

Guidelines for Identification of Onion & Garlic Variety/ Hybrid Evaluated under AINRPOG for Release



ICAR-Directorate of Onion and Garlic Research
(Indian Council of Agricultural Research)
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Guidelines for Identification of Onion & Garlic Variety/Hybrid Evaluated under AINRPOG for Release

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Foreword

The All India Network Research Project on Onion and Garlic (AINRPOG) has been instrumental in advancing Onion and Garlic breeding and technologies, resulting in the creation of superior varieties tailored to different agro-climatic conditions. Since its establishment in 2008, the project has facilitated strong collaborations among the ICAR institutes, state agricultural universities, and other research organizations, driving continuous progress in the varietal and technological development.

Over the past three decades, India's onion production has skyrocketed from 40 lakh tons to 302 lakh tonnes, while garlic production has surged from 4 to 32 lakh tonnes. This significant growth in production has outpaced the expansion of cultivation areas, indicating substantial improvements in productivity. The remarkable progress can be largely attributed to the adoption of high-yielding varieties and hybrids, as well as advanced technologies, supported by the institutional frameworks for their enhancement.

Systematic multi-location testing is crucial for identifying genotypes with consistent yields, resilience to biotic and abiotic stresses, and adaptability to diverse agro-climatic regions. Evaluating newly developed varieties across various environments enables the analysis of genotype x environment interactions and ensures the selection of superior varieties. Standardized norms and guidelines are essential to maintain the consistency across the vast national testing network. Prior to the establishment of these guidelines, there was a lack of comprehensive and standardized documentation for the variety release process under AINRPOG, leading to inconsistencies in the evaluation and release of onion and garlic varieties.

This important task was assigned to a dedicated committee to develop the comprehensive guidelines. Through thorough discussions, numerous meetings, and active collaboration with experts in the field of *Allium* species across the country, these guidelines have been meticulously crafted into their current simplified format for the purpose of varietal identification, evaluation, and release.

The document titled "**Guidelines for Identification of Onion & Garlic Variety/Hybrid Evaluated under AINRPOG for Release**" delineates the procedures for multi-location testing, data documentation, and decision-making criteria to ensure that only the most promising varieties are recommended for commercial cultivation. The primary objective of these guidelines is to streamline the evaluation and identification process of potential onion and garlic varieties/ hybrids, ensuring they meet the highest standards of productivity, disease resistance, and market demand.

These guidelines will serve as a valuable resource for the Central-Sub Committee on Crop Standards, Notification, and Release of Varieties for Horticultural Crops, facilitating a systematic approach to varietal evaluation and enhancing the efficiency and credibility of the variety release process. It is anticipated that this document will become an authoritative point of reference for breeders, researchers, and regulatory authorities, ultimately improving the efficiency of varietal release and supporting India's long-term objectives for sustainable horticultural development and global competitiveness.



(Sanjay Kumar Singh)

Preface

The Indian horticulture sector plays a pivotal role in ensuring nutritional security, enhancing rural employment opportunities, and diversifying farm activities. Contributing nearly 33% to the agriculture Gross Value Added, the sector significantly strengthens the Indian economy. With a total production of 320.48 million tons, horticulture has surpassed food grain production while utilizing a much smaller area 25.66 million hectares for horticulture compared to 127.60 million hectares for food grains. This transformation is largely attributed to the development and adoption of high-yielding varieties and hybrids across several horticultural crops. The remarkable progress in India's crop improvement programs would not have been possible without the simultaneous evolution of institutional frameworks for crop breeding & technology research and seed production.

Among horticultural crops, onion and garlic hold immense economic and strategic importance due to their widespread consumption, export potential, and essential role in Indian cuisine. India is the largest producer of onions globally, with a robust domestic and export market for both crops. The country produces 302.08 lakh tons of onion from 17.40 lakh hectares and 32.66 lakh tons of garlic from 4.09 lakh hectares. Recognizing the economic and strategic importance of onion and garlic, ICAR approved the All India Network Research Project on Onion and Garlic (AINRPOG) during the XI Plan in 2007-2012. The project officially began functioning in 2009-10, with the ICAR-Directorate of Onion and Garlic Research (ICAR-DOGR), Pune, as the coordinating center. Currently, AINRPOG operates through 10 main centers, 13 voluntary centers, and 2 cooperating centers, covering all major onion and garlic growing states. The primary objective of this network is to identify region-specific research needs and to evaluate and validate varieties and technologies developed by different research institutions for their suitability to specific agro-climatic zones.

