

Standard Operating Procedure for GMO Sampling and Testing



ORGANIC COTTON ACCELERATOR

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INTRODUCTION

The Organic Cotton Accelerator's (OCA) Farm Programme is a brand-driven sourcing and capacity-building programme with the aim of building integrity and prosperity at the farmer level. The Programme is OCA's primary market transformation tool for strengthening and growing the organic cotton sector. This harmonised industry approach is paired with a stream of investment capital to the farm-level (that includes direct brand-to-farm linkages) to build a resilient and transparent supply of organic cotton. A shared set of common guidelines and global indicators are used to measure and report on progress and impact.

Working as an additional layer on top of the national and international organic cotton standards OCA's Farm Programme Monitoring and Evaluation (M&E) system provides additional transparency and insight into inputs, activities, outputs at earliest stages of the supply chain. Through its M&E system, OCA provides additional insight into genetically modified organism (GMO) contamination at seed, farm and gin level. This information provides Farm Programme stakeholders with a comprehensive overview, alert and action system if GMO is detected, enabling Farm Programme stakeholders to make informed decisions with regards to their supply chain sourcing decisions.

Organic is a claim that genetically modified organisms (GMOs) are not deliberately or knowingly used and that organic producers take far-reaching steps to avoid GMO contamination along the organic cotton value chain,¹ from seed producers to farmers, to spinners, to brands/retailers. To manage this, it is essential that organic cotton stakeholders can test the cotton for any GMO presence or contamination at different Critical Control Points (CCPs) in the supply chain. They can do so alongside taking preventative measures such as the use of tall and dense border crops to minimise the risks of cross pollination.

For OCA's Farm Programme to achieve its goals of building integrity and prosperity at the farmer level, testing the cotton in different levels is vital. The purpose of this Standard Operating Procedure (SOP) is to guide OCA's Third-Party Verifiers (TPV)s and Implementation Partners (IP)s on how to sample and test for the potential presence of GM cotton from seed to farm, to gin, in each Farm Project. A streamlined GMO sampling process should be followed across OCA Farm Projects, so that comparable and consistent GMO testing results can be obtained in the Farm Programme.

1. Article 4 Council Regulation (EC) No 834/2007 and Article 5 Regulation (EU) 2018/848, and IFOAM Organics International, Position Paper 'Genetic Engineering and Genetically Modified Organisms', 2016

TERMS AND DEFINITIONS

Agricultural and Processed Food Products Export Development Authority (APEDA): The Indian government department responsible for the implementation of accreditation of the Certification bodies under the National Programme for Organic Production (NPOP for organic exports).

Brands/Retailers: The OCA partner Brands/Retailers actively involved in the Farm Programme

Critical Control Points (CCPs): Steps in the production process where preventative measures can be applied to reduce or remove a hazard, in this case contamination by genetically modified cotton.

Genetically Modified Organism (GMO): Genetically Modified Organism (GMO) means an organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.

Farmers: Organic (certified/in-conversion) farmers that are part of the groups and organisations from which the IP sources their cotton.

Internal Control Systems (ICS): It is a documented quality assurance system that allows the external certification body to delegate the annual inspection of individual group members to an identified body/unit within the certified operator.²

Implementing Partner (IP): Value chain players that are part of the Farm Programme. They are contacted by Brands/Retailers and manage source organic cotton from organic farmer programmes/groups growing cotton. IPs can cover one or more (integrated) steps in the supply chain, e.g. cooperative, ginner, spinners, weavers, garment makers.

International Seed Testing Association (ISTA): The association which produces internationally agreed rules for seed sampling and testing, accredits laboratories, promotes research, provides international seed analysis certificates and training, and disseminates knowledge in seed science and technology.

Monitoring & Evaluation (M&E): The process of collecting data and conducting analysis to understand the extent to which a programme or intervention has (or has not) met its original goals.

National Organic Programme (NOP): The federal regulatory program that develops and enforces consistent national standards for organically produced agricultural products sold in the United States. NOP also accredits the Certification bodies allowed to certify farms and businesses who meet NOP organic standard criteria. This comes under United State Department of Agriculture (USDA) authority.

National Programme for Organic Production (NPOP): Provides standards for organic production, systems, criteria and procedure for the accreditation of Certification Bodies within India and the regulation of import and export of organic products from the country.

Organic Agriculture: Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved.³

2. Based upon the definition used by IFOAM (<https://www.ifoam.bio/our-work/how/standards-certification/internal-control>)

3. Based upon the definition used by IFOAM (<https://www.ifoam.bio/why-organic/organic-landmarks/definition-organic>)

Organic Cotton Accelerator (OCA): A multi-stakeholder organisation dedicated to unleashing the potential of organic cotton for people and planet.

Standard Operating Procedure (SOP): A set of step-by-step instructions compiled into a single document in order to provide guidance when carrying out a particular routine or task.

Third-Party Verifier (TPV): Third-party entities that conduct data collection and validation activities.

OVERVIEW OF THE KEY PROCESSES AND PROCEDURES

1. Roles and Responsibilities

A series of GMO tests are made compulsory under this SOP. These GMO tests must be performed as per the ISO IWA32:2019 qPCR test protocol at accredited laboratories that have passed the ISO IWA proficiency test⁴. OCA's GMO sampling is performed by the IPs and TPVs in different stages during the season. In this way, the truthfulness of the GMO test results is ensured. The IP cooperates in this process, pays for the GMO lab tests (unless specified otherwise in the Farmer Commitment Agreement, the other option being to channel the GMO testing costs via OCA) and reports to OCA on extra preventative measures taken within the Farm Programme.

1. Implementing Partner:

- a. The IP cooperates and helps the TPV in facilitating the cotton sample collection process at the farm or at the Gin.
- b. The IP pays for the GMO lab tests (unless specified otherwise in the Farmer Commitment Agreement).
- c. The IP reports to OCA on extra preventative measures taken within the Farm Programme.

2. OCA TPV:

- a. The OCA TPV selects the sample farmers for seed cotton sample collection at the farm stage and the bales at the gin.
- b. Collection of triplicates of the cotton sample at each stage as per the Standard Operating Procedure for GMO Sampling and Testing.
- c. Post collection, the TPV recodes the samples according to the codes shared by OCA and then sends the samples to the designated lab for testing.
- d. The TPV coordinates with the lab for receiving the reports, collates the results, decodes them and shares them with OCA.
- e. The TPV shares the farmer and lot details to the lab for final report generation.
- f. The TPV must not delay the sample collection, labeling, and sending it to laboratories, in fact there should be a focus on reducing the turnaround time. Because the delay dissolves the purpose of GMO testing, by the time OCA/IP receives the reports the cotton either has been procured from the farmer or picked up by the brand.
- g. The TPV coordinates with the lab to receive the reports, and collates the results.

