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Screening of genetically modified organisms (GMOs) in cotton and textiles

Criblage pour la détection des organismes génétiquement modifiés (OGM) dans le coton et les textiles

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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International Workshop Agreement IWA 32 was approved at a workshop hosted by the Netherlands Standardization Institute (NEN), in association with the Organic Cotton Accelerator, held in New Delhi, India, in January 2019.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 General

This purpose of this document is to provide guidance to laboratories worldwide to assess, in a standardized way, whether cotton, cotton fibre and/or cotton-derived materials are produced from, or contain materials from, genetically modified (GM) cotton plants. This document is intended for non-GM cotton and textiles production lines, but it can be applied to any production line that wants to check the presence of GM cotton.

0.2 Protocol

The GM screening protocol described in this document is based on Polymerase Chain Reaction (PCR)-based methods, as these methods are the minimal set of DNA-based methods to cover all known GM-cotton events. The protocol is written for and tested to work on all four of the major commercial cotton species: *Gossypium hirsutum*, *G. barbadense*, *G. arboreum G. herbaceum*.

Cotton (*Gossypium* spp.) has been cultivated for lint for over 8 000 years. There are over 50 species in the *Gossypium* genus (Wendel et al., 2009). The *Gossypium* genome is complex, containing 2,25 to 2,43 gigabase (Arumuganathan and Earle, 1991). While GM-cotton cultivation covers a large part of global cotton production today, there are countries where the cultivation of GM cotton is not allowed by law as well as voluntary private and/or public standards that do not allow the intentional use of genetically modified organisms (GMOs) in the cotton and textile production process. This creates a need for an adequate and harmonized protocol on the screening of cotton and cotton-derived materials for the potential presence of GM-cotton related sequences.

This document describes a procedure to screen seed, leaf and (processed) fibre samples in the cotton production chain for the potential presence of GM-related DNA elements. The protocol describes three major steps:

a) an effective way to isolate DNA from cotton materials;

b) a method to confirm that the isolated DNA consists of amplifiable cotton DNA, i.e. suitable for PCR, preferably a low copy nuclear target;

c) A screening method consisting of a minimum set of detection methods covering all the currently known GM cotton events, to be performed on the cotton DNA isolate.

If the results of the screening methods described in this protocol are 'not detected', the likelihood that the cotton sample is (at least partly) derived from GM cotton is minimal, based on the ability of the screening methods to detect elements and constructs of the GM cotton events. GM cotton levels below the detection limit of the method or unknown GM cotton events that do not contain any of the elements or the construct tested cannot be determined by this detection method. When one or more screening methods indicate that GM elements are present, the sample should be considered as derived from GM cotton.

Further investigation for the identification of GM-cotton events present in the sample is not part of this document as such, but some guidance is provided in Annex A as to how further identification of the related cotton events can be achieved.

0.3 Structure

The structure of this document is illustrated in Figure 1. Clause 4 describes the principle of the screenings protocol. Clause 5 describes sample preparation for different types of material. Clause 6 describes the DNA isolation method that allows for successful DNA isolation from the respective cotton-related products. Clause 7 describes the DNA quality control for the different cotton species. Clause 8 describes the screening of GM-related DNA sequences in a cotton sample. Clause 9 describes recommendations on the test report (outcome). Annex A gives an overview of known GMO cotton events. Annex B gives an overview of detection methods applied by RIKILT[1)]. Annex C provides

1) https://www.wur.nl/en/Research-Results/Research-Institutes/rikilt.htm

more information on the inhouse validation as carried out by RIKILT. Annex D provides a list of the contributos to the International Workshop.

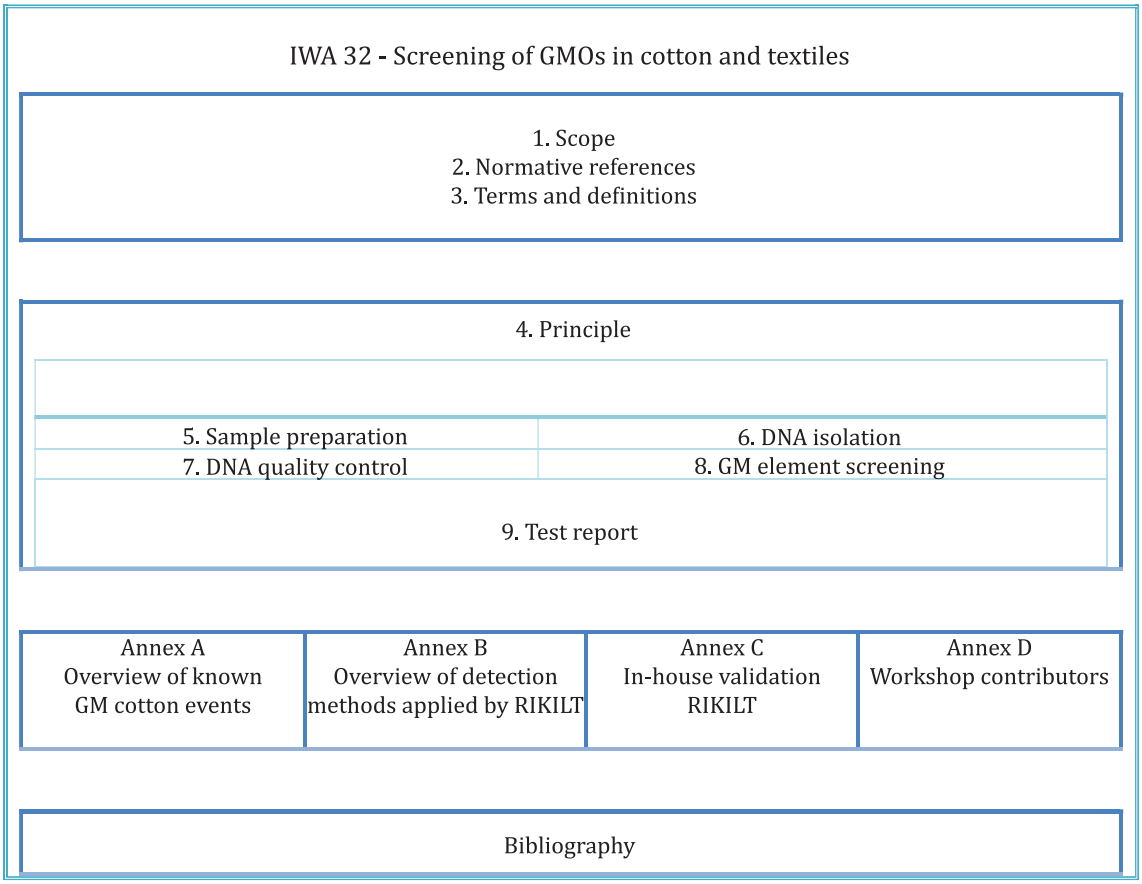

Figure 1 — Structure of this document