Developing cost-effective aflatoxin detection kits

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Food safety is equally important to food and nutritional security, and hence ICRISAT has given priority to this area of research. Aflatoxins are an important group of mycotoxins and pose a serious threat to food safety worldwide, but more particular developing countries where inappropriate post-harvest handling and processing facilities increase the risks. Currently >75% of the countries in the world have their own regulations on aflatoxins, indicating the level of concern that the present day world is putting on food safety issues. Unfortunately, aflatoxin contamination is often invisible, and it is difficult to physically separate contaminated grains. So it is inevitable to estimate and quantify toxins in commodities to safeguard human and animal health. Commercially available analytical and chromatographic techniques to researchers and traders are expensive. Hence ICRISAT has developed simple and cost-effective methods for detecting aflatoxins in various foods and feed commodities. ICRISAT has a fully equipped Mycotoxicology lab to produce monoclonal and polyclonal antibodies for Aflatoxin B1 and polyclonal antibodies to other mycotoxins such as Aflatoxin M1, Ochratoxin A, Fumonisin B1 by immunizing the animals with respective toxin-BSA conjugate (Devi *et al.* 1999, 2002). The antibodies are utilized to develop competitive ELISAs for the estimation of the toxin(s) in food, feed and milk. Two types of competitive ELISAs (direct and indirect) have been developed, and both types are heterogeneous assays that produce uniform results. The competitive ELISAs are simple, sensitive, rapid, versatile, and cost-effective for aflatoxins estimation and the results obtained were comparable with that of HPLC analysis (Waliyar *et al.*, 2009). The sensitivity of aflatoxin M1 detection is 0.5 µg/kg, and 1.0 µg/kg for other aflatoxins and ochratoxin, and 20 µg/kg for fumonisins. This suggests that these assays meet global standards for screening food samples. In all the assays the analysis cost is about US$ 1 per sample as against the $ 30 with HPLC systems. These detection tools provide unique opportunity for ICRISAT and its partners to test a large number of samples from field trials to devise pre- and post-harvest management strategies and to deploy appropriate interventions in value chains to enhance the food safety, human/animal health, and trade. ICRISAT's thrust towards capacity building of its national partners lead to setting up of more than 20 aflatoxin detection laboratories and trained more than 150 scientists/technicians in India, Kenya, Malawi, Mali, Mexico, Mozambique, Nigeria, Philippines and Vietnam, that rely on ELISA technology. These laboratories are successfully contributing to the quality certification of farmers' produce and enhancing product competitiveness in the global market. Recently ICRISAT developed a simple ELISA for quantitative estimation of Aflatoxin B1 albumin adducts in humans (Anitha *et al.*, 2011).

Keywords
aflatoxins; ELISA; aflatoxin B1 albumin adduct.

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TECHNOLOGY

Recent trends in the use of sprout testing technology in Australia

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There are a number of climate risks for grain production in Australia. These include drought, which can lead to delayed planting as well as early harvesting, increases in mean temperatures and also extreme temperature events ranging from heat to frost. Rain at harvest in particular has been a major factor affecting grain quality. This was highlighted by the record wet harvest in eastern and southern Australia in 2010/2011. The current 2011/2012 harvest is proving to be another wet season across the majority of growing regions, including Western Australia this time. This has resulted in a significant increase in weather damage testing at grain receival sites across the country.

Up until the past few years, weather damage testing equipment such as Falling Number instruments were stocked in limited numbers by grain handlers. The units were deployed sporadically, often only once every three to four years. There was also a high usage of visual assessment for sprouted grains.

This paper describes the changes that have taken place in weather damage testing of wheat and barley in Australia in the past two years. There has been a significant increase in the number of Falling Number instruments utilised for grain receival testing. Work practises have significantly improved in terms of training of receival site staff, as well as regular maintenance and check sample testing programmes. RVA technology is also now used for providing Stirring Number analysis for malting barley varieties.

Keywords
climate risks; harvest rain; weather damage; falling number; RVA.