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**NORTH AMERICA
SOYBEAN
COMMERCIAL PRODUCTION
QUALITY ASSURANCE
MANUAL**

ENLIST E3[®] SOYBEANS



To comply with all global agreements

Traits Quality Assurance Leader
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Enlist Duo® and Enlist One® herbicides are not registered for sale or use in all geographies, provinces, states or counties. Contact your marketing specialist or pesticide regulatory agency to determine if a product is registered for sale or use in your area. Enlist Duo® and Enlist One® herbicides are the only 2,4-D products authorized for use with Enlist crops. Consult Enlist herbicide labels for weed species controlled. Always read and follow label directions. Enlist E3® soybeans were jointly developed and owned by Dow AgroSciences LLC and M.S. Technologies, L.L.C.

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INTRODUCTION

This manual is designed to provide Licensees with the necessary protocols to fulfill the requirements for production of soybean varieties containing Dow AgroSciences (DAS) and M.S. Technologies, L.L.C. proprietary traits (Licensed Soybean Products). The protocols provided in this manual support the Trilateral Soybean Product License Agreement (“Agreement”), and are not intended to supersede the terms or conditions, including testing requirements outlined in the Agreements. In the event of a conflict between this manual and the terms of the Agreements, the Agreement terms shall control. These protocols represent the minimum testing required to produce soybean seed containing the Enlist E3[®] soybeans traits. Individual companies may institute testing procedures beyond what is required by their respective Agreement in order to verify the quality of their seed.

If local requirements are more stringent than the requirements set forth in this Soybean Commercial Production Quality Assurance Manual, those more stringent requirements will control. Any changes to local requirements should be forwarded to the Traits Quality Assurance Leader.

Questions relating to these protocols should be directed to:

Traits Quality Assurance Leader
Dow AgroSciences
FELTRQA@CORTEVA.com

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The transgenic soybean event in Enlist E3[®] soybeans is jointly developed and owned by Dow AgroSciences LLC and M.S. Technologies, L.L.C.

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DEFINITIONS

All capitalized terms used herein shall have the meaning set forth in this Definitions section, or if not defined in this Definitions section, shall have the meaning set forth in the Trilateral Soybean Product License Agreement and Soybean Product License Agreement, as applicable.

Breeder Seed: Breeder Seed is produced from pre-existing Breeder Seed or nucleus seed under conditions as specified by local soybean seed certification agency and under control of a breeder. Canada also refers to this as Breeder Seed.

Commercial Seed: Seed sold by the Licensee to plant a soybean crop for commercial production. Canada refers to this as Certified Seed.

DAS: Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268.

Deviant: A Deviant is defined as a seed that has a negative test result for any intended trait where the expectation is that the results would be positive.

Enlist Duo[®]: Premix of 2,4-D choline and glyphosate, with COLEX-D[™] Technology.

Enlist One[®]: 2,4-D choline with COLEX-D[™] Technology.

Enlist E3[®] soybeans: Enlist[®] molecular stack with 2,4-D, glyphosate, and glufosinate tolerance. Identified as APHIS Petition No. 11-234-01p and DAS-44406-6 in the U.S. Identified as DAS-44406-6 in Canada.

Foundation Seed: Foundation Seed is produced from Pre-Foundation Seed. Canada also refers to this as Foundation Seed.

Genetic Purity: The proportion of seeds within a given seed lot that have the same genetic composition as determined by observing phenotype characteristics (grow out), a protein profile, or DNA markers.

Licensee: An organization or entity with DAS and M.S. Technologies, L.L.C. (for Enlist E3[®]) under a valid Enlist[®] Soybean Research Material Transfer Agreement, Trilateral Soybean Product License Agreement, and/or Soybean Product License Agreement who is thereby authorized to use the specific Enlist[®] traits under the terms of such Agreement(s).

Pre-Foundation: Pre-Foundation Seed is produced from Breeder Seed. Canada refers to this as Select Seed.

Registered Seed: Canada only, Registered Seed is produced from Foundation seed.

Trait Purity: The proportion of seeds within a given lot of seed that exhibit evidence of a specified trait.

