

# Forage and Turf Seed Production Good Practice Guide

**MARCH 2025**

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## PURPOSE AND DISCLAIMER

This guide is designed to assist stakeholders, seed companies, and seed producers who are engaged in forage and turf seed production and sales to ensure the integrity of the production chain from stock seed<sup>1</sup> to commercial seeds. These commercial seeds are sold by seed companies to distributors and growers all over the world.

An additional aim of this guide is to safeguard Intellectual Property (IP) rights and other rights of the parental lines in general. For this, the best practice for forage and turf species include selecting a reliable seed producer, negotiating a verifiable seed production quota, sending stock seed, following the production of commercial seeds, shipping it to the seed company, and receipt of the seed.

This Guide is not meant to be a substitute for the ISF Rules and Usages for the Trade in Seeds for Sowing Purposes, but rather to complement this with some practical examples. You are strongly advised to refer to the ISF Rules and Usages for the Trade in Seeds for Sowing Purposes in the production contract signed by the contracting parties.

This Guide is flexible, and its application will differ according to the size, nature and complexity of the organization and the forage and turf seeds involved. The Guide is not exhaustive and does not define or create legal rights or obligations. It is the responsibility of any user of this Guide to consider the user's specific circumstances when developing a process specific to its organization, and in meeting any applicable legal requirements.

## INTRODUCTION

Plant and seed multiplication for crops is a continuous process in which products are grown according to defined standards and requirements to ensure genetic identity, maintain varietal purity, and meet certain quality standards before distribution to growers and consumers. In many countries, seed multiplication is part of a legally sanctioned system for quality control of this seed production.

The entire breeding process, from new entries to a breeding program and their cross with existing material until the development of parental lines, is managed as a controlled process. The parental line seeds are normally insufficient to produce sufficient seed for commercial sales and the parental line seeds are multiplied to sufficient quantities to be able to start commercial seed production. Seeds used for commercial seed production are commonly called stock seed<sup>1</sup>.

In those countries where seed registration and/or certification are required by law, there are generally four recognized stages of seed multiplication: 1) breeder seed, 2) foundation seed, 3) registered seed, and 4) certified seed. These are also recognized by the OECD Seed Scheme as Pre-Basic (breeder seed), Basic (Foundation/Registered seed), and Certified seed. Even in countries that do not require formal registration and certification, the following definitions are generally recognized as the different stages of seed multiplication (steps and terminology can be different in forage and turf seed companies). Breeder seed (related to the process of creating new fixed lines) is directly controlled by the originating or sponsoring plant-breeding organization. The first increase of seed breeder's parental lines (fixed lines) is usually referred to as foundation seed; it is handled to maintain specific genetic identity and purity. Foundation seed is used in most organizations to create

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<sup>1</sup> According to OECD categories: In those countries where seed registration and/or certification are required by law, there are generally four recognized stages of seed multiplication: 1) breeder seed, 2) foundation seed, 3) registered seed, and 4) certified seed.

stock seeds that are used as the base for commercial seed, produced by the breeder originator company, or outsourced to seed producers.

The guidance in this document is intended to be flexible and its application will differ according to the size, nature, and complexity of the organization involved, as well as the products being produced. Throughout the entire process, there is an emphasis on the importance of product identification and traceability as well as documentation and governance.

### **QUALITY MANAGEMENT SYSTEMS (QMS)**

In order to support good production practices, it is highly recommended that seed companies and seed producers implement a Quality Management System (QMS). A properly maintained process based and continuously improved Quality Management System is an important contributor to mitigation of risk around seed production and commercialization. A QMS is a collection of documented processes, procedures and work instructions reflecting the business of a company. The context of the QMS can be expanded to suppliers if they perform a specific service for the company. These documents, hence, inform employees and other stakeholders how certain processes and tasks and duties should be executed. Key elements of a QMS include processes to: 1) manage and control documentation, 2) address non-conformities; 3) trace and identify products; 4) train and measure competency of employees; 5) continuously improve systems and performance; and 6) audit and measure conformance to the system. Any mitigation measure involving changes of the set-up of processes or tasks should be included in the related documents.