3. OCA:

- a. OCA oversees the process of GMO sampling at all three stages.
- b. OCA shares with the TPV the number of samples they need to collect per project at the Farm and Gin stage of sampling.
- c. OCA also selects the labs to which the cotton samples will be sent by the TPV for each project.
- d. Post receiving the test results, OCA works with the IP on devising a methodology to prevent GMO contamination further and to ensure the samples that tested positive do not enter the brand supply chain.

4. https://organiccottonaccelerator.org/wp-content/uploads/s-reports/Global-ISO-IWA-32_2019-Proficiency-Test-Initiative-Labs-2023.pdf

4. Laboratory:

- Conduct qPCR testing as per ISO IWA:32 protocol for all farm and gin level samples.
- Share the draft test reports with the TPV.
- Creating the final reports as per the details shared by the TPV against each code.
- Sharing the final reports with the IP.

Summary of Requirements

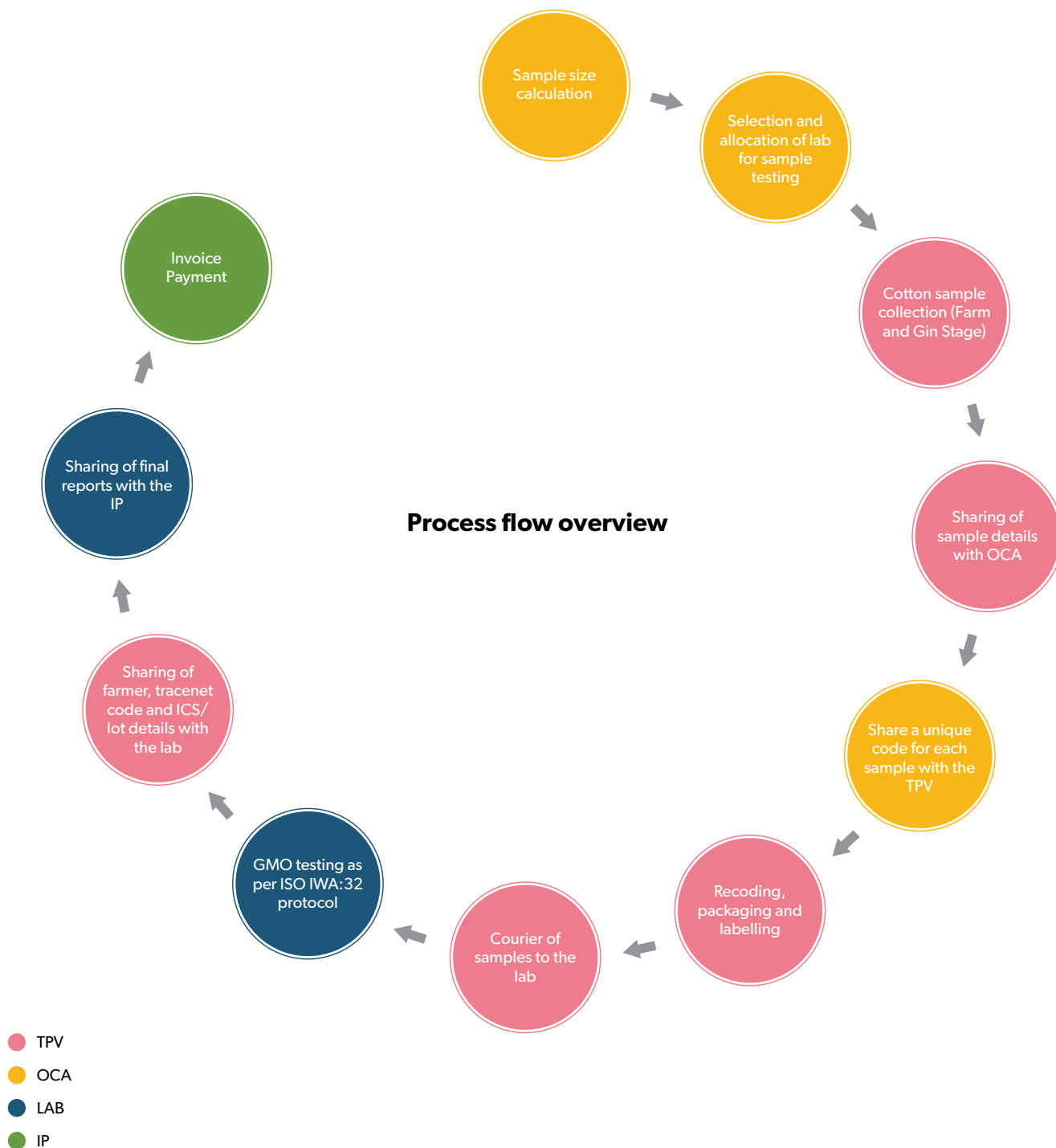
The table below provides an overview of the stages of GM sampling and testing, and responsible parties. Bear in mind that all the tests, except for S1-IP, are mandatory. The seed level tests i.e. S1, S2 and S3 indicate that the sampling is done by the IPs themselves whereas F-TPV and G-TPV (yellow boxes) indicate the sampling under the oversight of the TPVs.

Seed Level (S)			Farmer Level (F)	Gin Level (G)
Prior to seed purchase (S1-IP)	After seed purchase (S2-IP)	During seed distribution to farmers (S3-IP)	Farmer's field or storage (F-TPV)	At the ginnery (G-TPV)
Responsibility of IP	Responsibility of IP	Responsibility of IP	Responsibility of TPV	Responsibility of TPV
Location Seed supplier	Location IP	Location Cotton farm	Location Cotton farm	Location Ginnery
Mandatory / Recommended Recommended	Mandatory/ Recommended Mandatory	Mandatory/ Recommended Mandatory	Mandatory/ Recommended Mandatory	Mandatory/ Recommended Mandatory
Test method qPCR lab test or Bt-strip test	Test method qPCR lab test	Test method Bt-strip test	Test method qPCR lab test	Test method qPCR lab test
Reporting Test results to be reported to OCA by the IP	Reporting Test results to be reported to OCA by the IP	Reporting Test results to be reported to OCA by the IP	Reporting Test results to be reported to OCA by the TPV	Reporting Test results to be reported to OCA by the TPV
Anonymity of the test No	Anonymity of the test No	Anonymity of the test No	Anonymity of the test Yes, in countries where the overall sample size is more than 3000	Anonymity of the test No

