**International Movement of Grain: Brief Justifications for an ISPM**

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**Overview**

Grains are a whole range of small hard dry seeds which are comparatively easier to store, transport or measure and are harvested to provide food for humans and feed for livestock, mainly belonging to the Poaceae, Leguminoaceae, Asteraceae, Brassicaceae family and some Psuedoceareals such as grain Amaranthus. Grains particularly cereals, have been used as a measure of food production and security.

Grain demand is high owing to increasing population, and is being moved from areas of surplus to areas of deficit through trade or food aid. Wheat, maize and rice form the most traded grains worldwide.

**International Agreements facilitating Grain Movement**

Grain trade and movement globally is facilitated by a couple of international Agreements such as

i)  *The International Grains Agreement of 1995* comprising of Grain Trade Convention of 1995 and Food Aid Convention of 1999.

Aim: To advance international cooperation in grain trade by promoting expansion, openness and fairness in grain sector to enhance market stability and world food security.

ii) *Agreement on Technical Barriers to Trade* ensures that technical regulations, standards, testing and certification do not create unnecessary obstacles to trade. One area emphasized by the TBT Agreement is the development of international standards by providing governments and intergovernmental bodies with guidance on how best to set such standards.

iii )*The WTO SPS Agreement* which aims to facilitate international trade in Agricultural products and emphasizes on the protection of human, animal and plant health.

**International Agreements Protecting Plant Health**

**Generally, the international movement of plant and plant products facilitates the transfer of plant pests from one area to another, thus the need for international agreements aimed at protecting plant life. These are**

i) The Convention on Biological Diversity (CBD) of 1992 in its section (h) of Article 8 emphasizes the need to prevent the introduction of, control or eradication of those alien species threatening ecosystems, habitat or species

ii) The International Plant Protection Convention reviewed 1997 in its paragraph 1 of Article VII, recognizes and provides for sovereign authority of member states to regulate in accordance with applicable International Agreements the entry of plants and plant products and other regulated articles.

Paragraph 2 of Article VII reaffirms the provisions of Paragraph 1, by emphasizing that contracting parties shall only take measures when such measures are made necessary by phytosanitary considerations and are technically justified.

**Classical Examples of Pests introduced through International Movement of Grain**

Alien pests have been introduced through grain trade and food aid to countries where they were never known. These are exemplified by the following accounts

* Introduction of the *Prostephanus truncatus* [the Larger Grain Borer(LGB)], into the United Republic of Tanzania in food aid shipment in 1979 (FAO, 2001a). Today, the pest has spread in to nearly 18 African countries
* Introduction of *Lissorhoptrus oryzuphilus* (the Rice Water Weevil) native to the United States into Korea (Lupi et al, 2009)
* Introduction of *sorghum halpense* (Sudan grass) into New Zealand

**Cost of Control of LGB**

Estimated cost of control in stores by use of insecticidal mixtures or fumigants in E. Africa stood at $18.7/ha , prohibitive cost for small holder farmers (Global Invasive Species Programme: Economic Impacts of Invasive Alien Species: A Global Problem with Local Consequences)

**Current Quality Assessment Practices in Grain Trade**

The Fair Average Quality (FAQ) concept where samples are examined by sight, smell and taste is used (FAO Agricultural Service Bulletin, 1994).

The technique is associated with its own loopholes ant is not all inclusive and should not be used as a substitute for assessing grain health status

**The Rationale for an ISPM**

* Due diligence when member countries undertake risk assessment to determine their appropriate level of protection (ALOP) as provided for by the various paragraphs of Article 5 of the WTO SPS Agreement
* Variations in commodity standards among individual countries, regions and internationally, an ISPM would help bridge the gap when standards are harmonized
* Precautionary measures due to unforeseen spillages during transportation and processing which is outside the intended use of the grain commodity

**Pests with potentials of introduction through grains**

**1. The risk of introducing *Tilletia indica* (Karnal Bunt)**

* As spore contaminants on grain surfaces, *T. indica*, imparts foul odour due to trimethylamine chemical thereby reducing wheat grain quality
* Once introduced it would be impossible to eradicate since the spores can remain viable in the soil for along time (Data Sheets on Quarantine Pest: *T. indica*. EPPO Quarantine Pest)
* Current distribution of the fungus is in limited areas within the Indian sub-continent, neigbouring Middle East, South Western United States, Iraq, Afghanistan, Pakistan and Nepal and was also reported in Brazil in 1993.
* Fungus is classified as A1 pest absent from EPPO region and considered of quarantine importance for IAPSC and NAPPO

**Potential impact of *T. indica* on the wheat industry in Africa**

Africa presents a good potential for wheat production with significant production in Ethiopia, South Africa, Kenya, Zambia, Tanzania, Libya and Algeria and opportunities for expansion to Angola, Burundi, Madagascar, Mozambique, Rwanda, DRC and Zimbabwe. Africa is still the biggest importer of wheat and stands the risk of introducing Karnal Bunt, if strict phytosanitary measures are not adhered to.

