Bangladesh Agricultural Research Council
Ministry of Agriculture
Government of the People's Republic of Bangladesh

Standard Operating Procedures for Research and Release of Genome Edited Plants of Categories SDN-1 and SDN-2 in Bangladesh

December, 2023

কৃষিই সমৃদ্ধি

Translated in English from Bangla

Government of the People's Republic of Bangladesh
Ministry of Agriculture
Research-1 Section
www.moa.gov.bd

Memo no. 12.00.0000.062.99.005.23.646 Dated: 26 Agrahan 1430 / 11 December 2023

Subject: Approval of 'Standard Operating Procedures for Research and Release of Genome Edited Plants of Categories SDN-1 and SDN-2 in Bangladesh'.

Reference: Bangladesh Agricultural Research Council's Memo no.12.20.0000.004.99. 30.2023-2776, Date: 18-11-2023

With the above reference the approved SOP entitled 'Standard Operating Procedures for Research and Release of Genome Edited Plants of Categories SDN-1 and SDN-2 in Bangladesh' related to develop desired crop varieties after deletion/addition of specific genetic traits through advance 'Genome Editing' technology is hereby forwarded as per direction of competent authority.

11/12/2023

Mohammad Zahirul Islam
Deputy Secretary
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Executive Chairman
Bangladesh Agricultural Research Council
Farmgate, Dhaka

Memo no. 12.00.0000.062.99.005.23.646 Dated: 26 Agrahan 1430 / 11 December 2023

Copy forwarded for kind Information (Not According to the Seniority)

1. PS to Honorable Minister, Ministry of Agriculture, Bangladesh Secretariat, Dhaka
2. PS to Secretary, Ministry of Agriculture, Bangladesh Secretariat, Dhaka
3. PO to Joint Secretary, Research Wing, Ministry of Agriculture, Bangladesh Secretariat, Dhaka
4. PO to Joint Secretary, Research Branch, Ministry of Agriculture, Bangladesh Secretariat, Dhaka

11/12/2023

Mohammad Zahirul Islam
Deputy Secretary

Standard Operating Procedures for Research and Release of Genome Edited Plants of Categories SDN-1 and SDN-2 in Bangladesh

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Contents

1. Preamble

The 'National Agricultural Policy 2018' of Bangladesh has given importance to achieve poverty alleviation, food and nutritional security and agricultural growth in Bangladesh. The policy lays special importance to the use of modern techniques including biotechnology for development of stress tolerant, disease resistant and nutritious crop varieties. Genome editing is a revolutionary technology that enables both precise and efficient targeted modification in the genome of plants thus accelerating the pace of plant breeding. It is being used extensively by scientists all over the world to make desirable improvements in different crop plants such as cereals, pulses, oilseeds, fruits, and vegetables.

Genome editing uses site directed nucleases (SDNs) to make a desired change at the specific location (s) in the genome that may either be a small deletion, a substitution, or the insertion of a number of nucleotides or bases of a particular gene of a targeted plant species/crop variety. Such targeted edits result in improved traits in the plants. Based on the mechanism used in editing and the magnitude of the resulting changes, genome editing is primarily categorized as SDN-1, SDN-2, and SDN-3. The SDN-1 and SDN-2 categories of genome edited plants do not contain any transgene(s) and are indistinguishable from conventionally bred varieties. Therefore, many countries, including Argentina, Brazil, Canada, England, India, Japan, Philippines, and USA consider genome edited plants like conventionally bred varieties. Plant scientists are using genome editing to deal with serious challenges being faced viz. climate change, pests, diseases, nutritional quality etc. A good number of genome edited plants such as tomato, soybean, corn etc. are now cultivated in the farmers' fields in many countries.

Considering the precision and speed of crop improvement using genome editing technology, several research organizations, institutes under the National Agricultural Research System (NARS), National Institute of Biotechnology (NIB) Universities, private and public research laboratories in Bangladesh have initiated efforts to apply genome editing for improvement of crop plants for specific traits including climate-resilient, high quality and high yielding traits.

The Ministry of Agriculture, Government of the People's Republic of Bangladesh is responsible for variety registration for both notified and non-notified crops in Bangladesh. Variety registration procedures are followed for crops developed using conventional breeding methods. MOA has prepared the "Standard Operating Procedures for Research and Release of Genome Edited Plants of Categories of SDN-1 and SDN-2 in Bangladesh" to facilitate the research and release of genome edited crops that meet the needs of the farmers of Bangladesh and consumers.

2. Objective

The purpose of this SOP is to facilitate the research and release of genome edited plants falling under the categories of SDN-1 and/or SDN-2 in Bangladesh.

3. Definitions

Exogenous introduced DNA: DNA introduced into cell/tissue for genome editing including entire plasmid vector construct sequences. For the purposes of this document, exogenous introduced DNA includes the entire coding sequences for genome editing reagents, selectable markers, intact gene regulatory elements (e.g., promoters, transcriptional activators or modifiers, termination signals), and vector backbone. In SDN-2 genome edited plants, the sequences integrated at the ectopic locus to serve as homologous DNA template are considered as exogenous DNA, whereas any changes introduced at the target locus through genome editing would not come under the definition of exogenous introduced DNA.

Genome editing: A group of techniques used to make precise and targeted alterations including modification, insertion, replacement, or deletion of DNA sequences from an organism's genome. Genome editing uses site directed nucleases (SDNs) to introduce a DNA break.

Site-directed Nuclease: Abbreviated as SDN is an enzyme programmed to recognize a specific sequence within the genome of an organism and cleaves the DNA usually creating a double strand break.