A multi-disciplinary approach for crop improvement, agronomic practices, plant health management and post-harvest handling is followed to do research under the AINRPOG. This program emphasizes on the collective

planning, evaluation and exchange of germplasm across the Institutes and SAU's of the country, which is a biggest strength to enhance the scientific growth of this program. The multi-location testing system under AINRPOG enables to generate performance data of planned experiments across the diverse agro-climatic conditions. Besides public sector organizations, the role of private sector is also appreciable in the crop improvement, seed production and supply chain of vegetable crops. In cereals and other major crops, standard protocols have been developed and are in operation, while in onion and garlic it is lacking for identification and release of varieties/hybrids. Since, these bulb crops are photo-thermosensitive, therefore along with yield, traits for adaptability, resistance to key pests, bolting tolerance, processing, storability and market acceptability have to be given due importance.

In this direction, a committee was constituted by the Deputy Director General (Horticulture), ICAR. After series of meetings with the experts working on *Allium* species in the country, the present document '*Guidelines for Identification of Onion & Garlic Variety/Hybrid Evaluated under AINRPOG for Release*' has been developed. These guidelines will provide a framework for multi-location testing, data documentation and decision-making to identify and recommend promising high-yielding and resilient varieties/hybrids for commercial cultivation in the country.

The support provided by the Indian Council of Agricultural Research (ICAR) in the formulation of these guidelines is thankfully acknowledged. The guidance and encouragement given by Dr. Sanjay Kumar Singh, Deputy Director General (Horticultural Science) to develop these guidelines is gratefully documented. The Committee also expresses gratitude to ICAR-Directorate of Onion and Garlic Research, Pune, for facilitating discussions and logistical support during the drafting process.

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Date: 04.04.2025

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Proceedings of the Meeting held for Development of Guidelines for Identification of Onion & Garlic Variety/ Hybrid Evaluated Under AINRPOG for Release

The Hon'ble DDG (Hort. Sci.) constituted a committee vide ICAR vide File No. Hort. 10(86)/2023-HS-II (E-270712) dated 6th Nov, 2023 to draft guidelines for identification of variety/ hybrid evaluated under AINRPOG. A meeting of the committee was held online on 2nd Dec, 2023 at 10.00 AM and following were present in the meeting:

1.	Dr. Ajmer Singh Dhatt, Director Research, PAU, Ludhiana, Punjab	Chairman
2.	Dr. Sudhakar Pandey, Assistant Director General (PVS & MP), Hort. Sci., ICAR, New Delhi	Member
3.	Dr. R. P. Gupta, Ex-Director, NHRDF, New Delhi	Member
4.	Dr. Amar Jeet Gupta, Principal Scientist (Hort-Veg. Sci.), ICAR-DOGR, Pune, Maharashtra	Member
5.	Dr. V. Mahajan, Director, ICAR-DOGR, Pune, Maharashtra	Member Secretary

The final meeting of the above committee was held on 11th April, 2024 to finalize the draft guidelines for identification of variety/ hybrids evaluated under AINRPOG and all the members of the committee were present. After thorough discussion, keeping in view the previous guidelines and inputs taken from the experts working on Allium species in the country, a simplified draft of guidelines for identification of variety/ hybrid evaluated under AINRPOG are proposed as under:

PART A: Guidelines for Identification of Variety/ Hybrid Evaluated Under AINRPOG for Release

1. Criteria for Identification of Variety/ Hybrid in Onion, Multiplier & Rose Type Onion

a. General criteria for yield traits in onion, multiplier and rose type onion

- i. Varietal/ Hybrid/ Resistant trials: An entry performing under top three ranks for atleast two years at minimum two locations in one zone should be considered for recommendation.
- ii. The entry should be significantly superior for two years over the best check for yield, but in situation of non-significance at any one center in a year (out of two), then 10% superiority of a variety and 15% of a hybrid can be considered.
- iii. The entry being evaluated for trait specific character must be significantly superior over best check with respect to particular character like earliness or bolting tolerance or bulb storability or TSS or resistant/ tolerant to disease (*Stemphylium* leaf-blight or Purple blotch or Anthracnose) or pest (thrips).
- iv. The best check selected for marketable yield or earliness or bolting tolerance or bulb storability or TSS or resistant/ tolerant to disease(s) or thrips should also be assessed for other important horticultural traits.
- v. The bulb shape, size and colour should be uniform. The other important traits like less double and bolter bulbs must be considered for variety/hybrid identification.
- vi. National average yield should also be considered for qualifying, while identifying the variety (onion 19.0 t/ha during *LK & Rabi*, 11.0 t/ha during *kharif*; multiplier onion 10.0 t/ha during *rabi*, 8.0 t/ha during *kharif*; and rose type onion 12.0 t/ha during *rabi*, 8.0 t/ha during *kharif*).

