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Rapid monitoring tool using fluorescence microscopy and immunoassay

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Abstract

For the past 20 years, insect-resistant Genetically Modified Organisms (GMOs) have been commercially available all over the world [1]. For commercial agricultural applications, transgenic crops based on Bacillus thuringiensis (Bt) which is produced Crystalline (Cry) toxins are one of them [2]. Therefore, The environmental fate of Cry proteins has attracted more attention as a result of their widespread application in transgenic crops and pesticide formulations. These Bt crops can enter into soil and aquatic ecosystems effecting the food web for non-target organisms such as *Pycnopsyche* sp [3], caddis fly Lepidostoma liba [4, 5], and *Caecidotia communis[6]* by feeding with pollen or transgenic maize detritus which decreased growth rates and weight gain, reduced feeding, longer development time, and increased larval mortality [7]. Therefore, the need to develop an accurate and precise technique that is able to detect a low level of toxic proteins and pathogens in the early stage is the cornerstone of monitoring Cry toxins in the food and environment. Various detection techniques available to trace Cry proteins' fate in the environment, but few studies have been reported using the integration of magnetic beads with optical detection for the quantification of protein in the fluorescence image.

Keywords: Fluorescence, Immunoassay, Magnetic beads, Optical detection, Toxic Protein.