SDN-1: Involves the unguided repair of a targeted DNA break by the natural endogenous DNA repair mechanism of the host organism such as non-homologous end joining. The spontaneous repair of this break can lead to a mutation causing gene silencing, gene knock-out, or a change in the activity of a gene. The SDN-1 genome edited plants produced will be free from exogenous/foreign DNA. These mutations can be base substitution/indels/deletions including large deletions or structural changes. These resultant mutations are comparable to those occurring in nature, obtained through conventional mutagenic treatments or natural variation found in the primary/secondary gene pool.

SDN-2: Involves a template-guided repair of a targeted DNA break using an externally supplied template sequence. The donor carries one or several small mutations flanked by two sequences matching both ends of the DNA break, and is thus recognized as a repair template, allowing the introduction of the mutation(s) at the target site. The resultant mutant carries a modified sequence, leading to an altered expression profile of the gene and/or altered activity of the encoded protein/RNA. Thus, the edited version could be regarded as an allelic form comparable to those available in the primary/secondary gene pool.

Transgene: A DNA fragment or gene from a non-cross compatible species.

Transgenesis: The process of introducing an exogenous DNA fragment from a non-cross compatible species into the genome of a given cell and the propagation of such a fragment thereafter.

4. SOPs for research and registration/release of genome edited plants of SDN-1 and SDN-2 categories

4.1 Initiating Research and Development

4.1.1 Research and development on genome edited plants in Bangladesh must be conducted with authorization from **Institutional Oversight Body (IOB)** (***Annexure I***). The laboratory facilities, materials and the procedures must be approved by the **IOB**.

4.1.2 Laboratories involved in the research and development of genome edited plants must be monitored regularly by the **IOB**.

4.1.3 Standard laboratory practices for ensuring safety must be maintained.

4.2 Suggested procedure for handling genome edited plants

4.2.1 Progenies of individual T0 events should be maintained separately. Seeds obtained through selfing of individual T1 plants should be raised from a single plant to progeny row.

4.2.2 Investigators are recommended to provide the following information to the Institutional Oversight Body.

4.2.2.1 Numbers of T0 transformants generated.

4.2.2.2 Inform the generation in which mutation in the target site is detected, and the homozygous or heterozygous status of mutation.

4.2.2.3 Maintenance of mutation either at homozygous or heterozygous state.

4.2.2.4 The generation at which the homozygosity is attained.

4.2.2.5 Generation at which genome edited lines were found to be free of exogenous introduced DNA.

4.2.2.6 Provide DNA sequence information of the target sites and their proximity of the edited plants together with wild (mother plant) type.

4.2.2.7 Provide information that shows non-specific edits have not happened other than target site(s).

4.3 Variety registration procedure for SDN-1 and SDN-2 Genome Edited plants

4.3.1 Once investigators have developed genome edited plant(s) which is free from any exogenously introduced DNA and intend to take SDN-1 and/or SDN-2 plants out of containment conditions, they shall submit data in the prescribed format to an Institutional Oversight Body (IOB) established for this purpose and information for confirmation per *Annexure II*, that establishes that the plant no longer contains any transgenes or foreign DNA.

4.3.2 **IOB** to review data for the following:

4.3.2.1 Regularly monitor the progress of genome editing research activities.

4.3.2.2 Review data that establishes category(ies) of genome editing (SDN-1 and/or SDN-2).

4.3.2.3 Confirmation of genome editing at target locus/loci using DNA sequencing.

4.3.2.4 Whether selfing and/or backcrossing has been carried out to segregate any exogenously introduced DNA?

4.3.2.5 Whether any DNA-free method such as RNA-protein complex was used for genome editing?

4.3.2.6 Evidence to confirm that the genome edited plant is free from exogenous introduced DNA.

4.3.2.7 Were any unintended phenotypic changes observed on the genome edited plant whether it was selected/ segregated out?

4.3.2.8 Whether information on identical allele(s) already documented? If yes, information to be provided.

4.3.3 Applicant shall use protocols/methods prescribed in section 5 of this document to show that the genome edited plants are free from exogenous introduced DNA.

4.3.4 After the information provided according to ***Annexure II*** is examined and found to be satisfactory, the Institutional Oversight Body shall submit the recommendations along with ***Annexure II*** and their confirmation on the absence of any exogenously introduced DNA to the "Evaluation Committee for Genome Edited Plants" established by the Bangladesh Agricultural Research Council (BARC) as given in ***Annexure III***.

4.3.5 In the case of methods other than specified in the SOPs have been used to demonstrate the absence of any exogenously introduced DNA, the same may be verified and highlighted by the **IOB**.

4.3.6 The recommendations of the **IOB** must include:

4.3.6.1 Scientific evidence based on which the proposal by the applicant for the absence of any exogenously introduced DNA has been approved.

4.3.6.2 In the case of methods other than specified in the SOPs have been used to demonstrate the absence of any exogenously introduced DNA, the same may be verified and highlighted in the minutes.

4.3.7 Once the recommendations of **IOB** (along with ***Annexure II***) are confirmed by the Evaluation Committee for Genome Edited Plants of BARC, **IOB** shall communicate the decision to the applicant to proceed with registering or release of the plant following the same procedure as used for conventional breeding for Notified/Non notified crops of that plant species in Bangladesh. The applicant multiplies certain amount of seed of genome edited plants for the necessary trial of notified or non-notified crops.

4.3.8 After getting the certification of SDN-1/SDN-2, the proposal of the institution/organization for the variety release of genome edited plants should be submitted to the respective authorities following the Seed Rules-2020 (Bangladesh Gazette published on Tuesday, June 9, 2020) for conventionally bred plants.

