

Certified Reference Materials

AOCS 1022-B

Report of the certification process for

LLRICE62

Rice

First Batch

OECD Unique ID ACS-OS002-5

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Contents

Abstract.....	4
Acknowledgements.....	5
Glossary.....	6
Introduction	7
Material Processing	7
Trait Verification to Certify Presence of LLRICE62	7
Certified Value and Measurement Uncertainty	8
Homogeneity	9
Stability	9
References.....	11

Abstract

This report describes the preparation and certification of the rice CRM AOCS 1022-B produced by AOCS Technical Services in 2023. The CRMs have been prepared according to ISO 17034:2016 and are intended to serve as control material for third party testing of rice for transformation events. The rice LLRICE62 powder was provided by Bayer CropScience, St. Louis, MO. It was prepared by grinding the bulk seed at Bayer CropScience. The certified value of AOCS 1022-B was based on the purity of the bulk seed material and with 95% confidence, the true value is ≥ 944 g/kg. The powder was aliquoted and bottled in 27-mL glass headspace vials and sealed under a nitrogen gas environment at Illinois Crop Improvement Association. The presence of LLRICE62 in AOCS 1022-B was verified using event-specific, qualitative PCR analysis by FoodChain ID, Chantilly, VA (an ISO 17025-accredited laboratory). CRM samples should be stored in a dry, sealed container at ambient or cooler conditions in the dark.

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Glossary

<i>AOCS</i>	American Oil and Chemists' Society
<i>Conventional Crop</i>	Crop variety with no history of modern biotechnology and is produced through plant-breeding techniques that rely on selecting and mating parent plants possessing promising traits and repeatedly selecting for superior performance among their offspring
<i>DNA</i>	Deoxyribonucleic Acid
<i>Detection Limit</i>	Lowest level at which target DNA can be detected in a sample and be reliably tested by PCR methods. It is typically expressed as a percentage: the ratio of the number of modern biotechnology derived genomes to the number of crop genomes times 100 percent
<i>EC</i>	European Commission
<i>GMO</i>	Organism that has had genetic sequences modified using molecular-level techniques
<i>ISO</i>	International Organization for Standardization
<i>PCR</i>	Polymerase Chain Reaction: technique used to determine whether a sample of plant tissue contains a particular DNA sequence. PCR relies on primer sets that zero in on a particular target DNA sequence and a special DNA-copying enzyme (DNA polymerase) that makes enough copies of the target sequence for identification and measurement
<i>Qualitative PCR</i>	PCR methods that determine the presence or absence of a specific target DNA sequence at a particular level of detection
<i>Quantitation Limit</i>	Lowest level at which the amount of target DNA sequence in a sample can be reliably quantified. It is typically expressed as the ration of the number of transgenic genomes to the number of crop genomes times 100 percent
<i>Quantitative PCR</i>	PCR methods that estimate the relative amount of target DNA sequence in a mixture of DNA molecules
<i>Trait: LLRICE62</i>	Tolerance to the herbicide glufosinate

Introduction

Plant genetic modification is an extension of traditional plant breeding. It allows plant breeders to develop crops with specific traits including insect, disease, and herbicide resistance; processing advantages; and nutritional enhancement. An important component for identifying these new traits is a Certified Reference Material created from leaf, seed, or seed containing the new trait as well as a CRM created from the conventionally bred matrix. The European Commission has mandated that from 18 April 2004, a method for detecting a new event derived from transgenic technology and Certified Reference Material must be available before the EC will consider authorizing acceptance of a new crop derived from transgenic technology. Several nations outside Europe also require seed and ingredients to be labeled above a threshold level before accepting a shipment.

To meet the above regulatory requirements for GMO determination, AOCS 1022-B was manufactured from rice according to ISO 17034:2016 and in accordance with EC No 1829/2003, EC No 641/2004 and EC No 619:2011. This CRM is available from AOCS.

Material Processing

LLRICE62 rice seeds used to prepare AOCS 1022-B were homozygous resulting from several cycles of self-pollination. Bayer CropScience milled ~6 kg of LLRICE62 rice seed. All of the seed powder was passed through a 500 µm mesh sieve. The seed powder was delivered to AOCS who contracted Illinois Crop Improvement Association for packaging the samples. The powder was aliquoted and bottled in 27-mL glass headspace vials and sealed under a nitrogen gas environment.

Trait Verification to Certify Presence of LLRICE62

The presence of the LLRICE62 trait was assessed on 10 random vials of AOCS 1022-B. AOCS used the Random Number Generator function of Microsoft Excel to select samples for verification of trait presence. Sample numbers that were randomly selected were sent to FoodChain ID, Chantilly, VA (an ISO 17025-accredited laboratory) for event-specific, qualitative PCR analysis to verify the presence and homogeneity of LLRICE62 in the samples (Table 1).