- vii. In special case, if a trial is failed in some of the locations in that zone and in such situation or has less than three locations in a particular zone, then an entry performing significantly superior over best check for atleast two years at one location and one year at another location in particular zone may be considered for recommendation considering the requirement of variety/hybrid for that particular zone.

b. Criteria for trait specific characters in onion

In all trait specific trials, the yield of entry must be above the national average as given above in Point No vi, while other criteria for consideration to identify trait specific variety/hybrids in onion should be as below:

- i. **For Earliness:** Minimum 10 days earliness after transplanting over best check or days to maturity in different zones should be as given in below table:

Zone	Maximum days to maturity for earliness		Normal days to maturity	
	Kharif	LK and Rabi	Kharif	LK and Rabi
Zone I	-	140	-	170
Zone II	110	120	120	130
Zone III & IV	100	115	110	125
Zone V & VI	90	110	105	120

- ii. **For Bolting Tolerance:** Bolting should be less than 5% in tolerant entry, while in susceptible check bolting should be more than 15% in respective zones and seasons or minimum 10% less bolting in comparison with best check. Bolting data should be taken at the time of harvesting stage.
- iii. **For Bulb Storability:** Maximum 30% total weight loss (including sprouting, rotting and physiological weight loss) after 4 months of storage of *rabi* or 2 months of *late kharif* or 1 month of *kharif* season onion and should have atleast 10% difference in comparison to best check for storage under naturally ventilated storage structure.
- iv. **Processing traits:** The entry for identification should have more than or equal to 16% TSS for processing purpose in onion. Further, varieties may

have more than 60% proportion of marketable bulbs preferably white bulbs.

- v. **For Disease(s):** Less than 10% PDI of *Stemphylium* leaf-blight or Purple blotch or Anthracnose and there should be more than 50% PDI in susceptible check, while identifying an entry for resistance to disease(s) under epiphytotic and artificial screening.
- vi. **For Thrips:** Less than 20% foliage damage by thrips and more than 60% foliage damage and/or should have more than 30 thrips/plant (above ETL) in susceptible check, while identifying an entry tolerant to thrips under field and controlled screening.

c. Criteria for trait specific characters in multiplier onion

- i. **For Earliness:** Minimum 7 days earliness after planting over best check or less than 75 days after planting during *kharif* or 85 days after planting during *rabi*, while identifying an entry for earliness in multiplier onion.
- ii. **For Bulb Storability, TSS, Disease(s) and Thrips** same as onion.

d. Criteria for trait specific characters in rose type onion

- i. **For Earliness:** Minimum 7 days earliness after sowing over best check or less than 80 days after planting during *kharif* or 90 days after planting during *rabi*, while identifying an entry for earliness in multiplier onion.
- ii. **For Bulb Storability, TSS, Disease(s) and Thrips** same as onion.

2. Criteria for Identification of Variety in Garlic

a. General criteria for yield traits in garlic

- i. **Varietal/ Resistant trials:** An entry performing under top three ranks for at least two years at a minimum of two locations in one zone should be considered for recommendation.
- ii. The entry should be significantly superior for two years over the best check for yield, but in situation of non-significance at any one center in a year (out of two), then 10% superiority of a variety can be considered.
- iii. The entry being evaluated for trait specific character must be

significantly superior over best check with respect to particular character like earliness or bulb storability or TSS or resistant/ tolerant to disease (*Stemphylium* leaf-blight or Purple blotch or pest (thrips).