4.3.9 If the plant is a notified crop, the proposal will be submitted to Director of Seed Certification Agency (SCA) through fulfilling the **FORM-10 (*Annexure IV*)** of the Seed Rules 2020 in case of Notified Crops for the purpose of Variety Release and Notification by the Ministry of Agriculture, and thereby the application will have to be executed through the procedures as indicated below.

4.3.9.1 The Director SCA will perform necessary field evaluation and submit the field evaluation report to the meeting of the Technical Committee (TC) of the National Seed Board (NSB).

4.3.9.2 The TC will verify the technical merit of the report through in-depth evaluation in the meeting of the TC, and thereby recommend the crop variety to the NSB through specifically mentioning the average yield, growth duration (life cycle), source of variety, and other necessary other relevant varietal traits including mentioning the category of genome editing (SDN-1 or SDN-2).

4.3.9.3 If the proposed variety is being qualified, and it is developed either by the process of SDN-1 or SDN-2, the meeting of the NSB will approve it and send it to the Seed Wing of the Ministry of Agriculture for issuing certificate to the concerned applicant for registration of the variety.

4.3.10 If the plant is a non-notified crop, the proposal will be submitted to the Director General of Seed Wing or Secretary of NSB by fulfilling the prescribed **FORM-11 (*Annexure V*)** of the Seed Rules 2020 in case of Non-Notified Crops for the purpose of Variety Registration by the Ministry of Agriculture, and for its final approval as the seeds developed through conventional breeding.

4.4 Record Keeping

4.4.1 All records associated with research and development involving the use of genome edited plants will be maintained by the applicant/s (based on ***Annexure II***) and must be submitted to the **IOB**.

4.4.2 The **IOB** shall archive copies of the records for all applications submitted for exemptions for a minimum of five (5) years, whether or not the regulated material is granted the exemption.

5. Process Diagram for Approval procedures

When a genome edited plant is developed using either SDN-1 or SDN-2 method and the final product is free from any exogenous introduced DNA transgene or foreign gene as confirmed by the **IOB** and the Evaluation Committee for Genome Edited Plants at BARC, the respective institute/ university should proceed with registering or releasing of the plant following the same procedure as used for conventional breeding of that plant species in Bangladesh.

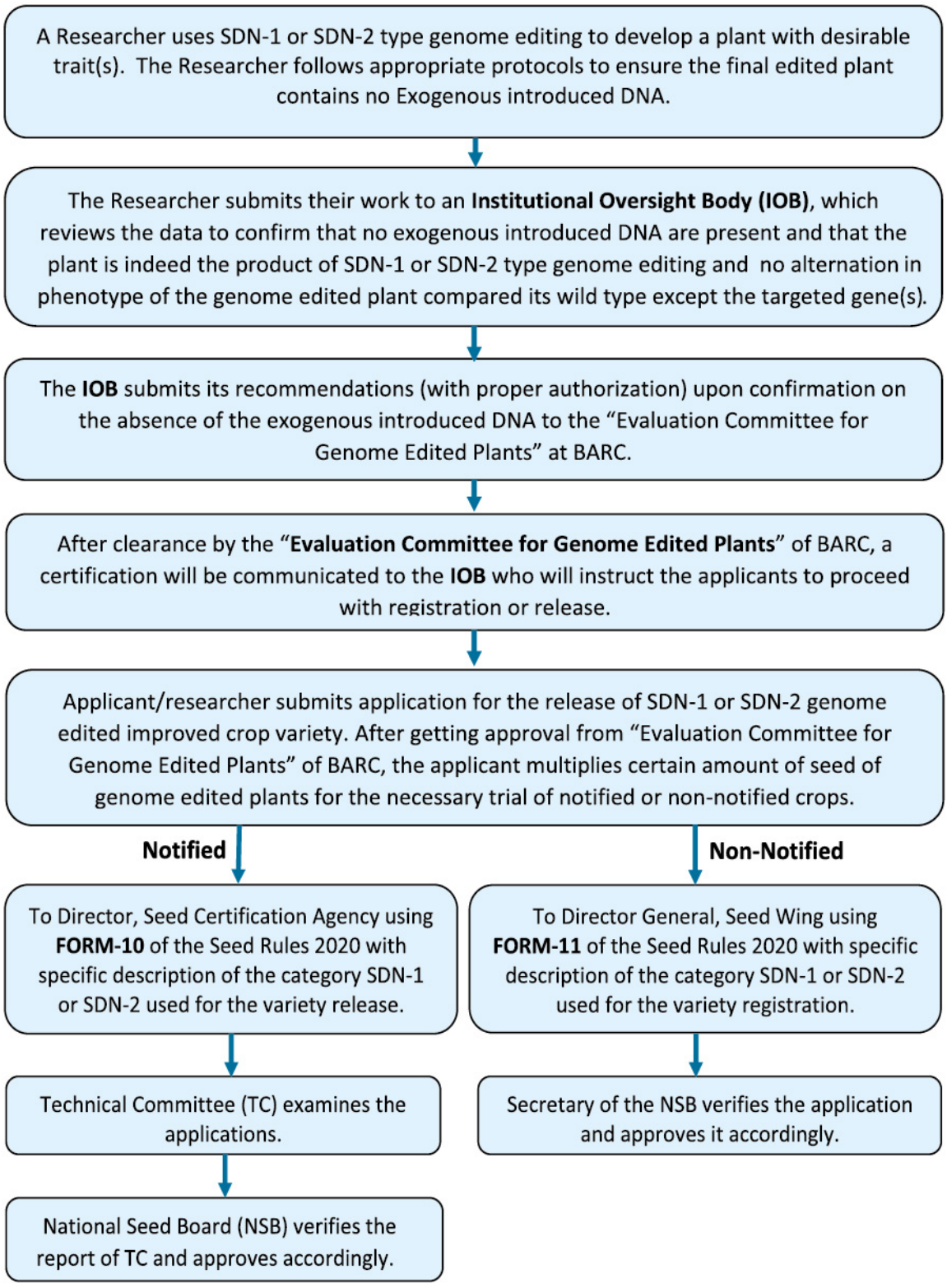

Fig. 1. Process diagram for research and release of genome edited plants of categories of SDN1 and SDN2 in Bangladesh

6. Protocols to demonstrate that a genome edited plant is free from exogenous introduced DNA

The two steps described below are the recommended protocol to show that the genome edited plants of SDN-1 and/or SDN-2 categories are free from any exogenously introduced DNA.