The International Organization for Standardization (ISO) family of standards collectively provides a framework that an organization may use to develop, implement, and maintain a management system that incorporates a process for continual performance improvement while addressing the needs of interested parties. The ISO maintains the generally accepted standards for developing and implementing a QMS (ISO 9001:2015 and ISO 9000:2015). It requires a documentation system that contains the processes, procedures and standard operating procedures (SOPs) of the company controlled by a workflow allowing continuous improvement and accountability.

The QMS should include a record of employees' training which should be checked regularly by an audit process. The non-conformities and corrective action that are the result of this process should lead to improved documentation and re-training of staff.

The integrity of the seed production chain:

- Secure the identity of the stock seeds
- Prevent mislabeling
- Prevent errors in tracking
- Prevention of seed admixtures
- Status of QMS implementation Determine critical control points
- Transport of stock seeds to the Seed Producer
- Unbroken chain of labelling, movement and storage of seeds
- Confirmation of reproductive isolation in order to avoid cross pollination
- Extraction, cleaning, disinfection and drying of seeds
- False safe combining of seed lots
- Transfer of seeds for conditioning, packaging storage and transport

## **CHILD LABOUR**

Child labour is a violation of fundamental human rights. It has been shown to hinder children's development, potentially leading to lifelong physical or psychological damage. International labour standard sets the general minimum age for admission to employment or work at 15 years. ISF suggests that all contracts include a specific clause stating that no child labour is allowed in the production of seeds.

## **GOOD PRACTICE FROM THE SEED COMPANY'S PERSPECTIVE**

### **1. Selecting a reliable producer in a good production area**

It is important for the Seed Company and the Seed Producer to achieve reliable crop production. For the requisite interaction between the Seed Company and the Seed Producer, it is important that:

- The Seed Company checks that the Seed Producer has a good reputation of professionalism and honesty.
- When brokers are involved, clarify that seed companies are looking for a reliable producer.
- The Seed Producer preferably has a QMS system that shows that the growers are properly trained and provided with the right documentation to produce the commercial seeds.

### **2. Negotiating seed production quotas/contracts**

The collaboration between the Seed Company and the Seed Producer needs to be formalized by a contract that stipulates the responsibilities and autonomy of each party in the production of the seeds. The roles of the Seed Company and Production Company are as follows.

- The Seed Company guarantees that it is the IP owner of the variety or authorized to produce the seeds of the variety.
- The Seed Company has ideally performed (a) trial production(s) before undertaking large-scale production with a Seed Producer to be able to provide concrete information for commercial seed production.
- The production should always be sanctioned by a production contract to be signed by both parties. The contract includes as a minimum the specification of the final product to be shipped to the Seed Company in quantity and quality (germination, physical purity, genetic identity and purity), the price per seed quantity, the time of delivery and the conditions of shipment should be declared.
- The Seed Producer should agree that after completion of the production activities any remaining seeds (including stock seeds) will be returned to the Seed Company.
- It is recommended that you add to the contract that you are entitled to organize additional sampling for extra quality checks, including true-to-type testing, prior to shipment.

### **3. Sending shipments of stock seeds to the producer**

The stock seeds being shipped to a Seed Producer will normally pass through numerous hands including but not exclusively the shipper, custom officers and plant quarantine employees in both countries. Each of the steps can lead to actions affecting the product integrity. It is, therefore, important that the following are adhered to.

- Seed packages sealed and labelled with appropriate label identifying the stage of stock seed (e.g. Foundation or Basic).
- On the seed package, label should include the crop species, the variety name, the lot number, and the quantity of seeds in the packet (weight).
- Certificate of analysis including quality information (batch/lot number, a germination percentage and date, purity percentage) should be provided.
- Always ensure that the stock seed sent is free of diseases where seed is a pathway or any other diseases that could create phytosanitary problems, or problems in seed production.
- If the contract stipulates that the seed being produced should be free from certain seed borne diseases, it should be based on an agreed list of diseases and tests.
- The documentation mentions a reference person who can be contacted by the Seed Producer in case of information or content that can be interpreted differently.