2. Overall Process for GMO Sampling and Testing

Getting started:

1. The IP agrees to a set of conditions with OCA and its partnering brands/retailers, laid out in the Farmer Commitment Agreement for each individual Farm Project the IP facilitates. This includes:
 - a. To facilitate the seed level GMO testing as per the ISO IWA 32 standards before the seed lots are distributed to the farmers.
 - b. To cooperate with the OCA TPV for the farm and gin level testing process.
 - c. The modalities of payment of the GMO test – typically paid by the Implementation Partner or OCA depending on the choice of the partnering brand.
 - d. A contingency plan to be followed if GMO presence is found in the project throughout the season. The contingency plan should include the corrective actions recommended under this SOP, complemented by the requirements from the IP or the brand specified in the Farmer Commitment Agreement (FCA).
2. A TPV is assigned to the Farm Project by OCA.
3. OCA ensures standardized testing costs across all the ISO ISW 32 accredited labs that have passed proficiency tests.
4. OCA will assign the risk assessment for each project based on the previous year's performance for each IP. For the new IPs the risk assessment will be considered to be medium. A total number of GMO tests (to be sent to laboratories) is defined proportionally to the risk level of the project.
5. The TPV creates a stage-wise plan for GMO sampling at farm and gin level, testing and reporting as per this SOP and share with the OCA programmes team and the IP.
6. GMO sampling, testing and reporting is carried out at seed level at different stages by the IP.
7. GMO sampling, testing and reporting is carried out at farm level typically 100 to 130 days after planting. See test F-TPV.
8. GMO sampling, testing and reporting is carried out at gin level typically 180 to 200 days after planting. See test G-TPV.
9. OCA divides the samples to be tested at both farm and gin stage, across the selected labs.
10. The process is supported by the OIS platform throughout all the three stages – seed, farm and gin. GMO contamination is reported via the following means:
 - a. **Mid-season general performance reporting:** Progress Update Report (PUR) is produced by OCA several times during the season which provides an update on GM presence – if any detected.
 - b. **End of season general performance reporting:** The overall GM presence (if any) can be found in Farm Project External Validation Report.
 - c. **End of season feedback loop:** Performance Improvement Report (PIR) is provided by TPVs after the season ends created to establish continuous improvement.



3. Calculating the total number of Mandatory Laboratory GMO Tests per Farm Project

Total number of samples

The total number of samples to be sent for laboratory testing can be calculated as follows.

OCA Formula to calculate the total number of samples for laboratory testing

$$\text{Number of samples to be sent for laboratory testing} = \text{risk factor} * \sqrt{(0,92 * \text{number of Metric Tons of lint committed under the Farm project})}$$

This formula has been extracted from IFOAM's requirements for external inspection of organic farm groups⁵ and converted into volumes of metric tons of lint committed under an OCA Farm Project, using agronomic yield data from OCA's Farm Programme between 2018 and 2021.

Evaluation of the risk factor to be used in the formula above

The risk factors are drawn from a risk assessment that is carried out by the TPV prior to the season.

The risk factors are drawn from a risk assessment that is carried out by the TPV prior to the season. OCA will share the risk category for each project with the TPV and the respective IP.

Risk factor to be used in the formula	
Low risk factor	1
Medium risk factor	1,2
High risk factor	1,4

Example:

Number of samples to be sent for laboratory testing = risk factor * $\sqrt{(0,92 * \text{number of Metric Tons of lint committed under the Farm project})}$.

For a medium risk factor project, 45 samples to be sent for laboratory testing = $1,2 * \sqrt{(0,92 * 1500)}$.

5. IFOAM (2014). The IFOAM Norms for Organic Production and Processing version 2014

4. Distribution of Samples across Different Stages

Sampling stages

Samples are drawn by OCA's TPVs in different proportions at critical stages throughout the organic cotton farming system, i.e., at farmer, and gin level. These CCPs have been identified to enable segregation and isolation of any contaminated produce before it is passed on to the next actor in the supply chain, when product ownership changes.

Sampling stage	Proportion of total samples to be taken for lab tests	Example for a Farm Project of 45 total GMO samples
Seed Level (S2-TPV): Sampling of - Purchased seed bags after reception by Implementing Partners and prior to distribution to farmers - This test is to be conducted by the IP across all its OCA Farm Projects - See Seed-level sampling for more information	Dependent upon seed procurement plan: 1 composite sample per unique seed lot* per seed variety per Implementation Partner across all its OCA Farm Projects.	If an IP procures 10 seed lots for all its Farm Projects: 10 composite samples are taken for S2-TPV testing.
Farmer Level (F-TPV): Sampling of - Seed cotton on the field before harvest - Seed cotton at farmer storage post-harvest, depending on what is available at the time of the TPV visit	70% of the total samples	25 of the remaining samples will be used in farmer level (F-TPV)
Gin Level (G-TPV): Sampling of - Storage heaps of seed cotton, - Baled lint cotton at the ginner, depending on what is available at the time of the TPV visit	30% of the total samples	10 of the remaining samples will be used in gin level (G-TPV)

**A seed lot (as per ISTA) is a batch of seed produced by a (commercial) seed producer / supplier, identified with a unique number that is mandatory on seed packaging. The germination rate and purity of this seed lot has been previously assessed and recorded by the seed producer / supplier before distribution.*

5. GMO Test Methods

ISO IWA 32:2019 qPCR test at laboratories

Among the several methods of GMO testing, qualitative Real-Time Polymerase Chain Reaction (qPCR) testing is considered the best technological option to perform a general screening for GMO detection. qPCR testing methods can detect the presence of a transgenic DNA sequences in a plant cell's genome. They must be performed by a qualified laboratory. qPCR testing is the most sensitive testing method as it commonly has a limit of detection of 0.01%. Please note that the only conclusion that can be drawn from qualitative qPCR tests is the fact that a sample 'contains GM-elements' or 'does not contain GM elements' involved in GM cotton events (no quantitative percentage can be deducted).

The ISO IWA 32:2019 protocol must be used by the laboratory for testing the samples from the Farm Project. The International Organization for Standardization (ISO) International Workshop Agreement (IWA) 32 is the protocol on screening of Genetically Modified Organisms (GMOs) in cotton and textiles. This protocol ensures the screening of genes (GM- elements) that are involved in all known GM cotton events, across all four commercial cotton species (*G.hirsutum*, *G.barbadense*, *G.arboreum*, *G.herbaceum*). The protocol can be purchased [here](#) on the ISO website.