6.1 Absence of selectable/scorable marker

The final edited plant lines must be sensitive to the selection reagents (antibiotics/herbicide/ any other) at the concentration used for selecting the plants having exogenous introduced DNA. In the case of a scorable marker, the final edited plant line should be phenotypically negative for the same. Seeds of a segregant line harboring the any exogenously introduced DNA should be used as the positive control, and the parental genotype used for genome editing as the negative control.

6.2 Overlapping PCR/nested PCR

6.2.1 Total genomic DNA is to be used as the template for PCR amplification.

6.2.2 The primers must be chosen such that the amplicons cover the full length of the any exogenously introduced DNA (full length of the vector DNA).

6.2.3 The intended amplicons should be at the maximum of 500 bp in size and the overlap between consecutive amplicons should be at least 50 bp.

6.2.4 For each amplification reaction, three PCR positive controls must be used:

6.2.4.1 A well-known endogenous low copy gene (actin/tubulin, etc.) of the same species using the same amount of the same genomic DNA sample of the final edited lines as mentioned above.

6.2.4.2 The genomic DNA of a segregant line harboring full or part of the any exogenously introduced DNA (using the same primer pairs and the same amount of genomic DNA used for overlapping PCR).

6.2.4.3 Genomic DNA of the parental genotype spiked with at the most $1/1000^{th}$ (*w*/*w*) of the full-length purified vector DNA used to develop the genome edited line (using the same primer set used for overlapping PCR).

6.2.4.4 The amount of template DNA and the PCR conditions should be such that a clear band of the expected size is visible in all the positive controls.

6.2.4.5 No amplification should be detected in any of the reactions with primers directed against any exogenously introduced DNA for the final genome edited line, while clear amplification should be detected in all the positive controls by ethidium bromide- stained agarose gel electrophoresis.

6.3 Use of other methods

Evidence of the absence of exogenous introduced DNA with alternative methodologies/ technologies may be considered by the Institutional Oversight Body if the methods have the same level of stringency as the methods described above.

7. Review of the SOPs

These SOPs will be reviewed periodically by Bangladesh Agricultural Research Council (BARC) in line with technological advancements, particularly the methods that are to be used to show that genome edited plants are free from exogenous DNA.

Annexure I

Composition of Institutional Oversight Body (IOB)

An Institutional Oversight Body may be formed in each university and public institute/organization working towards development of SDN-1 and/or SDN-2 categories of genome edited plants. IOB will be formed at each institute/organization following the consent/approval of the head of the institute/organization/authorized person. The Institutional Oversight Body will have five members including experts in relevant fields such as-

1. Biotechnology/ Molecular Biology
2. Breeding/ Genetics
3. Agronomy
4. Horticulture etc.

Institute may co-opt members of relevant expertise from other institutions.

Annexure II

Format for Information and Review of SDN-1 and/or SDN-2 genome edited plants

Researcher Information	
Name of the Principal Investigator, Co-PI, Research Team	
Institution	
Chair of the Institutional Oversight Body	
Additional Information (collaborators involved in performance of the SOP)	

Information on the Genome Edited Plant		
Sl No.	**Item**	**Information to be provided**
1	Name of the plant species and genotype	
2	Targeted trait(s)	
3	Reference number or identifying name	
4	Category of genome editing: SDN-1 and/or SDN-2	
5	Targeted genomic region • Name of the gene(s) or locus/loci • Specific region of the gene or locus (promoter, terminator, other regulatory elements, coding region, intron, etc.) • Nucleotide sequence of the parental allele • Specific site(s) chosen for editing (in case of SDN-2)	
6	Genome editing method used including CRISPR- Cas, TALEN, ZFN, RNPs, Base editing, prime editing, etc.	
7	Details of vector, gene construct, editing reagents (molecular tools) including maps and nucleotide sequences	
8	The method used for delivery of gene editing reagents (Agrobacterium-mediated, Biolistic, etc.)	

Sl No.	Item	Information to be provided
9	Current Generation of the genome edited plant(s) (T0, T1, T2, etc.)	
10	Data on Phenotypic expression of the target trait(s) as assessed under containment conditions, if applicable	
11	Molecular data for confirmation of the targeted editing a. By sequencing of the parental and the modified allele(s) using Sanger or other Sequencing technologies with a minimum 10X coverage of the edited region(s) and base quality of a minimum Phred score 30 b. Sequence difference between parental and modified/edited allele through sequence alignment	
12	Whether the mutation is homozygous or heterozygous. Provide evidence for inheritance of the mutation through two generations using sequencing.	
13	Whether selfing and/or backcrossing has been carried out to segregate the any exogenously introduced DNA? Provide information.	
14	Whether any DNA-free method such as RNA-protein complex was used for genome editing? If yes, provide information.	
15	Provide evidence to confirm the absence of exogenous introduced DNA in genome edited plant by phenotypic selection (sensitivity to herbicide/ antibiotic, or absence of scorable marker) and using overlapping PCR/ Nested PCR/other appropriate methodology (as per Section 6).	
16	In case, any unintended phenotypic changes were observed on the genome edited plant whether it was selected/ segregated out. If selected, provide information.	
17	In the case of nutrition-related traits, provide data on the targeted nutritional trait in comparison to the parental line.	