**Some of the Guiding Risk Assessment Questions for *T. indica* on Wheat Imports**

* Examine the chances of *T .indica* coming into Africa with imported wheat as pathway paying special attention to the countries of origin of import
* Examine the chances of establishment with special attention to diversion from intended use, spillages during transportation, processing, vicinity and stage of growth of host plant
* Examine the availability of favourable climatic conditions prevailing at the time of importation
* What are the survival chances if conditions are unfavourable with attention to mechanisms for spores to survive extremes of weather conditions and spore dormancy
* Examine the chances of spread by wind or other mechanisms

**2. Risk of introducing *Trogoderma granarium* (Khapra Beetle)**

***Status:*** *T. granarium* is listed among the worlds’ worst 100 invasive pest species.

***Geographic range:***

* The pest can establish in areas outside its known geographical range as long as good climatic conditions prevail.
* *T. granarium* is established within an area broadly limited north by the 35° parallel, south by the Equator, west by West Africa and east by Myanmar (EPPO Data Sheet on Quarantine Pest: *T. granarium*)
* Reported in some countries of Africa, however some countries are still free of the pest and require protection as well as limit the spread of the pest

***The risk***: Pest could be associated with maize or wheat grain (as pathway) moving in international trade or food aid and once imported, it could establish owing to the following characters

* Ability to survive lengthy periods of cold, drought or starvation of up to 13 months as resting larvae
* Ability to reduce pesticide uptake and translocation due to its low metabolic rate , therefore very difficult to kill
* Short lived live span for adults making them less vulnerable target to fumigation
* Low respiration rate of facultative diapausing larval stage also leading to tolerance to fumigation

**Damage:** Can cause grain weight loss of between 5-30% and may reach 70% if unchecked (Ellis and Hoghes, 2007), body parts and setae contamination on grain can cause gastrointestinal irritation

**3. Risk of Introducing Invasive Plant Species**

Seeds of unwanted plants could accompany grain consignments moving in international trade particularly if

* The contaminant weed seed cannot be separated during grain cleaning owing to similarities in size with the grain crop
* The contaminant has structures that could facilitate its firm attachment to grain

For example, *Parthenium hysterophorus* (Asteraceae) commonly called Congress Weed, is of South American origin, considered to be one of the world’s most serious invasive plants, invading Australia, Asia and Africa (McConnaichie et al, 2011).

**Status:** Considered one of the worlds’ most serious invasive plants

**Geographical Range:** Native of South America with invasion in Asia, Africa and Australia. In Africa is believed to have been introduced in Ethiopia through contaminated food donation from the USA in 1970s (Mulugeta Kinde Wubeshaw, 2006). Current distribution is in South Africa, Mozambique, Swaziland, Zimbabwe, Madagascar, Uganda and Kenya

**The risk:** Unintentionally distributed in international movement of grains, locally spread by vehicles, water, wind and farm machinery

**Damage:**

* Displacing grazing land;
* Triggering allergies in humans (dermatitis, eczema, asthma and hay fever);
* Effect on wild life ecosystem as in the current invasion of the Serengeti-Masai Mara ecosystem in Africa, which hosts the largest wildlife migration ([www.iucn.org](http://www.iucn.org/)).
* *P. hysterophorus* when unchecked can also reduce sorghum yields by up to 97%

**Likelihood of establishment when introduced**

* Very prolific producing numerous non dormant seeds with a wide germination temperature range of 8-300C;
* Produces growth inhibitors released to the soil through leaching, exudates from roots and suppress growth of indigenous plants

**Some General Technical concepts to bear in mind when conducting PRA of Regulated Pests**

* The Concept of Maximum Pest Limit (MPL), a threshold upper limit above which the pest species in question is deemed capable of establishing a population if imported in a consignment (Hughes,2003)
* The Probit 9 Efficacy, a probability that 99.9968% of mortality or 0.0032% survival (Haack et al ,2011) is achieved for quarantine treatment of pest. Though considered efficient, some live pests can still be shipped in treated consignments when trade volumes or infestation levels are high.

**General Opportunities and Challenges in the Management of the Pests**

Rationally apply the three SPS for grain moving in international trade to strike a balance in food and feed quality, plant and animal health.

Quality and health enhancement can be achieved through hygiene, fumigation, use of amorphous silica, residual chemical sprays and application of gamma radiation and biological control

. Countries are at different levels in terms of availability and affordability