#### **4. Following production with the Seed Producer**

It is good practice for the Seed Company to visit and/or follow up regularly on the production with the Seed Producer. The frequency is determined by the Seed Company and the Seed Producer. However, critical control points specifically relate to the following.

- Verifying the information on the seed bag labels and the received documentation before sowing are identical
- Planting of the seeds
- Disease monitoring of fields
- Ensuring good isolation from neighboring fields to avoid cross-pollination.
- Estimation of seed yield
- Harvesting
- Transport to storage cleaning, drying site
- The drying process
- It is good practice to receive regular crop reports from the Seed Producer with pictures. It is important to study these reports and comment immediately if something is out of ordinary.

#### **5. Receiving seed from the third-party producer (i.e. contractor company that multiplies seed on contract)**

It is important that the quality of the seed produced is assessed before shipping the lots. This is to prevent the transportation of lots that cannot be used by the Seed Company. It is hence important to:

- Send a representative sample from the Seed Producer to the Seed Company before sending the entire seed shipment, when needed.
- The Seed Company should send instructions to the Seed Producer on how she/he would like to receive samples (individual lots or blended lots), how many, and in what packaging.

- For the Seed Company to test the seed for germination, genetic purity, identity and seed health and confirm the results to the Seed Producer who then arranges the shipment of remaining seed or check analyses upfront prior to shipment for approval.
- It is recommended to do a decent entry check at arrival, in addition to germination and purity also check the identity and label correctness.

## **GOOD PRACTICE FROM THE SEED PRODUCER'S PERSPECTIVE**

### **1. Acceptance of the Seed Company**

The Seed Producer should check that the Seed Company has a good reputation of professionalism and honesty, and should ask for a statement of good reputation from the Seed Company in case of doubt.

### **2. Negotiation of seed production quota/contract**

Seed Producer's contract should stipulate that by signing the contract the Seed Company declares that he/she is the legal owner of the IP rights or authorized to produce seeds of the particular variety. If any doubt exists about this, the Seed Producer may indicate that the material could be subject to PCR testing.

It is the responsibility of the Seed Company to ensure that all relevant technical information on a variety is made available to the Seed Producer to ensure optimal seed production results (e.g., special agronomic practices required, etc.).

Ideally, the Seed Producer, with the assistance and support of a representative of the Seed Company, should propose a small-scale trial production for those varieties that have never been grown in the proposed production area.

The production contract is signed by the parties agreeing to all conditions and quality requirements agreed upon for production.

### **3. Selection of reliable growers in good and sustainable production areas**

After accepting a production contract from the Seed Company, the Seed Producer must ensure he selects reliable experienced growers in an adequate production area.

### **4. Receiving of stock seed from the Seed Company**

- The Seed Producer will receive the stock seed from the Seed Company.
- It is good practice to take photos of the packets containing stock seed to make sure that the label on the packet corresponds to documentation and that packets have not been tampered with. In case of any doubt, contact the Seed Company representative indicated in the documents.
- Check the received weight and compare it with the weight on the packing list.

- Always keep a sample of stock seed (if quantity permits) in case a problem of genetic purity or seed-borne diseases arise later.
- It is good practice to retest the germination of the stock seed as soon as received and report the result in case it is inconsistent with the information received.  
Keep the information of the Seed Company confidential (limit the number of people who have access to this information).

## 5. Follow-up of production with the Seed Producer

It is good practice to provide regular feedback to the Seed Company about the ongoing production, ideally once a month or on an *ad hoc* basis, according to the Seed Company or as stipulated in the production contract.

- Send the Seed Company a report indicating sowing dates, size of each field area where the field is located, and a name or code identifying each field.
- Follow up on different agricultural activities.
- Make sure isolation distance is kept as agreed in the production contract. It is considered good practice to indicate the GPS coordinates of the fields in the report, if available.
- Immediately report deviating types/off-types from the variety description and be available to remove them upon request of the Seed Company. Administrate and report the number of removed plants in total.
- Contact the representative of the Seed Comp for any additional checks by specialists who could assist in verifying the quality of the seed production
- Follow up on the yield development.