Annexure III

Composition of the "Evaluation Committee for Genome Edited Plants"

Bangladesh Agricultural Research Council (BARC) will establish an "Evaluation Committee for Genome Edited Plants" to independently evaluate the proposals submitted by the Institutional Oversight body and certify that the genome edited plant is free from any exogenously introduced DNA. This committee will be convened by the Executive Chairman of BARC and Member Director (Crops), BARC will be the Member Secretary. Members of this committee will consist of five distinguished scientists from research institutes and universities working in the area of genome editing. In addition, an international relevant reputed expert may be co-opt in the committee. In case of any IPR issues arise for releasing genome edited crops, concerned authority will take necessary steps.

The Terms of Reference for the Independent Evaluation Committee for Genome Edited Plants will be as follows:

1. Receiving the proposals from the Institutional Oversight Body of any universities and public institutes.
2. To certify that the genome edited plant is free from any exogenously introduced DNA.
3. Within 30 days the committee will recommend the certified material to the institute for further processing of registration/release as notified/non-notified crop.
4. The "Evaluation Committee for Genome Edited Plants" will develop a format of certification of generated product through SDN 1 and SDN 2.

Note: There will be a provision of honorarium as per government rules for the meeting of "Evaluation Committee for Genome Edited Plants"

Annexure IV

FORM-10 of the Seed Rules 2020 in case of Notified Crops (English version)

FORM- 10
[See Rule 11, Sub- Rule (2)]
Application for Releasing of Notified Crop Variety

To
Director
Seed Certification Agency

Date:

1. Name and Address of Applicant:
2. Registration Number of Seed Dealer (Valid/ Updated):
3. Name and Address of person in- charge of the development of the proposed variety:
4. The variety from which the proposed variety is developed
   (A) Variety Name in Bangla:
   (B) Variety Name in English:
   (C) Botanical/ Scientific Name of Variety:
   (D) Station Number:
   (E) Name of the proposed Variety (in Bangla and English):
5. Source of proposed variety
   (A) Introduction:
   (B) Country of Origin/ Place and Name of Organization:
   (C) Original Station Number:
   (D) Pedigree Number:
   (E) Parentage:
6. Ecological requirement of the proposed variety:
   (A) Season:
   (B) Soil:
   (C) Water:
   (D) Other Information:
7. Agronomical requirement of the proposed variety
   (A) Method of Cultivation:
   (B) Seed rate per hectare (kg):
   (C) Spacing/Planting Distance (cm/meter):
   (D) Population per hectare:
   (E) Fertilizer requirement per hectare(kg):
   (F) Growth duration of crop in the field in days (seed to seed):
8. Describe, if special processing is needed for the product to be used.
9. Name of usable part of the crop:

10. Description of any tests performed on disease and insect reactions:
    (A) Natural (number of tested seasons/ number of years):
    (B) Artificial tests:

11. Description of the distinctive features of the proposed Variety:

12. Description of tests listed below (Result of yield in metric ton per hectare) conducted:
    (A) Advanced Yield Trial (AYT):
    (B) Regional Yield Trial (RYT):
    (C) Advanced Line Adaptive Research Trial (ALART):
    (D) Agronomical Trial:
    (E) On Farm Yield Trial:
    (F) Participatory Varietal Trial (PVT):

13. (A) Source of Plant Breeding Material:
    (B) Method of Plant Variety Development for proposed Variety:

14. (A) Overall Morphology of proposed Variety:
    (B) Identification features of Variety:

15. (A) Appropriateness of the Variety in the
    Agro- Ecological Zone:
    (B) Description of appropriate Crop Layout, if applicable:

16. Description of optimal Farm Management Practices including fertilizer and water management:
    (A) Planting:
    (B) Fertilizer application:
    (C) Water management:

17. (A) Yield Trial Result and Description of proposed Variety:
    (B) Comparative difference between Varietal Characteristics of the best variety and the proposed Variety:
    (C) If there is a suggestion to withdraw any species, its Name:

18.Crop Harvest and Collection Method :

19. (A) Good Post-Harvest Processing and Storing Method (If new method is needed, its description):
    (B) Storing Test Result:
        (1) In natural condition:
        (2) Air- conditioned (Special type/ method):

20. (A) Physical Components (Size, Shape, Weight, etc.) (if applicable):
    Size/ Shape:
    Texture:
    Color:
    Weight of One Thousand Grains (Gram) (Except Potato/ Sugarcane):
    Seed Dormancy:

(B) Chemical Ingredients, Nutritional Status and Cooking Utility Techniques (For edible substances):
(C) Recovery Ratio (if applicable):
(D) Breaking Ratio of usable crop parts (if applicable):

21. Diseases and Insect-Pests reaction:

22. Part used as Seed:

23. (A) Seed producing method (Special precautions, separation standards, seed vitality extension for at least 12 months and special warehousing requirements taken for inbred or hybrid):
(B) List of Morphologically Most Similar Varieties and Species:
(C) List of differences according to DUS Test from list of Most Similar Variety or Species (Proof is needed to be Submitted):

24. (A) Who will produce Breeder Seed and Where:
(B) Quantity of Breeder Seed that can be supplied in every season / per year:
(C) Who will produce Foundation Seed and Certified Seed and consent of the producers has been obtained
(D) When DAE will be able to undertake the demonstration of this variety in the farmers' fields in collaboration with the variety development organization and how many demonstrations.
(E) A Bangla Leaflet is enclosed herewith indicating all information as mentioned above and incorporating Post-Harvest and Seed production Technology.