Table 1. Trait verification testing on AOCS 1022-B LLRICE62 rice performed by FoodChain ID, Chantilly, VA (an ISO 17025-accredited laboratory).

AOCS 1022-B Sample	Trait LLRICE62 Presence
Sample # 84	Positive
Sample # 127	Positive
Sample # 176	Positive
Sample # 233	Positive
Sample # 280	Positive
Sample # 315	Positive
Sample # 371	Positive
Sample # 448	Positive
Sample # 463	Positive
Sample # 561	Positive

Certified Value and Measurement Uncertainty

The genetic purity of the seed lot used to produce AOCS 1022-B was assessed by Bayer CropScience. A total of 640 rice seeds were subjected to individual seed testing for the presence of LLRICE62 by qualitative event-specific PCR. 624 of the 640 seeds tested positive for the presence of LLRICE62.

Purity estimation was calculated using SeedCalc8 (Remund *et al.*, 2008) and corresponded to the lower bound of true % purity. The % purity in the sample was 97.5%, when 624 out of 640 seeds were tested positive for LLRICE62. Using a 95% confidence level, the true % purity of the LLRICE62 seed lot was 94.4%. Consequently, with 95% confidence, the true value is ≥ 944 g/kg.

The measurement uncertainty (U_{CRM}) is the expanded uncertainty with a coverage factor of 2 and a confidence level of 95%. It is obtained by combining the uncertainties from the purity assessment ($u_{char,rel}$), the homogeneity assessment ($u_{bb,rel}$), the transport stability assessment ($u_{sts,rel}$) and the long-term stability assessment ($u_{lts,rel}$):

$$u_{CRM,rel} = \sqrt{u_{char,rel}^2 + u_{bb,rel}^2 + u_{sts,rel}^2 + u_{lts,rel}^2}$$

$$U_{CRM} = 2 \times u_{CRM,rel} \times 1000 \text{ g/kg}$$

When using an asymmetric uncertainty, the reported measurement uncertainty is truncated on the right side such that the value does not exceed 1000 g/kg. The expanded measurement uncertainty for AOCS 1022-B is 18 g/kg.

Homogeneity

The homogeneity of AOCS 1022-B is related to the purity of the seeds. 624 out of 640 seeds tested positive for the LLRICE62 rice event by event-specific PCR. Based on the sample purity of 94.4%, as determined using SeedCalc8, the batch was considered to be homogenous.

In addition, the homogeneity of the LLRICE62 trait was confirmed when 10 random vials of AOCS 1022-B were selected and were sent to FoodChain ID, Chantilly, VA (an ISO 17025-accredited laboratory) for event-specific, qualitative PCR analysis to verify the presence of LLRICE62 in the samples (See Trait Verification section and Table 1).

Stability

Time, temperature and light are regarded as the most relevant influences on the stability of CRM (Linsinger et al., 2001). The influence of light is mitigated by shipping and storing the vials in boxes, thus minimizing the possibility of degradation due to light. The influence of temperature is mitigated by storing the vials in a temperature-controlled room, and shipping vials at ambient temperature.

The effect of temperature and time are investigated.

A transport (short-term) stability study is conducted to assess the stability of maize CRM during transport. The temperature and time conditions in the study cover the typical conditions and the not so rare situations. The outcome of the study is considered transferable to other CRMs of similar property. Samples were subject to 3 different temperatures (4 °C (fridge), 25 °C (ambient), 60 °C (oven)) for 4 different durations (0, 1,

2, and 4 weeks). The study concluded that samples are stable at 4 °C (fridge) and 25 °C (ambient) for 4 weeks. The estimated uncertainty contribution from transport (short-term) stability is 1.0%.

A long-term stability study is conducted to assess the stability of maize CRM during storage. Samples are stored at 25 °C (ambient) and the stability of the sample is monitored as long as the samples is available. The storage temperature study is 25 °C and the length of time to be studied is 10 years. The outcome of the study is considered transferable to other CRMs of similar property. In the initial 1-year stability study, samples were subject the storage condition for 4 different durations (0, 1, 3, 6 and 12 months). The study concluded that samples are stable at 25 °C (ambient) for 12 months. The estimated uncertainty contribution from long-term stability is 0.42%.

Stability of these CRMs has been listed as 1 year from the certificate date. The materials were processed and are stored at ambient temperature, under nitrogen gas, in 27 -mL glass headspace vials. These materials are expected to be stable for longer than the estimated expiration date. The stability of the powder material will be reevaluated at time of expiration. If the samples still test positive for the presence of the intended trait, the certificates will be extended.

References

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Telephone: 1 703-222-8700 www.foodchainid.com

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Telephone: +1 217 359 4053 Fax: +1 217 359 4075; <https://www.ilcrop.com/>

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