (2) an eradication program and (3) an area freedom program.

Field monitoring indicates that the pathogen has been eradicated from the Tully area and the area freedom program is in progress to meet international guidelines. The demonstration of area freedom remains an inexact science. In this respect, research is urgently needed to provide a more scientifically based set of protocols on surveillance. I challenge our epidemiologists to become involved in such research.

Four key elements contributed to the apparently successful response to this incursion in the Tully area: (1) early detection, (2) a prompt decision to eradicate, (3) molecular diagnostics and (4) committed leadership and teamwork.

The increasing trade in agricultural commodities is also increasing the risk of incursions. Pest-risk analysis is a relatively new inter-disciplinary field combining expertise in biology, pathology, economics and statistics. Risk analysis is an integral part of trade negotiations for agricultural commodities under the WTO SPS Agreement. It is an area worthy of expanded research and postgraduate training. There are shortages of well-trained specialists in this field.

Every country or political unit must have the institutions and processes just outlined to exploit the trade opportunities available under the WTO's new trading rules. The establishment of the WTO was designed both to strengthen and add to the international trading rules. Under WTO, new opportunities have been created for trade, including trade in agricultural and related products. Trade in such products has been, and is, constrained by quarantine; that is, sanitary and phytosanitary measures or restrictions. In reality, these measures have been used as non-tariff trade barriers. In the past, exporting countries had no legal basis for redress in such situations. Prior to WTO, countries could put a quarantine measure in place without declaring its scientific basis.

However this situation has changed dramatically. The WTO *Agreement on the Application of Sanitary and Phytosanitary Measures*, the SPS Agreement, recognises that sanitary and phytosanitary measures are valid only if based on rigorous scientific principles and risk analyses as well as conforming to international standards. Furthermore, these restrictions must be the minimum necessary to protect plant, animal and human health.

Importantly, the WTO's SPS Agreement allows for the settlement of trade disputes between member countries through the Dispute Settlement Body. This body may appoint a panel to examine all the scientific evidence and make recommendations on the validity of evidence at the centre of such disputes. The panel may recommend that a country modify or remove restrictions based on plant health arguments. This process places a severe responsibility on us, as plant pathologists, to ensure the integrity of scientific data. Such data and evidence may be subjected to searching analysis by peers in a legal adversarial process.

A country seeking access to overseas markets for an agricultural commodity is usually required to state and defend the plant health status claimed for that commodity. Similarly, a country wishing to exclude access to its markets must produce rigorous scientific evidence of unacceptable biosecurity risks associated with the potential import commodity. This evidence is presented in the form of an import risk analysis. This essentially involves providing evidence of area freedom from a particular pathogen. The starting point of these analyses is published lists of pests and diseases. Voucher disease specimens, cultures or DNA lodged in recognised collections are a crucial basis for such published lists of pests and diseases. Only permanently preserved specimens can be relied on because they can be re-examined to prove their validity.

In order to be useful to quarantine and plant health services, plant disease herbaria, culture collections and DNA reference libraries must be properly managed and freely accessible to other scientists. Lists of pathogens, relevant published material and data on collections should also be freely available. If a country has accurate and freely available records, market access negotiations for agricultural products can progress quickly with obvious benefits to its rural sector. However, long delays can occur when such records and data are not available.

As plant pathologists we also have a responsibility to educate political leaders and the community on the link

between biosecurity and trade. We must argue the case for more resources for biological collections, centres of taxonomic excellence, training and the sharing of information and resources. Molecular technologies are proving invaluable in improving our abilities to more precisely identify and characterise pathogens.

Furthermore, developed countries have a non-binding obligation under the WTO to assist less developed member countries meet SPS requirements. The responsibility of assistance falls to plant pathologists and other plant health professionals in developed member countries. Developing countries often lack resources such as databases of pathogens, culture collections and herbaria of diseased specimens. This restricts their ability to argue market access cases or defend import restrictions of agricultural products, based on quarantine issues. Indeed, the very measures designed to enhance trade and assist developing countries may in effect become non-tariff trade barriers working against the interests of these countries.

I suggest that one solution to this problem would be to establish regional research centres to service countries in close geographic proximity. In this context, the ASEANET initiative is to be commended. This initiative is a Technical Cooperation Network for sustainable development, through capacity building in taxonomy. ASEANET is committed to achieving self-reliance in plant health data management for member countries by sharing resources and reciprocal provision of expertise in taxonomy. The rehabilitation of biological collections and the establishment of databases are also high priorities. Electronic communication of information and images, the use of DNA-based diagnostics and movement of samples by air make it feasible to operate key reference centres on a regional or indeed global basis.

The critical linkage between biosecurity, trade and plant pathology justifies more resources for training and research in such areas as (1) taxonomy, (2) surveillance and diagnostics, (3) epidemiology and incursion response, and (4) risk analysis.

Many of these issues will be considered, both directly and indirectly, at this Congress.

I believe it is imperative that we all cooperate to develop strategic initiatives in plant health education and research, in the context of biosecurity and trade. These initiatives are crucial if we are to realise the potential benefits of trade liberalisation while ensuring biosecurity at national and regional level.