BRII Challenge – Managing the biosecurity of hitchhiking pests and contaminants on shipping containers

Fact sheet

This Fact sheet provides information on the BRII Challenge – Managing the biosecurity of hitchhiking pests and contaminants on shipping containers. For information on BRII, please see the BRII Fact sheet.

Short description

Develop new innovative and technical solutions to detect and manage hitchhiking pests, organisms, diseases, weeds and other contaminants on or in shipping containers.

Potential Themes

Biosecurity, robotics, drones, scanning technology, artificial intelligence, machine learning, automation.

Overview of Challenge

Incoming shipping or sea containers, whether carrying cargo or arriving empty, can provide a pathway for hitchhiking pests, organisms, diseases, weeds and contaminants to enter Australia and create a biosecurity risk. Australia is free of most significant pests, organisms, diseases, weeds and contaminants that are present in other countries. Every arrival (International traveller, cargo consignment, vessel or container) has the potential to change this status and introduce exotic pests and diseases which could spread, harming our agricultural industries and natural environment. This can also affect our reputation as an exporter of `clean and green’ produce.

The Department of Agriculture and Water Resources (DAWR) manages the biosecurity risk associated with the external surfaces of containers from high risk countries through targeted physical inspection. Where the containers are treated in an approved Sea Container Hygiene System prior to import to Australia, this intervention is reduced. Containers from other countries are randomly selected for less intensive inspection. All containers destined for unpack in a rural location are subject to internal and external inspection.

Inspecting containers can be challenging, time-consuming and costly. The underside of typical containers have structural folds every 30cm to 45cm which can potentially block line of sight
inspection by humans and even robotic sensors. Containers also have high levels of rust and
dents/scratches that provide hiding spots for hitchhiking pests or organisms which can vary
from insect, snails, eggs or egg masses, animal material (hair, faeces, feathers) plant material
(seeds, straw, twigs, leaves, fruit and vegetables), plant pathogens (fungi, nematodes, bacteria,
viruses), and soil (dirt, mud, clay and sand which could harbour nematodes, bacteria etc).
Managing biosecurity is also becoming more challenging with trade volumes and container
arrivals expected to double by 2025.
For this reason DAWR is looking for innovative and cost-effective solutions to improve the
detection and management of hitchhiker pests and other contaminants on or in containers. This
may include new technologies and computer algorithms, or modifying existing technology or
solutions.

Solution requirements

The solution(s) should permit quantitative measurements to detect hitchhiking pests, diseases
and other contaminants on or in containers. The final technological solution(s) should consider
new technologies and different approaches (as an alternate to human inspection), including but
not limited to the following:

- Sensors mounted on static platforms at wharfs or within port precincts.
- Mobile platforms such as drones and robotics.
- Handheld devices that can be used in a point-and-shoot fashion.
- Automated container cleaning solutions/facilities which can be installed at ports.

The impact of the technology/solution on the efficient movement of containers in and out of
wharfs and port precincts will need to be considered, as will the aptitude for:

- Use by a wide range of staff without specialised training being required.
- Remote sampling and diagnosis of volatiles within a container to limit human exposure
to containers that may have been fumigated or infected.
- Real time data capture and results display.
- Operation in different environments (e.g. heavily congested and automated container
receive port in a metropolitan or peri-urban area versus smaller port in a rural area) and
for different pests and pathogens (there may not be a one size fits all solution).
- Future scalability (e.g. inspection of ships holds and air cargo containers, commodity
specific inspections, and to detect ‘invisible’ contaminants like paint odour or toxic fumes,
or container structural defects).

A solution should also have scope for private commercialisation on a national or global scale.
Benefits of the solution

Proposals of suitable technological or other innovative solutions that are practical to achieve will result in improved productivity. Currently, contaminated containers can result in delayed cargo release and unexpected costs for owners, importers or shippers due to increased demurrage, treatment or export costs.

Benefits can also include increased consumer confidence in the national biosecurity systems and its protection of Australia’s environmental assets, food security and agricultural productivity.