25. Additional Information:

Signature, Date and Seal of Applicant

The following documents will have be attached with the Application Form

1. Copy of Seed Dealer Registration Certificate.
2. Declaration by the applicant to be responsible for preserving the quality and characteristics of the variety.
3. Non-government organizations are required to submit a copy of the Certificate of Membership of Bangladesh Seed Association.

FORM-10 of the Seed Rules 2020 in case of Notified Crops (Bangla version)

ফরম-১০

[বিধি ১১ এর উপ-বিধি (২) দ্রষ্টব্য]

নিয়ন্ত্রিত ফসলের জাত ছাড়করণ বা নিবন্ধন আবেদন

বরাবর
পরিচালক
বীজ প্রত্যয়ন এজেন্সি

তারিখ :

১। প্রতিষ্ঠানের নাম ও ঠিকানা:

২। বীজ ডিলার নিবন্ধন নম্বর (বৈধ/হালনাগাদ):

৩। প্রস্তাবিত জাতের উন্নয়নের জন্য দায়িত্বপ্রাপ্ত ব্যক্তির নাম ও ঠিকানা:

৪। যে জাত হইতে প্রস্তাবিত জাতের উদ্ভব হইয়াছে তাহার
- (ক) বাংলা নাম:
- (খ) ইংরেজি নাম:
- (গ) উদ্ভিদতাত্ত্বিক/বৈজ্ঞানিক নাম:
- (ঘ) স্টেশন নম্বর:
- (ঙ) জাতের প্রস্তাবিত নাম (বাংলা ও ইংরেজি):

৫। প্রস্তাবিত জাতের উৎস:
- (ক) সূচনা:
- (খ) উৎস দেশ/স্থান ও প্রতিষ্ঠানের নাম:
- (গ) মূল স্টেশন নম্বর (Number):
- (ঘ) বংশ পরিচয় নম্বর (Pedigree Number):
- (ঙ) প্যারেনটেজ (Parentage):

৬। প্রস্তাবিত জাতের পরিবেশগত (Ecological) চাহিদা:
- (ক) মৌসুম:
- (খ) মৃত্তিকা:
- (গ) পানি:
- (ঘ) অন্য কোনো তথ্য:

৭। প্রস্তাবিত জাতের কৃষিতাত্ত্বিক (Agronomical) চাহিদা:
- (ক) চাষ পদ্ধতি:
- (খ) প্রতি হেক্টরে বীজের হার (কেজি):
- (গ) রোপণ দূরত্ব:
- (ঘ) প্রতি হেক্টরে গাছের সংখ্যা:
- (ঙ) প্রতি হেক্টরে সারের প্রয়োজনীয়তা:
- (চ) মাঠে ফসলের জীবনকাল (বীজ হইতে বীজ):

৮। পণ্য ব্যবহারের জন্য যদি বিশেষ প্রক্রিয়াজাতকরণের প্রয়োজন হয়, তাহা হইলে উহার বিবরণ:

৯। ফসলের ব্যবহারযোগ্য অংশের নাম:

১০। রোগ এবং পোকার প্রতিক্রিয়ার উপর কোনো পরীক্ষা করা হইয়া থাকিলে উহার বিবরণ:

(ক) প্রাকৃতিক (পরীক্ষিত মৌসুম/বৎসরের সংখ্যা):

(খ) কৃত্রিম:

১১। প্রস্তাবিত জাতের স্বাতন্ত্র্য বৈশিষ্ট্যের বর্ণনা :

১২। নিম্নলিখিত পরীক্ষাগুলোর বর্ণনা (টন/হে:):

(ক) অগ্রগামী সারির ফলন পরীক্ষা (AYT):

(খ) আঞ্চলিক ফলন পরীক্ষা (RYT):

(গ) অগ্রগামী সারির অভিযোজন পরীক্ষা (ALART):

(ঘ) কৃষিতাত্ত্বিক পরীক্ষা:

(ঙ) খামারে ফলন পরীক্ষা:

(চ) কৃষকের মাঠে পরীক্ষা (PVT):

১৩। (ক) প্রজনন দ্রব্যের উৎস:

(খ) প্রস্তাবিত জাত উন্নয়নের পদ্ধতি:

১৪। (ক) প্রস্তাবিত জাতের সামগ্রিক অঙ্গসংস্থান (Morphology):

(খ) জাত শনাক্তকারী বৈশিষ্ট্য:

১৫। (ক) কৃষি-পরিবেশ অঞ্চলে (Agro-Ecological Zone) জাতটির উপযুক্ততা:

(খ) উপযুক্ত শস্য বিন্যাসের বর্ণনা, যদি থাকে:

১৬। সার ও পানি ব্যবস্থাপনাসহ অনুকূল চাষ পরিচর্যার বর্ণনা:

(ক) রোপণ:

(খ) সার প্রয়োগ:

(গ) পানি ব্যবস্থাপনা:

১৭। (ক) ফলন পরীক্ষার ফলাফল এবং প্রস্তাবিত জাতের বর্ণনা:

(খ) সর্বোত্তম জাতের বৈশিষ্ট্যের সহিত তুলনামূলক পার্থক্য:

(গ) কোনো প্রজাতির প্রত্যাহারের পরামর্শ থাকিলে তাহার নাম:

১৮। শস্য সংগ্রহ পদ্ধতি:

১৯। (ক) প্রক্রিয়াজাতকরণ এবং গুদামজাতকরণের পদ্ধতি (কোনো নূতন পদ্ধতির প্রয়োজন হইলে তাহার বর্ণনা):