- iv. The best check selected for marketable yield or earliness or bulb storability or TSS or resistant/ tolerant to disease(s) or thrips should also be assessed for other important horticultural traits.
- v. Other important traits like bulb shape and colour may be considered for varieties identification. The bulb shape and colour should be uniform.
- vi. National average yield should also be considered, while identifying the variety (garlic 8.0 t/ha during *rabi*).
- viii. In special case, if a trial is failed in some of the locations in that zone and in such situation or if a trial has less than three locations in a particular zone, then an entry performing significantly superior over best check for atleast two years at one location and one year at another location in particular zone may be considered for recommendation considering the requirement of variety for that particular zone.

b. Criteria for trait specific characters in garlic

Minimum yield should be above the national average as per Point No vi, while other criteria for consideration to identify trait specific variety in garlic should be as below:

- i. **For Earliness:** Minimum 15 days earliness after planting over best check or days to maturity in different zones should be as given in below table:

Zones	Maximum days to maturity for earliness	Normal days to maturity
Zone I	170	200
Zone II	150	170
Zone III & IV	140	160
Zone V & VI	130	150

- ii. **For Bulb Storability:** Maximum 10% total weight loss after 6 months of storage during *rabi* and should have atleast 10% difference in total weight loss in comparison to best check, while identifying an entry for long shelf-life of garlic at ambient room temperature.
- iii. **Processing traits:** The entry for identification should have more than 45% TSS, while identifying an entry for processing purpose in garlic. Further, varieties should have 15-20 bold and white cloves. For boldness in cloves, the weight of clove may be more than 2 g per clove.
- iv. **For disease(s) and thrips** same as in onion.

3. Criteria For Conducting Varietal Trial

- i. Maximum three (2 national + 1 local) suitable checks for zone(s) may be included in the varietal/ hybrid/ trait specific trials during IET and same checks will be continued in AVT-I and AVT-II.
- ii. The best check selected for marketable yield or earliness or bolting tolerance or bulb storability or TSS or resistant/ tolerant to disease(s) or thrips should also be evaluated for other important traits.
- iii. In the hybrid trial(s), one popular commercial hybrid and two popular varieties one as national check and one local check may be included during formulation of trial and best check should be consider for comparison and recommendation of hybrids.
- iv. In trial for evaluating specific character (earliness or bolting tolerance or bulb storability or TSS or resistant/ tolerant to disease(s) or pest) atleast one trait specific check along with national check should be included in the trials. In case of disease or pest resistance, the occurrence of pest or disease on susceptible check must be ensured creating artificial or epiphytotic conditions.

4. Suggested Format for Summary Report of Varietal Trial: Varietal Trials(.... trials)

1. Crop/Trial: Onion /Garlic (IET, AVT-I, AVT-II) (Checks: 1.....2.....3.....)

Centre	Trial	Year	Rank-wise entry of the trait.....			Best Check	CD 5%	Zone
			I	II	III			
			Entry (value)	Entry (value)	Entry (value)	Check (value)	...	
Srinagar	IET							I
	AVT-I							
	AVT-II							
Almora	IET							
	AVT-I							
	AVT-II							
Palampur	IET							
	AVT-I							
	AVT-II							
Tripura	IET							
	AVT-I							
	AVT-II							

2.Crop/Trial: Onion/ Garlic(IET, AVT-I, AVT-II)

Season: Kharif	Entry/ Trial	Decode	Zone II					
Trial & Year	Code		Durga pura	Jammu	Karnal	Ludhi ana	IARI	Mean
			MY	MY	MY	MY	MY	
IET								
AVT-I								
AVT-II								
	Mean							
IET								
AVT-I								
AVT-II								
	Mean							
IET								
AVT-I								
AVT-II								
	Mean							
IET								
AVT-I								
AVT-II								
	Mean							
Contd. for all entries								
IET	CD at5%							
AVT-I	CD at 5%							
AVT-II	CD at 5%							

Season: Kharif	Entry/ Trial	Decode	Zone II					
Trial & Year	Code		Durga pura	Jammu	Karnal	Ludhi ana	IARI	Mean
			MY	MY	MY	MY	MY	
IET	CV %							
AVT-I	CV %							
AVT-II	CV %							
IET	SEm							
AVT-I	SEm							
AVT-II	SEm							

Note: Same table may be used for all zones and all the traits.