SOYBEAN COMMERCIAL PRODUCTION QUALITY ASSURANCE CRITERIA

A. Summary of Required Quality Testing on Commercial Soybean Production

All costs associated with tests that are required for approval and sale of a product are the sole responsibility of LICENSEE.

Test Description	Page #	Frequency/Timing	To Be Tested and Minimum Sample Size	Successful Test Criteria
B. Soybean Commercial Production Field Activities Requirements				
1. Seed Purity Requirements for Enlist [®] Commercial Seed Production	7	All commercial seed increases	Inspection frequency as determined by regional certification agency according to field size	Field meets respective regional certification agency genetic purity standards
2. Commercial Seed Multiplication Field Production Requirements	7	All commercial seed increases	All acres over the top application	All acres sprayed with Enlist Duo [®] with Colex-D [™] Technology or Enlist One [®] with Colex-D Technology tank-mixed with Glyphosate or Glufosinate herbicide following label requirements
C. Soybean Commercial Production Analytical Testing Requirements				
3. Herbicide Bioassay for Trait Purity of Commercial Seed	8	Each commercial seed lot/batch	Representative sample	≥98.5%

B. Soybean Commercial Production Field Activities Requirements

1. Seed Purity Requirements for Enlist® Commercial Seed Production

For multiplications of Enlist E3® Seed intended for commercialization in the U.S, all multiplications of Licensed Product must meet genetic purity standards as defined by the Crop Improvement Association field inspection standards.

For multiplications of Enlist E3® Seed intended for commercialization in Canada, all multiplications of Licensed Product must meet genetic purity standards as defined by the Canadian Seed Growers Association standards.

Common production practices used to achieve high levels of trait and genetic purity include, but are not limited to the following:

- Selection of land based on previous planting cycle.
- Use of isolation distances.
- Use of pure Breeder Seed and/or Foundation Seed materials. Beginning the seed production process with high Trait and Genetic Purity seed will increase the probability of Commercial Seed meeting these requirements
- Develop and use equipment clean out procedures for production and processing.
- Develop and use sampling and testing procedures to determine level of Genetic Purity.

2. Commercial Seed Multiplication Field Production Requirements

All production acres for Enlist E3® soybeans Commercial Seed must be treated with an over the top application of Enlist Duo® with Colex-D™ Technology or Enlist One® with Colex-D Technology tank-mixed with Glyphosate or Glufosinate herbicide at recommended label rates for weed control purposes. All seed increase growers must document, select, provide and apply herbicides that are approved for Enlist E3® soybeans. This application is to help with trait purity of the licensed product during field production. Applications must be applied according to the product label and Enlist® Product Use Guide. Tank additives are available at Enlist.com. Other herbicides may be used for supplemental weed control on Enlist E3® soybeans when used according to their label. Their use will not meet the herbicide-tolerance testing requirements contained in this manual.

Dow AgroSciences suggests as part of its Quality Assurance program to do a genetic purity field inspection after the first over the top application Enlist Duo® with Colex-D™ Technology or Enlist One® with Colex-D Technology tank-mixed with Glyphosate or Glufosinate herbicide for commercial seed production. Dow AgroSciences shall have access, if requested to all field inspection and spray information for a period of two (2) years including the year of production. These terms shall be required in writing of all seed multiplication growers as a condition of the contract for production.

Always follow product label requirements and any other applicable requirements that may be in place for the area in which the crop is grown.

C. Soybean Commercial Production Analytical Testing Requirements

3. Herbicide Bioassay for Trait Purity of Commercial Seed

Criteria for a Successful Test:

≥98.5% of seed tested expresses the presence of all intended herbicide trait proteins.

Product to be Tested	Enlist Duo®
Enlist E3® soybeans	≥98.5%

Protocol and test kit information

Prior to being offered for sale, trait purity must be tested in each commercial finished lot/batch of Enlist E3® Soybeans Seed. Licensee must use the Herbicide Bioassay protocols to verify Enlist E3™ Soybean herbicide tolerance traits present at the appropriate level. A Licensee can acquire DAS certification to perform the required tests at their facilities or the licensee can send seeds to a DAS certified laboratory for a service fee.