Strip tests in-house

Strip testing (Lateral Flow strip) methods are immunological GMO testing methods, able to detect transgenic proteins. They can be done in-house. The limit of detection above which GMO presence can be detected by a Strip testing method ranges between 0.1 and 1%, which is less than qPCR methods but still make it a powerful decision tool to screen and monitor the presence of GMOs, identify risks, and verify corrective actions daily. They are especially useful to check that no contamination has occurred during seed distribution, and later, on the farmer's field to check that the farmer has only planted GM-free seed (including for gap filling). OCA recommends the use of Bt-Strip tests that can screen at least for the **Cry1Ac** delta-endotoxin / protein.

Advice on the procurement and use of Bt-strip tests can be found in Annex 1.

6. Selecting and Interacting with Laboratories for qPCR Tests⁶

While for the GMO sampling at the Farm and Gin stage OCA will designate the lab for the IP from its selected list of approved labs, the IP is expected to select one lab from the same list to get the seed level GMO testing conducted for the seed lots procured for the season.

Laboratory selection criteria for qPCR tests

When carrying out qualitative GMO testing in cotton and greige cotton products as per the ISO IWA 32:2019, OCA requires IPs to work with laboratories who:

- have successfully passed the proficiency test for qualitative cotton screening according to ISO IWA 32:2019 organised in 2023 by Organic Cotton Accelerator in collaboration with the Global Organic Textile Standard and Textile Exchange, and with the technical support of Wageningen Food Safety Research.
- hold a valid ISO/IEC 17025:2017 accreditation by a local laboratory accreditation body (e.g., NABL in India) for GM cotton screening as per the ISO IWA 32:2019. This standard verifies its competence, impartiality, and consistent operation.
- are recognised by organic standard setting organisations (e.g., APEDA in India) for sampling and analysing GMOs in organic cotton products.

The list of laboratories that meet OCA's requirements for GMO testing is available in Annex 2.

Instructions for laboratories:

- The laboratories should be instructed to follow the ISO IWA 32:2019 protocol when screening for the presence of GM cotton in Farm project samples.
- All the empaneled laboratories will be given access to the OCA information system (OIS) which will only be used for sharing information like sample numbers, sample codes, and IP information.
- Once the sample is received, the laboratory is required to update the real-time information till report generation, upload the results on OIS, and share them with TPVs.
- Once TPV approves the reports, all the relevant information (IP details) against each sample will be shared with laboratories to create the final reports as per the details.
- As soon as the TPVs approve the reports and IP information is received, the laboratory will share the draft reports with the IPs over Email along with the invoice to make payments.
- The laboratory must not delay the testing, report generation, and communicating it to OCA, in fact there should be a focus on reducing the turnaround time. Because the delay dissolves the purpose of GMO testing, by the time OCA/IP receives the reports the cotton either has been procured from the farmer or picked up by brand.
- Once the payment is received the laboratory will be required to share all the original test reports with the IP either a soft copy over email or a hard copy at the given address.
- The laboratories will proactively follow up with the IPs for the invoice payment.
- The labs are expected to share all the draft reports and information with OCA over the OIS.

6. GMO Testing, <http://www.gmotesting.com/Testing-Options>, consulted on 11/2019

Overview on the detection, interpretation and reporting on the presence of unauthorised genetically modified materials - Guidance document from the European Network of GMO Laboratories (ENGL), European Commission - Joint Research Centre - Institute for Health and Consumer Protection, 2011

Instructions for laboratories:

Seed level test:

- The IP is expected to share the seed testing reports for all the seed lots purchased for the season and distributed to farmers under the OCA Farm Programme.

Farm and Gin level tests:

- The TPV will send a handing-over letter to the designated lab once the re-coded samples are couriered to the lab. The TPV will only share the sample code with the lab.

The draft of the takeover letter is attached as Annexure 2.

For the Farm and Gin stage sampling the lab will share the reports with OCA on the OIS, and only upon OCA's approval will the reports be shared with the respective IPs.

4

SEED-LEVEL SAMPLING (S)

1. GMO Testing Processes

GMO testing prior to seed purchase (S1-IP)

Even though this stage is **not mandatory**, OCA strongly encourages that the IP always tests its seed lots to be procured prior to purchase, at the seed supplier's vicinity, to secure the quality and reliability of the purchased lots. Potential risks of GMO contamination in seed level stage include unreliable purity of seed lots and mixing of seeds during seed packaging.

- **Sampler:** The sampling can be managed preferably by the IP, or alternatively by the seed supplier itself. See Sampling Methodology below.
- **Test method:** a qPCR lab test (as per ISO IWA 32:2019) should preferably be carried out at one of the laboratories recommended by OCA. Alternatively, a Bt-strip test can be used in cases of time pressure.
- **Reporting:** All GMO test results should be reported by the IP to OCA as per the reporting guidelines.

The test reports will inform OCA's Seed Assurance programme where OCA provides seed producers with capacity building support to monitor and prevent GMO presence along their seed supply chain as per expert guidelines. The more contamination detected in the seed lots from the seed supplier, the more OCA will extend its effort to support them.

- **Corrective actions in case of contamination detected in S1-IP:**
 - The IP must reject the seed lots that tested positive and instead buy the missing seed quantities from other lots which have not tested positive for GMO presence.
 - If there is unavailability of uncontaminated seed for the project, the IP must inform OCA.

When the presence of GMOs is detected in seed lots / bags prior to purchase, the following corrective actions are recommended by OCA:

- If there is time available, the project partner can re-test the seed lot / bag by breaking it down into several sub-samples to assess the extent of the contamination.
- The IP must reject the seed bags and lots testing positive and buy seeds from reserve lots which have not tested positive for GMO presence.
- If there is unavailability of seed for the project, the IP must inform OCA.

GMO testing after seed purchase (S2-IP)

The IP will sample the seed lots procured and prior to seed distribution to farmers. This stage is **mandatory** to ensure action is taken in a timely manner to eliminate GMO presence from an OCA Farm Project from the start.

- **Sampler:** The sampling will be managed and sent to the laboratory by the OCA IP.
- **Test method:** a qPCR lab test (as per ISO IWA 32:2019) must be carried out at the laboratory chosen in the Farm Commitment Agreement.