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Part B: Guidelines for Testing the Onion & Garlic Varieties and Hybrids under AINRPOG (All India Network Research Project on Onion & Garlic)

The procedures/guidelines for conducting of All India Network Research Project on Onion and Garlic (AINRPOG):

1. Stages of Network Testing

The three-tier system of multi-location evaluation spread over a minimum period of three years, involving following stages are must for release of a variety or hybrid. This process comprises the following stages:

- (i) First year: Initial Evaluation Trial (IET)
- (ii) Second year: Advanced Varietal Trial I (AVT-I)
- (iii) Third year: Advanced Varietal Trial II (AVT-II)

2. Mode of Induction of Test Entries

- (i) Test entries in network trials shall be included in the network trials depends upon two years of data derived from pre-network testing including station and other trials. The nominated entries must undergo thorough evaluation or screening in station/regional trials conducted by the sponsoring breeder/ institution/ organization/ company. All data from pre-network tests on yield and other important horticultural attributes, responses to pest and diseases or relevant quality parameters, should be provided to the coordinator in support of inclusion of test entries in network trials (***Proforma for submission of new entry in networking trials is attached as Annexure 1a & 1b.***)
- (ii) If the entry is to be tested for specific character, the specific character for which it is to be tested should be mentioned and accordingly trial shall be formulated.
- (iii) The entries shall be included on the basis of their superior performance in terms of yield and/or other desirable traits, such as resistance/ tolerance to biotic/abiotic stresses, superior quality components or other important traits.

- (iv) Entries must exhibit a high degree of phenotypic uniformity and genotypic stability.
- (v) The seeds supplied for testing entry must adhere to minimum seed certification standards for germination and physical purity.
- (vi) Entries may be possessing distinct test features that differentiate them from varieties of common knowledge or use.
- (vii) Information about the pedigree/parentage of entries must be provided to the coordinator at the nomination stage by the sponsoring breeder/ institution/ organization/ company. Preference will be given to entries with diverse parentage/genetic bases if performance levels are similar.
- (viii) Acceptance of entries for network testing follows the same system, regardless of the method used in the development of lines.
- (ix) Induction of entries from private organizations with established R&D units would require:
 - a. Discussion and approval in the annual workshop/group meeting of the All India Network Research Project on Onion and Garlic, chaired by the DDG(HS)/ADG or his representative.
 - b. Strict adherence to national laws, especially those pertaining to bio-safety and other regulations.
 - c. Payment of a minimum fee specified by the Council time to time. At present minimum Rs. 60000/- per entry per season per year is required to be paid in advance and should be paid for three years before the commencement of the trial.

3. Evaluation of Test Entries

The separate set of trials will be conducted in accordance with the three stages outlined above. The evaluation of test entries will remain consistent across these three stages (IET, AVT-I and AVT-II) with the following considerations:

a. Constitution of trials

These trials would be constituted with new entries sponsored by breeders/institutions along with the specified check varieties, including the

latest identified/released varieties. An IET trials would be formulated segment-wise i.e; red onion varietal trial, white onion varietal trail, yellow onion varietal trial, multiplier onion varietal trial, rose onion varietal trials/ hybrid trials, garlic varietal trials and may be other as and when required. The separate trials for specific traits in onion or garlic may be formulated based on the requirements.

b. Number of entries

A minimum of two entries will be required to create an IET trial for multi-location evaluation excluding checks.

c. Check varieties

A maximum of three check varieties shall be used, comprising the following:

- i. National check: Two national checks shall be used for evaluation of trials. National check refers to a cultivar that has been grown across diverse environments and regions for a substantial duration, wherever feasible. Examples for onions include Bhima Super, Bhima Dark Red for *kharif*, Bhima Shakti for *late kharif* and Bhima Shakti, Bhima Kiran for *rabi*. In the case of garlic, Agrifound White (G-41) is identified as a suitable check variety for *rabi*.
- ii. Local check: The variety commonly grown in a given region/ environment of the trial location.
- iii. Additional check: If required, may be included whenever felt necessary.
- iv. The national and local checks will remain consistent for a minimum period of three years (IET, AVT-I, AVT-II) to facilitate comparisons with the identical test entries.

d. Source and quality of seeds for entries

Genetically pure and true-to-type seeds, fulfilling minimum seed certification standards, shall be used during trials. The minimum quantity of quality seeds/ bulbs/ bulblets/ planting material are required per entry per centre per season for conducting the trail. Minimum 30 g quality seed of onion or 1500 healthy cloves of garlic or 1500 medium sized bulblets of multiplier onion per entry per centre per season are required. The agencies responsible for maintenance/

multiplication will ensure that the supplied seed quality conforms to the minimum seed certification standards. Seed/ planting material should be supplied well in time (up to 31st May for *kharif* and *late kharif* onion trials; up to 31st July for *rabi* onion and garlic trials) to the Project Director, ICAR-DOGR, Pune.

i. Test entries: The breeder/ sponsoring institution/ organization/ company will supply the seed which ensures germination and physical purity standards equivalent to the minimum seed certification standards of the crop.