(খ) গুদামজাতকরণ পরীক্ষার ফলাফল:

(১) প্রাকৃতিক অবস্থায়:

(২) শীতাতপ নিয়ন্ত্রিত (বিশেষ প্রকার/পদ্ধতি):

২০। (ক) ভৌত উপাদান (আকার, আকৃতি, ওজন ইত্যাদি) (প্রযোজ্য ক্ষেত্রে):

আকার/আকৃতি:

বুনট (Texture):

বর্ণ (Colour):

এক হাজার দানার ওজন (গ্রাম) (আলু/ইক্ষু ব্যতীত):

বীজের সুপ্ততা:

(খ) রাসায়নিক উপাদান, পুষ্টিগত অবস্থা এবং রান্নার উপযোগিতা কৌশল (ভোজ্য দ্রব্যের ক্ষেত্রে):

(গ) পুনরুদ্ধারের অনুপাত (Recovery ratio) (প্রযোজ্য ক্ষেত্রে):

(ঘ) ফসলের ভোগ্য অংশ ভাঙ্গার অনুপাত (প্রযোজ্য ক্ষেত্রে):

২১। রোগ বালাইয়ের প্রতিক্রিয়া:

২২। বীজ হিসাবে ব্যবহৃত অংশ:

২৩। (ক) বীজ উৎপাদনের পদ্ধতি (ইনব্রিড বা হাইব্রিডের জন্য গৃহীত বিশেষ সতর্কতা, পৃথকীকরণ মান, বীজের জীবনীশক্তি কমপক্ষে ১২ (বার) মাস পর্যন্ত বর্ধিতকরণ এবং বিশেষ গুদামজাতকরণের প্রয়োজনীয়তা):

(খ) অঙ্গসংস্থানগতভাবে (Morphologically) কাছাকাছি (Most Similar) জাত বা প্রজাতিসমূহের তালিকা:

(গ) ডিইউএস (DUS) টেস্ট এর আলোকে কাছাকাছি (Most Similar) জাত বা প্রজাতির তালিকা হইতে পার্থক্যের তালিকা (প্রমাণপত্র দাখিল করিতে হইবে);

২৪। (ক) কে বা কোথায় প্রজনন বীজ উৎপাদন করিবে:

(খ) মৌসুমওয়ারী/বাৎসরিক কী পরিমাণ প্রজনন বীজ সরবরাহ করা যাইতে পারে:

(গ) কে ভিত্তি বীজ ও প্রত্যায়িত বীজ উৎপাদন করিবে এবং উৎপাদনকারীর মতামত নেওয়া হইয়াছে কি না:

(ঘ) ডিএই যখন কৃষকের মাঠে জাত উন্নয়ন সংস্থার সহযোগিতায় প্রদর্শনী গ্রহণে সমর্থ হইবে তখন কতগুলি প্রদর্শনী করিতে হইবে:

(ঙ) উপরে উল্লিখিত সকল তথ্য ও ফসল সংগ্রহোত্তর এবং বীজ উৎপাদন সংবলিত একটি বাংলা প্রযুক্তি অনুলিপি এতদ্‌সঙ্গে সংযোজিত।

২৫। অতিরিক্ত তথ্যাবলি :

আবেদনকারীর স্বাক্ষর, তারিখ ও সিল

আবেদনপত্রের সহিত নিম্নবর্ণিত কাগজপত্র সংযুক্ত করিতে হইবে:

১। বীজ ডিলার নিবন্ধ সনদের কপি।

২। আবেদনকারী কর্তৃক জাতটির গুণগতমান ও বৈশিষ্ট্যসমূহ সংরক্ষণের দায়-দায়িত্ব বহন করিবার ঘোষণাপত্র।

৩। বেসরকারি প্রতিষ্ঠানসমূহকে বাংলাদেশ সীড এসোসিয়েশনের সদস্য মর্মে সনদপত্রের কপি দাখিল করিতে হইবে।

Annexure V

FORM-11 of the Seed Rules 2020 in case of Non-Notified Crops (English version)

FORM- 11
[See Rule 11, Sub- Rule (3)]
Application for Registration of Non-Notified Crop Variety

To
The Director General, Seed Wing
Secretary, National Seed Board
Ministry of Agriculture
Bangladesh Secretariat, Dhaka- 1000

1. Name and Address of Applicant

2. Seed Dealer Registration Number (Valid/ Updated): Date:

3. Name and Address of Applicant (Person in- charge for the development of proposed Variety):

4. The Variety from which the proposed Variety has been developed-
   (A) Variety Name in Bangla:
   (B) Variety Name in English:
   (C) Botanical/ Scientific Name of the Variety:

5. Name of proved Variety for Registration (In Bangla and in English):

6. Ecological requirement of the proposed Variety:
   (A) Introduction:
   (B) Country of Origin / Place and Name of Organization

7. Name and Address of Breeder:

8. Agronomical requirement of the proposed Variety:
   (A) Cultivation Method:
   (B) Seed rate per hectare (in kg):
   (C) Planting Distance/Spacing (in cm/meter):
   (D) Number of seedlings per hectare:
   (E) Requirement of fertilizer per hectare (in kg):
   (F) Growth duration of crop in the field in days (seed to seed):

9. Describe, if special processing is needed for the product to be used.

10. Name of usable part of the crop

11. Description of any tests performed on disease and insect reactions: Natural (Number of Trial Seasons/ Number of Trial Years):

12. Description of features of proposed Variety:
   (A) Identification features:
   (B) Other special features:

13. Description of tests listed below (Result of yield in metric ton per hectare) conducted:
    (A) Regional Yield Trial (RYT):
    (B) On Farm Yield Trial:
    (C) Yield Trial on Farmers' Field:
    (D) Agronomical Trial:

Signature, Date and Seal of Applicant

The following documents will have be attached with the Application Form:

1. Copy of valid/ updates Seed Dealer Registration Certificate;
2. Declaration by the applicant to be responsible for preserving the quality and characteristics of the Variety; and
3. Private sector Organization is required to Submit Copy of the Certificate of Membership of Bangladesh Seed Association.