- **Required from the IP:** At least four to five weeks prior to seed distribution to farmers, once seeds have been procured The IP's seed procurement plan should be made available to OCA including the name of the seed varieties procured, their seed lot numbers, the seed volumes (number of seed bags) procured as well as the tentative time of seed distribution to farmers. The IP will further mention the details for the seed lots procured for each ICS in the FCA signed for each project, and further share the corroborating data for the seed lots in the set 1 data shared with OCA. OCA will also be asking the IP for the subsequent seed purchase documents.
- **Number of samples taken:** 1 composite sample per unique seed lot per seed variety. All seed lots of all seed varieties procured by the IP should be sampled using the composite sampling methodology provided by OCA further below.
- **Reporting:** All GMO test results will be reported to OCA by the IP as per the reporting guidelines.
- **Corrective actions in case of contamination detected in S2-TPV:**
 - If time allows and guarantee systems have been agreed with the seed producer, the IP can return the seed lots that tested positive to the seed producer and instead buy the missing seed quantities from other lots which have not tested positive for GMO presence. If there is no uncontaminated seed available for the project, the IP must inform OCA.
 - If product return is not possible and there is time available, the project partner can re-test the seed lot to assess the extent of the contamination using qPCR lab tests. Re-tests can be done by breaking the composite sample down into several sub-samples (minimum 5). OCA needs to be informed about the results of the re-test before a decision is made by the IP.
 - If a re-test shows contamination in many sub-samples: the lot should be rejected and clean seeds from a different seed lot should be used instead.
 - If a re-test shows that contamination is minimal, and all parties (OCA and IP) decide to take the risk to distribute the seed lot to farmers: Bt-strip tests S3-IP should be carried at ALL project farmers to whom the potentially contaminated seed lot is distributed.

GMO testing during seed distribution to farmers (S3-IP)

OCA Implementation Partners must test the purity of each seed bag in front of the farmer at the moment of seed distribution, using rapid Bt-strip tests. This stage is mandatory to eliminate GMO dissemination right from the start of the Farm Project.

- **Sampler:** The sampling should be managed by the IP staff in front of the farmer.
- **Test method:** Bt-strip test should be used as there is no time to externalise the testing at the moment of seed distribution to farmers. Bt-strip tests should be taken from at least 10% of the OCA project farmers, spread across different seed varieties and seed lots. Open the seed bag in front of the farmer, take a representative handful of seeds from the seed bag and follow the instructions from the strip test provider alongside the general advice provided by OCA in Annex 1.

- **Reporting:** Both Bt-strip test results and traceability records of seed distribution are required. All GMO test results should be reported by the IP to OCA as per the reporting guidelines. It is instrumental that the IP traces the seed lots from their origin to the farm, so that the seed lot can be examined as a possible root-cause in case GMOs are detected in the farmer's seed cotton later. Therefore, traceability records of seed distribution from seed provider to farmer are required by OCA. The information recorded includes seed cultivar name, seed provider name and seed lot number per farmer plot.
- **Corrective actions in case of contamination detected in S3-IP:**
 - If the Bt-strip test shows GMO contamination of the seed bag, the project partner must not distribute it to the farmer and must provide the farmer with a non-contaminated seed bag instead.

2. Sampling Methodology for Lab Tests

All seed lots⁷ from all seed cultivars procured by the Implementation Partner should be tested for GMO presence. The required lab samples should never be taken from a partial sub selection of cultivars and lots, so it is critical that the IP plans its seed purchase in time so as to get each lot for each variety tested well in advance before the seed distribution.

Two sampling methodologies are proposed for IPs for S1-IP and S2 testing, depending on whether the seed lots have already been packed into smaller seed bags or not.

Sampling methodology for retail-size seed bags

If retail size seed bags need to be sampled (either for S1 or S2), it is important to find the best compromise between taking a representative sample without opening too many bags (which can lead to product or quality loss, and increase the risks of mixing).

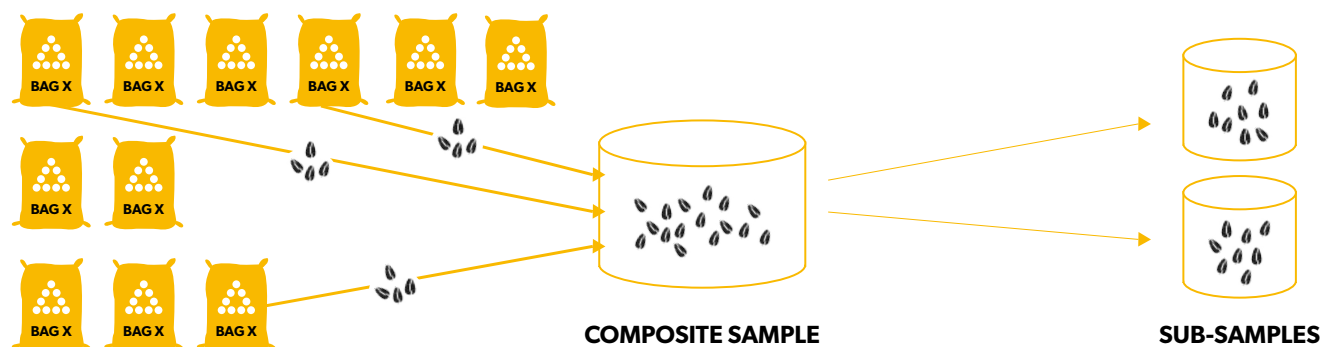
- For each seed lot: take samples from a representative number of bags or containers (e.g., 10 out of 100 bags). Care should be taken that all seed bags sampled go to OCA project farmers during seed distribution.
- Combine primary samples carefully into composite sample.
- Mix well and divide by successive sample reduction procedures into homogenous sub-samples as necessary to reach the number of samples required from OCA (one sub-sample required for S2) with the appropriate submitted sample size (300 g of seeds).

Please note that for each sample, 2 sub-samples must be taken:

- A sample will be sent to the laboratory (sent from the IP office).
- A sample will be stored at the IP office as a reserve sample for potential re-test.

7. A seed lot (as per ISTA) is a batch of seed produced by a (commercial) seed producer / supplier, identified with a unique number that is mandatory on seed packaging. The germination rate and purity of this seed lot has been previously assessed and recorded by the seed producer / supplier before distribution.

- Store the composite sample for eventual re-test at a later stage.



Submitted sample size to be sent to the laboratory : 300g of seeds minimum

Segregation:

- The 2 samples can be segregated upon collection on the spot by using envelopes or labels of different colours.

Packaging:

- Use plastic tamperproof envelopes for sampling.
- Collect every sample envelope and place them in a bigger envelope for transfer to the laboratory.