It is good practice to request that the fields should be visited by Seed Company staff at critical phases during the seed production: sowing, planting, rouging of aberrant plants, harvesting and cleaning/drying stage. Because these stages vary according to climate conditions during production, it is important to indicate in advance the best time for a planned visit. Taking pictures of agreed moments in the production process can be a solution when not possible to travel to the production fields.

## 6. Sending of produced seed to the Seed Company

It is good practice to receive seed separately from each individual farmer producing the same variety.

Representative samples must be taken.

- These samples should be tested for germination (in-house or outsourced) and if vigour specifications have been agreed in the production contract.
- Depending on the agreement with the Seed Company, the representative samples should be sent to the Seed Company either individually or grouped into composite samples and in size/weight/number of seeds as requested by the Seed Company after having tested the individual lots.
- Depending on the agreement with Seed Company of breeder originator the other tests (genetic purity/seed health) are performed by either the Seed Company the breeder originator, by a third party, or by the Seed Producer.

The produced seed should be packed in freight-worthy packages, with labels indicating clearly the crop species, the production code/variety name given by the Seed Company, the batch/lot number (from the Seed Producer's record), the quantity.

## **GOOD PRACTICE FROM THE SEED GROWERS' PERSPECTIVE**

### **1. The Grower (farmer) should make sure to get a contract with a company of good reputation.**

Seed Grower should check that the contract before signing includes precise information on terms for the multiplication period. This could, for example, be:

- the received stock seed is of the correct generation,
- amount received,
- specific demands concerning the growing of the seeds (area, plant protection/weed control, distance from possible cross-pollination fields, ownership etc.),
- conditions concerning returning of the harvested multiplied seed
- price/level of purity/germination, etc.,
- how to handle possible disagreements.

### **2. During growing season**

Seed Grower should make sure to perform in the best possible agricultural way for the specific species/variety to maximize yield and quality.

It is suitable to follow the multiplication crop during the growing season, and to report any irregularity that may occur.

If the contract has foreseen visits or other documentation during or after growing season, the farmer should be willing to accept this.

If the seed producer/company have any relevant information on how to grow the particular species/variety it should be shared with the grower.

### **3. Harvest and delivery of the harvested seeds to the producer/company**

The grower should make sure to harvest, dry, and store the contracted seeds in a suitable way as this is the interest of both parties.

The hand-over of the whole harvest should be agreed upon according to standard procedures.



## UNCERTIFIED SEED PRODUCTION (EXAMPLE FROM THE AMERICAS)

In order to maximize return on uncertified production, many of the same steps of the certification process should be discussed by both grower and company. It is highly recommended that the grower be aware of the following:

- 1) Grower should know that the variety has been adequately tested to determine its value and ability to adapt to the climatic conditions in area of production
  - 2) Breeding history
  - 3) Plant description
  - 4) Evidence of seed yield performance
  - 5) Agreement to handling of seed stock
  - 6) Crops status per PVP or similar
  - 7) Ploidy when applicable
  - 8) Who will be copied/ informed on seed lab results
  - 9) Disclosure of field history.
- Cultivar Identification through genetic testing with molecular markers: A sample of breeder or first-generation seed is sent to a University or private laboratories where new high throughput genotyping methods are available that allow for genetic tests for cultivar identity.

These methods were not available and adapted to the turf and forage grasses until recently. However, we can now robustly distinguish varieties based on the high-throughput genotyping methods for any grass crop.

The process has three steps: (1) extracting DNA from plants or seeds, (2) preparing the DNA and sequencing the samples at a University or private core facility, and (3) using a computer server and statistical packages to quantify differences within and between cultivars.

- Genotyping lab forwards sample to the Colorado State University Seed germplasm bank for safe storage
- Breeder chooses if data from genetic testing is sent to the National Agriculture Library
- Samples for genetic testing of uncertified seed can be sent to one of several approved sequencing labs for variety identification at any time.