Alternative approaches to demonstrating Trait Purity may be considered by submitting request to FELTRQA@CORTEVA.com

Sample Collection: Collect seeds from each finished Commercial Seed lot/batch prior to distribution for sale and test for herbicide tolerance. Seed must be appropriately sampled and labeled. Multiple tests on the same lot must be statistically evaluated using SeedCalc, if the tests are valid (i.e., control samples behave appropriately.)

Contact the DAS Traits Quality Assurance Leader for the following reasons at: FELTRQA@CORTEVA.com

- Laboratories owned or managed by licensee must be approved prior to the initiation of testing. This approval process may include completion of proficiency testing administered by DAS to demonstrate competency
- Contact DAS for information about certified fee-for-service laboratories.
- Alternative Trait Purity methods can be considered and granted by submitting request
- Protocol and test kit information is available to approved testing facilities

Dow AgroSciences may require that Licensee provide such data from an independent seed testing or the seed company's testing laboratory. Licensee hereby authorizes any independent seed testing laboratory to release such data directly to Dow AgroSciences. Dow AgroSciences shall have access, if requested to all trait purity testing information for a period of two (2) years including the year of production.

OTHER GENERAL QUALITY ASSURANCE REQUIREMENTS

1. Collection of Seed Samples for Testing

The objective of sampling is to ensure that the portion of the seed taken for testing is a true representative of the entire lot. A representative sample must be collected from each seed lot to be tested.

For larger seed lots: A representative sample must be obtained which meet the AOSA or ISTA standards.

An example of an approved protocol:

These rules indicate that 5 containers + 10% of the total number of containers in the lot must be sampled to create a single composite sample. The following table indicates the number of containers that must be sampled if an automatic sampling system is not used.

# containers in lot	7	10	23	50	100	200	300	400 - 2000
# containers to sample	6	6	7	10	15	25	30	30

A container is anything used to contain seed except vehicles, trailers, or bins.

Ex: Paper bag, poly bag, composite box, metal box, etc.

A trier or probe long enough to reach all portions of the quantity being sampled should be used and cleaned to prevent admixes and inaccurate results. The trier or probe shall be designed so that it will remove an equal volume of seed from each part of the container through which it travels. For paper bags, it is recommended to use a double-sleeve slotted probe or a Nobbe trier. For larger poly bags or composite boxes, it is recommended to use a 63 inch partitioned probe. The use of a bag trier which is of diminishing diameter (“thief trier”) is prohibited.

Seed sold as finished bulk seed will be subjected to the same sampling rules. The seed sample should be immediately shipped to the laboratory for testing.

2. Certified Laboratories

A DAS certified lab must be used when conducting fee for service testing, ex. Herbicide Bioassay. For a list of certified labs in your geography, please submit your request to the Traits Quality Assurance Leader at: FELTRQA@CORTEVA.com for an updated list of certified labs.

Additional laboratories may be certified if a need is demonstrated and supported by DAS. For lab certification process, contact: Traits Quality Assurance Leader: FELTRQA@CORTEVA.com

Laboratories owned or managed by Licensee must be certified prior to the initiation of testing. This approval process may include completion of proficiency testing administered by DAS to demonstrate competency.

3. Records and Sample Retention

Commercial seed lot samples must be retained for as long as the specific seed lot is being offered for sale or three (3) years plus the current year, whichever is longer. If local requirements are more stringent those requirements must be followed.

Other documentation must be maintained for a minimum of 3 years including:

- inspection records
- test results
- seed conditioning records linking finished seed lots to bulk lots
- other records regarding finished lot number changes
- shipping records

4. Sample Shipments

Seed sample shipments are highly regulated, and shippers are required to follow all applicable regulations and maintain all appropriate documentation.

5. Audits

All records outlined above must be available to DAS upon request. DAS has a right to audit Licensee’s quality control program and test sub-samples from the samples retained by the Licensee.

6. Costs

All costs associated with the Quality Assurance programs shall be borne solely by the Licensee.

7. Summary of Information

Approved Soybean Products			
Test Description	Submission Date	Timing	Data
Trait Purity Herbicide Bioassay	Upon request	Finished Commercial Seed lots.	Available*

**Available = data not required for submission but should be generated and made available within 5 working days, upon request.*