Labelling:

- Use printed labels or barcodes which include Farm Project details, seed lot number and seed producer.

5

FARM-LEVEL SAMPLING (F)

1. GMO Testing Processes

GMO testing: Farmer's field or storage (F-TPV)

One F-TPV sample can be taken either on the farmer's field, or in his storage facilities depending on what is available during the TPV visit.

OCA will send a TPV to sample the seed cotton directly at the farmers' field or at the farmer's storage, depending on what is available at the time of the TPV visit. This stage is mandatory to eliminate GMO dissemination. Potential risks of contamination in farm stage are gap filling at sowing, cross pollination, and mixing of batches after harvest, during storage or transport.

- **Sampler:** The sampling will be managed and sent to the laboratory by the TPV senior/managerial staff.
- **Test method:** a qPCR lab test (as per ISO IWA 32:2019) must be carried out at the laboratory selected by OCA and shared with the TPV over the OIS.
- **Preparation required from the IP:** Once the IP shares the farmer list with OCA over the OIS (by 31st August), OCA will then come up with the distribution of samples across farmers.
- **TPV-IP communication:** TPV will send a summary email to the IP with a takeover letter and an overview of the number of samples collected at the farm level and the related sample details.

Post sample collection the TPV will need to share a sample take-over letter to the IP stating that the TPV has taken the requisite samples from the IP farmers and share the details of the farmers who were a part of the process. The TPV will only share the following details in the takeover letter:

1. Farmer name
2. Tracenet code
3. ICS details
4. Village

The draft of the takeover letter is attached as Annexure 3.

This process of GMO sampling is anonymized, the TPV will not share the sample codes or the lab details with the IP until the lab results are shared by OCA with the IP over their OIS.

- **Reporting:** All GMO test results will be reported to OCA by the Lab directly over the OIS.
- **Corrective actions in case of contamination detected in F-TPV:**
 - In partnership with the TPV, investigate and if possible - confirm the source of contamination. Carry out GMO testing with other farmers who used the same seed lot to rule out the seed contamination hypothesis.
 - Carry out further GMO testing at the farmer to investigate whether the contamination is incidental and can be controlled.
 - If high volume detections occur in a particular location (like a village), the project partner should discuss the issue with OCA for further decisions, after investigating the possible root causes.

2. Sampling Methodology

Selection of the farmers to be visited

The TPV will extract a sub-sample of farmers from the overall validation sample extracted for data validation as per the number of samples to be taken during the F-TPV stage. The TPV should ensure that the GMO sample should be representative of :

- Grow different seed lots from each other, to cover the entire range of seed lots procured by the IP
- Belong to different ICSs, in case of group certification.
- Are located in different villages, in a way that reflects the diversity of farmers within the Farm Project in case of group certification.
- Additionally, at least one production site shall be chosen at random.

Where possible, consecutive TPV visits should avoid duplicate sampling during subsequent years. However, if there are justified reasons, such as receipt of a substantiated and/or high-risk complaint, a production site should be visited two years in a row.

Sampling on farmers' fields

OCA recommends following the methodology from the *IFOAM EU Guideline for Pesticide Residue Contamination for International Trade in Organic*.

- Visually split the field into at least 10 blocks / sections – avoiding 2-meter edges.
- Take one handful of seed cotton per block, each constitutes a primary sample.
- Combine primary samples into a composite sample by mixing well.
- From this composite sample, sub-samples are obtained by successive sample reduction procedures until the required submitted sample size is achieved.

Please note that for each sample, 3 sub-samples must be taken:

- A sample will be sent to the laboratory (sent from the TPV office).
- A sample will be stored at the TPV office as a reserve sample for potential re-test.
- A sample will be stored at the IP office for the IP's own re-testing purposes.

Sampling in farmers' storage

OCA recommends following the methodology developed by GOTS and the Organic Cotton Standard in alignment as per the *ISO 1130:1975 on Textile Fibres — Some methods of sampling for testing*.

Product type	Lot size available at the storage	Sampling methodology
Raw / seed cotton	< 5 kg	Random selection of about 100 tufts each about 0,3 or 0,5 g totalling between 30 and 50 g
Raw / seed cotton	> 5 kg	Consider division into equal portions and then select randomly equal number of tufts from each of about 0,3 or 0,5 g such that the total from all portions is at least 100.

Submitted sample size to be sent to the laboratory: 200g of seed cotton minimum

Segregation:

- The 3 samples can be segregated upon collection on the spot by using envelopes or labels of different colours.
- Furthermore, as this stage of sampling is anonymized, the TPV has to ensure proper sample segregation mechanisms are being maintained to ensure there is no mixing of information between the samples and that they are correctly labelled as per the code mentioned on the OIS. In doing so, the TPV should ensure the confidentiality of the sample codes.

Packaging:

- Use plastic tamperproof envelopes for sampling.
- Collect every sample envelope and put them in a bigger envelope to transfer to the laboratory at once.

Labelling:

For seed cotton: The TPV will label the samples with the required project details at the farmers' field to ensure proper segregation at the time of sample collection, but will not seal the bags. Before dispatching the cotton to the OCA-designated laboratory, the TPV will remove the farmer and project details from the bag to be sent to the lab, and code the samples referring to the codes mentioned on the OIS to anonymise them. The TPV must ensure that the farmer or project details are not disclosed to the laboratory, nor should the laboratory's details be shared with the IP until the test results are communicated to OCA via the OIS.

GIN-LEVEL SAMPLING (G)

1. GMO Testing Processes

GMO testing: At the Ginnery (G-TPV)

One G-TPV sample can be taken either on storage heaps of seed cotton or baled lint cotton at the ginnery, depending on what is available at the time of the TPV visit. This stage is **mandatory** to eliminate GMO dissemination. Potential risks of contamination in gin stage are mixing of batches at gin storage or during ginning, mis-identified heaps or bales and mislabelling.

- **Sampler:** The sampling will be managed and sent to the laboratory by the TPV senior/managerial staff.
- **Test method:** a qPCR lab test (as per ISO IWA 32:2019) must be carried out at the laboratory selected by OCA and shared with the TPV over the OIS.
- **Preparation required from the IP:**
 - a. The IPs should have traceability records from the farmer to gin with them at the time of the TPV visit.
 - b. The IP needs to ensure that they are in constant communication with the TPV and allow sufficient time for the sampling to be conducted and the results to be shared before the cotton is shipped to the brand.
 - c. The IP needs to ensure that the lint bales are demarcated properly based on the cotton to be supplied to the relevant brand and that there are sufficient bales present at the ginning unit for the TPV to sample from.
- **TPV-IP communication:** TPV will send a summary email to the IP with a takeover letter and an overview of the samples taken and the related sample details.
- **Reporting:** All GMO test results will be reported to OCA by the Lab directly over the OIS.
- **Corrective actions in case of contamination detected in G-TPV:**
 - In partnership with the TPV, create smaller heaps with a limited number of farmers and re-test each heap separately for GMO presence to be able to limit any rejections.
 - Only procure from uncontaminated sources as identified from previous GMO tests and segregate cotton from unconfirmed sources. This can avoid large scale rejections, in case of positive GMO detection from the ginning heaps.