FORM-11 of the Seed Rules 2020 in case of Non-Notified Crops (Bangla version)

ফরম-১১

[বিধি ১১ এর উপ-বিধি (৩) দ্রষ্টব্য]

অনিয়ন্ত্রিত ফসলের জাত ছাড়করণ বা নিবন্ধন আবেদন

বরাবর
মহাপরিচালক, বীজ অনুবিভাগ/সচিব, জাতীয় বীজ বোর্ড
কৃষি মন্ত্রণালয়
বাংলাদেশ সচিবালয়, ঢাকা-১০০০

১। প্রতিষ্ঠানের নাম ও ঠিকানা:

২। বীজ ডিলার নিবন্ধন নম্বর (বৈধ/হালনাগাদ): তারিখ :

৩। আবেদনকারীর নাম ও ঠিকানা (প্রস্তাবিত জাতের উন্নয়নের জন্য দায়িত্বপ্রাপ্ত ব্যক্তি):

৪। যে জাত হইতে প্রস্তাবিত জাতের উদ্ভব হইয়াছে তাহার—

(ক) বাংলা নাম:

(খ) ইংরেজি নাম:

(গ) উদ্ভিদতাত্ত্বিক/বৈজ্ঞানিক নাম:

৫। নিবন্ধনের জন্য প্রস্তাবিত নাম (বাংলা ও ইংরেজি):

৬। প্রস্তাবিত জাতের পরিবেশগত (Ecological) চাহিদা :

(ক) সূচনা:

(খ) উৎস দেশ/স্থান ও প্রতিষ্ঠানের নাম:

৭। প্রজননবিদের নাম ও ঠিকানা:

৮। প্রস্তাবিত জাতের কৃষিতাত্ত্বিক (Agronomical) চাহিদা:

(ক) চাষ পদ্ধতি:

(খ) প্রতি হেক্টরে বীজের হার:

(গ) রোপণ দূরত্ব:

(ঘ) প্রতি হেক্টরে গাছের সংখ্যা:

(ঙ) প্রতি হেক্টরে সারের প্রয়োজনীয়তা:

(চ) মাঠে ফসলের জীবনকাল (বীজ হইতে বীজ):

৯। ফসলের উৎপাদিত পণ্য ব্যবহারের জন্য যদি বিশেষ প্রক্রিয়াজাতকরণের প্রয়োজন হয়, তাহা হইলে উহার বিবরণ:

১০। ফসলের ব্যবহারযোগ্য অংশের নাম:

১১। রোগ এবং পোকার প্রতিক্রিয়ার উপর কোনো পরীক্ষা করা হইয়া থাকিলে উহার বিবরণ: প্রাকৃতিক (পরীক্ষিত মৌসুম/বৎসরের সংখ্যা):

১২। প্রস্তাবিত জাতের বৈশিষ্ট্যের বিবরণ :

(ক) শনাক্তকারী বৈশিষ্ট্য:

(খ) অন্যান্য বিশেষ বৈশিষ্ট্য:

১৩। নিম্নলিখিত পরীক্ষার বর্ণনা (ফলন: টন/হেক্টর):

(ক) আঞ্চলিক ফলন পরীক্ষা (RYT):

(খ) খামারে ফলন পরীক্ষা:

(গ) কৃষকের জমিতে ফলন পরীক্ষা:

(ঘ) কৃষিতাত্ত্বিক পরীক্ষা:

আবেদনকারীর স্বাক্ষর, তারিখ ও সিল

আবেদনপত্রের সহিত নিম্নবর্ণিত কাগজপত্র সংযুক্ত করিতে হইবে:

১। বীজ ডিলার নিবন্ধ বৈধ/হালনাগারদ প্রত্যয়নপত্রের সনদের কপি;

২। আবেদনকারী কর্তৃক জাতটির গুণগতমান ও বৈশিষ্ট্যসমূহ সংরক্ষণের দায়-দায়িত্ব বহন করার ঘোষণাপত্র; এবং

৩। বেসরকারি প্রতিষ্ঠানসমূহকে বাংলাদেশ সীড এসোসিয়েশনের সদস্য মর্মে সনদপত্রের কপি দাখিল করিতে হইবে।

8. ACKNOWLEDGEMENTS

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2.	**Professor Dr. Haseena Khan** Secretary, Bangladesh Academy of Sciences	Member Secretary
3.	**Maj. Gen. (Retd.) Professor Dr. ASM Matiur Rahman** Fellow, Bangladesh Academy of Sciences	Member
4.	**Professor Dr. Zeba Islam Seraj** University of Dhaka and Fellow, Bangladesh Academy of Sciences	Member
5.	**Professor Dr. Mirza Hasanuzzaman** Sher-e-Bangla Agricultural University and Fellow, Bangladesh Academy of Sciences	Member
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9.	**Dr. Vibha Ahuja** Chief General Manager, Biotech Consortium India Limited	Member
10.	**Professor Dr. Rakha Hari Sarker** University of Dhaka & Country Coordinator, SABP	Member
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12.	**Dr. Mohammad Khalequzzaman** Director (Research), Bangladesh Rice Research Institute	Member
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