WEED RISK ANALYSIS OF WEED CONTAMINANTS IN BULK FEED MAIZE TO BE IMPORTED FROM THE USA

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Abstract The Australian Quarantine and Inspection Service (AQIS) is responsible for administering the conditions under which imports of plant and plant products enter the country. These conditions are determined partly by the Pest Risk Analysis (PRA) framework provided by the International Plant Protection Convention (IPPC), Quarantine Act 1908, Quarantine Proclamation 1999 and other relevant legislative authority.

As a member of World Trade Organisation (WTO), Australia needs to comply to the agreement on the application of sanitary and phytosanitary (SPS) measures developed by IPPC. An SPS measure is defined as: any measure applied to protect animal or plant life or health within the territory of the member from risk arising from entry, establishment or spread of pests (ie. arthropod pests, weeds, diseases, disease-carrying organisms or disease-causing organisms). Assessment of phytosanitary risk and determination of the appropriate level of SPS protection is the major part of PRA process.

Weed Risk Analysis is a particular application of the Pest Risk Analysis (PRA) process developed by FAO. The Weed Risk Analysis process incorporates Risk Identification, Risk Assessment, Risk Management and Risk Communication. Weed Risk Analysis of a proposal to import bulk feed maize from the USA to Australia was conducted to assess the risk of introducing weed species into Australia as contaminants, and to review possible management strategies to reduce the risk. A Technical Working Group (TWG) comprising the authors was established to conduct the Weed Risk Analysis. Weed species recorded in summer field crops in the USA or found in exported shipments of USA maize to other countries and to Australia in 1994-1995 were identified as potential weed contaminants. Quarantine weeds were defined as species that are not present in Australia, or present but prohibited or listed as noxious species under Commonwealth, State or Territory legislation. Quarantine taxa included herbicide resistance genotypes of weed species found in USA maize fields. Biological information on each quarantine weed, required to assess the potential to establish, spread and impact on the Australian maize industry, was recorded in the datasheet format of AQIS. The risk of herbicide resistant maize becoming weedy or spreading the genes for resistance in the Australian environment was also assessed. The weediness of quarantine species that are not present in Australia was confirmed using AQIS’s Weed Risk Assessment system.

Most quarantine weeds are common summer weeds in field crops in the USA, however, some winter weeds were found as contaminants in previous maize consignments exported from the USA. These winter weed contaminants probably arose from cross-contamination during post harvest processing. Of one hundred and thirty four weed species identified as possible contaminants, seventy-two species were found to be quarantine weeds. Twenty-four species were not recorded as present in Australia. The remaining quarantine weeds were regulated as prohibited species or noxious weeds by Commonwealth, State or Territory legislation, or herbicide resistance variants found in maize fields in the USA. The risk assessment confirmed that these weed species had high potential to become establish and spread in Australia. Introduction of quarantine weeds presents a high risk of significance loss of maize yield, loss of export markets and expensive and tedious control strategies. Quarantine weeds such as Kochia scoparia, Striga asiatica, Ambrosia spp., Ampelamus albidos, Eriochloa villosa, Eupatorium capillifolium, Muhlenbergia frondosa, Salsola collina, Solanum ptycanthum, Rubus allegheniensis and Xanthium spp. were recorded to reduce crop yields from 9-60%, by competition for resources. Some twining weeds, such as Ampelamus albidos, Brunichia ovata, Sicyos angulatus, Ipomoea hederacea, Ipomoea turbinata and Cocculus carolinus could cover maize plants and seriously hinder harvesting resulting in a considerable yield loss.
Detection of some quarantine weed seeds such as *Striga* seeds in imported consignments is very difficult, as the seed are the size of dust particles. Maize sourced from *Striga* free areas is, therefore, considered essential and should be easily implemented. Because *Striga* infested areas are under an intensive control strategies which confine this weed to North and South Carolina only.

The potential of herbicide resistant maize lines becoming serious weeds was assessed as low. We considered that cultivated varieties of maize have lost the capacity to establish and naturalise. It is unlikely that maize seeds, if spilt during transport or storage, will survive until reproductive stage, because maize cannot grow well in poor soil, is not drought resistance and has a number of natural predators. Maize seed has no dormancy and is therefore unlikely to persist longer than one season. The chance that herbicide resistance genes could escape from introduced maize and integrate into the genome of weedy relatives was assessed to be exceedingly low. This judgement was based on the evidence that very few sexually compatible weedy relatives are present in Australia.

To reduce the risk of introducing quarantine weed contaminants with imported bulk maize, a number of management options were considered. These included sourcing maize from weed free areas, pre harvest management, consignment sampling, intensive cleaning and devitalisation using heat treatments. Steam heat treatment was considered the most practical and best option to manage the risk of weed contaminants in bulk shipments of feed maize from the USA.