Please note that for each sample, 3 sub-samples must be taken:

- A sample will be sent to the laboratory (sent from the TPV office).
- A sample will be stored at the TPV office as a reserve sample for potential re-test.
- A sample will be stored at the IP office for the IP's own re-testing purposes.

2. Sampling Methodology

The total number of samples required for G-TPV should be taken across different seed cotton and lint batches using the sampling methodology below. Care should be taken that the seed cotton and lint originate from as many different farmers as possible.

Sampling of raw / seed cotton storage heaps

OCA recommends following the methodology developed by GOTS and the Organic Cotton Standard in alignment as per the *ISO 1130:1975 on Textile Fibres — Some methods of sampling for testing*.

Product type	Lot size available at the storage	Sampling methodology
Raw / seed cotton	< 5 kg	Random selection of about 100 tufts each about 0,3 or 0,5 g totalling between 30 and 50 g.
Raw / seed cotton	> 5 kg	Consider division into equal portions and then select randomly equal number of tufts from each of about 0,3 or 0,5 g such that the total from all portions is at least 100.

Sampling of baled / lint cotton

OCA recommends following the methodology developed by GOTS and the Organic Cotton Standard in alignment as per the *ISO 1130:1975 on Textile Fibres — Some methods of sampling for testing*. This will allow the IP to use the OCA gin sample for its transaction certificate for verification against its Chain of Custody Standard (GOTS or OCS).

Product type	Lot size available at the storage	Sampling methodology
Cotton bale	1 bale	Going down vertically, pull tufts from all sides of the bale where each tuft is about 0,3 - 0,5g, totalling about 50 g. Avoid soiled cotton.
Cotton bales	Between 2 and 10	Select about 100 tufts from the lot covering all bales, from random locations, each tuft being about 0,3 - 0,5g and totalling about 50 g. Avoid soiled cotton.
Cotton bales	>10	Randomly select 10% of the total number of bales and proceed to draw tufts as described above.

Submitted sample size to be sent to the laboratory: 200g of seed cotton or 50g of lint minimum

Segregation:

- The 3 samples can be segregated upon collection on the spot by using envelopes or labels of different colours.

Packaging:

- Use plastic tamperproof envelopes for sampling.
- Collect every sample envelope and put them in a bigger envelope to transfer to the laboratory at once.

Labelling:

- For seed cotton: Use printed labels or barcodes which includes farm project details, details of farmer and Identification Code.
- For lint: Use printed labels or barcodes which includes farm project details, heap and ginning lot number.

The TPV will label the samples with the required project details to ensure proper segregation at the time of sample collection and code the samples referring to the codes mentioned on the OIS.

ANNEX 1

**RECOMMENDATIONS ON
PROCUREMENT AND USE OF
BT-STRIP TESTS**

Where can I buy Bt-Strip tests?

The following Bt-strip suppliers are known to OCA. Please note that OCA hasn't run any tests to verify the reliability of the different brands.

- DesiGen <https://www.desigendx.com>
- Envirologix <https://www.envirologix.com/gmo-testing/gmo-testing-kits-protein/>
- Agdia <https://orders.agdia.com/gmo-trait-tests/immunostrip-tests>

Which Bt-Strip tests should I buy from the provider?

- Strip tests are transgenic protein specific. Hence, they should screen relevant transgenic proteins produced by the GM cotton events known to be grown and/or approved in the country of production.⁸
- The commonly available Bt strip tests in the market can detect the Cry1Ac protein (e.g., expressed by Bollgard™ and Bollgard II™ Cotton), the Cry2Ab protein (e.g., expressed by Bollgard II™ Cotton), or both at the same time (for the strip tests with multiplexing capacity).
- OCA recommends the use of Bt-Strip tests that can screen at least for the Cry1Ac delta-endotoxin / protein.

How should I store my Bt-strip tests?

- These strips are moisture sensitive and at times the results cannot be conclusive if the moisture is absorbed by the kits. Poor storage conditions and high temperatures can deteriorate the quality of strip tests. Hence, strip tests should be stored under cool and dark conditions.
- Storage and handling of these kits in a controlled environment might be a challenge at the farm level but cost-effective instantaneous results are invaluable when screening for GMO contamination at critical control points.

How can I sample for Bt-strip testing?

- Please refer to the seed-level and farmer-level sampling methodologies referred in this SOP.

How should I use a Bt-strip test?

- Bt-strip testing can be done most reliably at seed stage before sowing or on fresh/young terminal leaves (as Bt protein expression is reduced during the vegetation period and in dry leaves).
- Manufacturer's guidelines need to be followed, especially regarding the proper dilution of the buffer. Users should also make sure that the strip tests are not used beyond the expiry date.



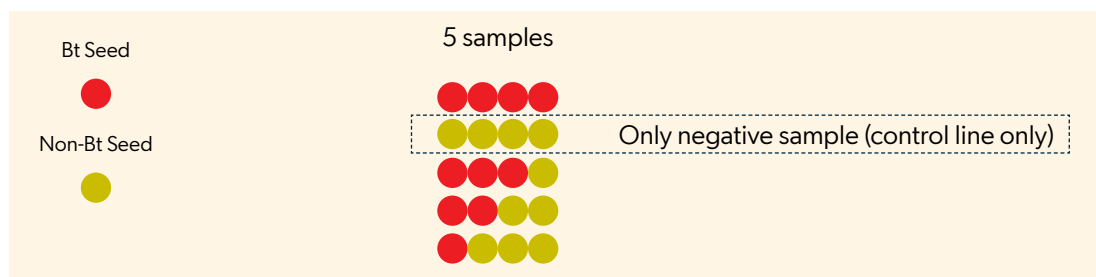
Photo: Fairtrade | Ranita Roy | Fairpicture

8. Please consult <http://www.isaaa.org/gmapprovaldatabase/approvedeventsin/default.asp?CountryID=IN&Country=India>

- Prior to testing with the Bt-strip kit for the first time, the quality of strip test kits can quickly be verified by testing one strip with seed of both GM and non-GM cotton cultivars.

5 total samples can be made of 10 Bt seeds and 10 non-Bt seeds in different combinations:

5:0; 3:1; 2:2; 1:3 and 0:5.



- Seed kernels should be crushed after removing the seed coat to make a homogenous sample for conducting the test as per procedure



Photo: Fairtrade | Ranita Roy | Fairpicture



Photo: Fairtrade | Ranita Roy | Fairpicture

- Put the strip in the buffer solution and interpret the strip after the time indicated by the manufacturer.



Photo: Fairtrade | Ranita Roy | Fairpicture



Photo: Fairtrade | Ranita Roy | Fairpicture



Photo: Fairtrade | Ranita Roy | Fairpicture

- Read the results:
 - If Bt proteins are present the test shows 2 lines. Even a faint line below the test line indicates Bt contamination
 - If no red control line appears on top of the strip, it indicates that the test is not working properly. Please use new strips and repeat the test

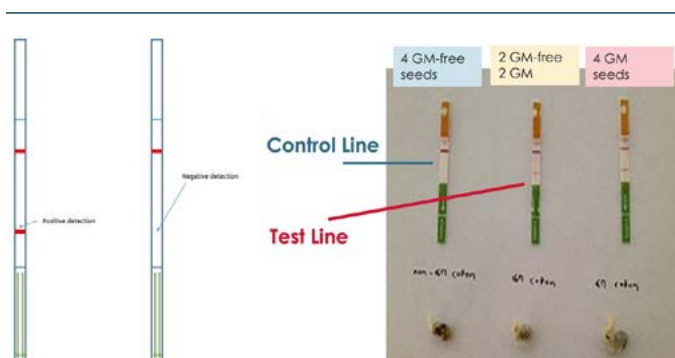


Photo: Fairtrade | Ranita Roy | Fairpicture

- Keep your results for record-keeping and share them with OCA

CR/AC - Testing	Result	Result
Sample 1 (Soybean)	Positive	Positive
Sample 2 (Soybean)	Positive	Positive
Sample 3 (Soybean)	Positive	Positive
Sample 4 (Soybean)	Positive	Positive
Sample 5 (Soybean)	Positive	Positive
Sample 6 (Soybean)	Positive	Positive
Sample 7 (Soybean)	Positive	Positive
Sample 8 (Soybean)	Positive	Positive
Sample 9 (Soybean)	Positive	Positive
Sample 10 (Soybean)	Positive	Positive

Implementing Partner
recording farmers'
strip test results

Photo: Fairtrade | Ranita Roy | Fairpicture

ANNEX 2

**LABORATORIES THAT MEET
OCA'S REQUIREMENTS FOR
GMO TESTING**

The laboratories below comply with OCA's requirements as of September 2023.

India

1. NAWaL Analytical Laboratories

Email: ecogreen.labs@gmail.com

Website: www.nawallabs.in

2. Reliable Analytical Laboratories Pvt. Ltd.

Email: rashmi@reliablelabs.org

Website: www.reliablelabs.org

3. SGS India Private Limited.

Email: samyak.vakil@sgs.com

Website: www.sgs.com/en-in/services/laboratory-testing-services

4. Testtex India Laboratories Pvt. Ltd.

Email: labsindia@testtex.com

Website: www.testtex.com

5. Viridian Testing Laboratories LLP.

Email: info@viridianlab.com

Website: www.viridianlab.com

Pakistan

1. SGS Pakistan Pvt Ltd

Email: sajjad.khan@sgs.com

Website: www.sgs.com/en-pk

Türkiye

1. Union Gozetim ve Belgelendirme Ltd. Sti.

Email: turkey@controlunion.com

Website: www.controlunion.com.tr

2. Ekoteks Laboratory

Email: info@ekoteks.com

Website: www.ekoteks.com

3. Intertek Turkey

Email: 2sales.turkey@intertek.com

Website: www.intertek.com

4. Nanolab Laboratuvarlar Grubu

Email: info@nano-lab.com.tr

Website: www.nano-lab.com.tr

5. Oksijen Analiz Laboratuvar Hizmetleri Ticaret Anonim Sirketi

Email: fatmabukin@oxigenanaliz.com

Website: www.oxigenanaliz.com

ANNEX 3

**TAKE OVER LETTER TO
IMPLEMENTING PARTNERS**

To,

[IP Address]

Subject: Collection Of Raw Cotton Samples For Farm Level Sampling / Collection Of Lint Cotton Samples For Farm/Gin Level GMO Sampling

Dear *Implementing Partner*,

As per the OCA Monitoring and Evaluation guidelines, the OCA TPV is directed to collect seed cotton samples/ lint cotton samples for your farm programme project. We, the team from (TPV Name), are writing to inform you that we have collected the following samples from your projects –

1. Number of samples collected:
2. Location of sample collection: Farm/ Farmer storage / Gin

These samples will be sent to the OCA impanelled lab for testing for GMO contamination according to the ISO IWA 32:2019 Standard.

For any further information , you can reach out to :

1. The OCA Secretariat:

- a. Gitanjali Puri: gitanjali@organiccottonaccelerator.org
- b. Manish Malokar: manish@organiccottonaccelerator.org

2. The OCA TPV:

Regards,

TPV Details

ANNEX 4
**HANDING OVER LETTER TO
LABORATORIES**

To,

[Lab Address]

Subject: Shipment Of Raw Cotton Samples For Farm Level Sampling / Collection Of Lint Cotton Samples For Farm/Gin Level GMO Sampling

Dear *Lab Representative*,

As per the OCA Monitoring and Evaluation guidelines, the OCA TPV is directed to collect seed cotton samples/ lint cotton samples from the farm programme projects and to send them to the designated lab to be tested for GMO contamination as per the ISO IWA 32:2019 Standard. We, the team from (TPV Name), are writing to inform you that we are sending the following samples from your projects -

1. Number of samples collected:
2. Location of sample collection: Farm/ Farmer storage / Gin
3. Date of sending the samples:

The sample codes and further details can be found on your respective dashboard shared by OCA.

For any further information , you can reach out to :

1. The OCA Secretariat:

- a. Manish Malokar: manish@organiccottonaccelerator.org
- b. Gitanjali Puri: gitanjali@organiccottonaccelerator.org

2. The OCA TPV:

Regards,

TPV Details



ORGANIC COTTON ACCELERATOR

Let's unleash the potential of organic cotton, together