ii. National checks: The required quantity of seeds must be produced and arranged by the concerned network center/ institution/ organization. The Project Director must facilitate timely supply of the requisite quantity.

iii. Local checks: Seeds of local checks identified should be supplied by the concern breeder/institution/organization to the Project Director, ICAR-DOGR, Pune well in time specified so that it will be further coded and supplied along with entries to different centers to concerned breeder /institution/ organization.

iv. Coding of entries: All the entries including checks will be coded by the Project Director before sending to different centers. The code detail should also be submitted to DDG (HS)/ ADG (VS) every year. The centers should not change the code and should report as per the codes provided for the entries. The codes and decodes will be reported in annual report of AINRPOG.

e. Experimental design and field layout

- i. The experimental design, specifically the Randomized Block Design (RBD), will consist of three replications for a plot size of normally $3 \times 2 \text{ m}^2$. However, in cases where there are less than four entries, the RBD design with four replications for a $2 \times 2 \text{ m}^2$ plot size should be determined during workshops based on past trial experience. This approach aims to minimize experimental errors and enhance the ability to detect specified differences. All the *kharif* trials should be conducted on raised beds of 1.2 m width and about 15 cm height ($1 \times 6 \text{ m}^2$) with well drainage. Accordingly, the net plot size should be of 1 m width and 6 m length. If the entries are less than four than plot size should be of 1 m width and 4 m length ($1 \times 4 \text{ m}^2$) with four replications.

- ii. Plot size and replications should be consistent across all test locations.
- iii. The experiment should be conducted in well-leveled fields with uniform fertility.
- iv. All replications should be accommodated in the same field, if necessary, should be shifted to an adjacent field as a whole.

f. Cultural practices of trials

- i. Cultural practices should be followed as per the technical programme formulated during the workshop.

g. Locations/centers for test of entries

- i. The same set of trials (IET, AVT-I, AVT-II) should be conducted across all zones where the trial is allotted.
- ii. Test centers, preferably ICAR Institutes, SAUs, Regional Research Centers, or State Govt Centers, should be identified in workshops (***The details of Zones under AINRPOG are attached as Annexure 2***).
- iii. Aim for maximum test locations with at least three trial sites in each zone.
- iv. Avoid clustering trial sites in any one region/zone.

h. Monitoring of trials

The monitoring of trials should be conducted in accordance with the guidelines specified in the monitoring report of AINRPOG trials (***Proforma for monitoring of onion and garlic trials under AINRPOG is attached as Annexure 3***).

- i. A monitoring team will be constituted by the Project Director during workshop which should include minimum three members which may consist a Plant Breeder, Horticulturist/ Agronomist, Pathologist/ Entomologist, and other specified discipline scientists according to the need of trials to be monitored. The team leader may be Project Director or any senior member of team.
- ii. The team should assess trial quality, management and data reliability during visits from full growth stage.
- iii. Observations should cover plot uniformity, crop stand, pest and disease incidence and other factors affecting data quality.

- iv. Yield estimates, trial acceptance/rejection recommendations and data on agronomic features should be provided by the monitoring team.
- v. Monitoring team should submit duly signed report to Project Director, ICAR-DOGR, Pune within 5 days of monitoring.

i. Data generation

- i. Record data on economic produce and agronomic features, as specified by the workshop (***Format for important traits of onion and garlic are attached as Annexure 4).***
- ii. Generate additional data (if required) under artificial test conditions and hot spots for pest and diseases.
- iii. Provide each test center with proforma/data-books, measurement scales and descriptors.
- iv. Cooperators should adhere to guidelines, record observations and if asked should submit data-books to the Project Director.

j. Data processing

- i. All the data received at the coordination cell shall be critically examined to decide suitability for inclusion for further statistical processing or compilation in report.
- ii. The trial data may be considered for removal or acceptance for further processing on the basis of the following:
 - a. Recommendations of the monitoring team
 - b. Suggestions by the PI/concerned breeder
 - c. Deviation from the specified range of sowing date, specified crop management practices for the trial such as fertilizer doses, irrigation system (drip/ flood) etc.
 - d. Any other serious flaw in conducting of trial/ data recording/ reporting
 - e. Damage by animals/ birds/ natural calamity

All the trials considered acceptable on the basis of the above may be statistically analysed.

k. Additional data to be generated at AVT-II stage

- i. Evaluate how the crop responds to various agronomic variables such as different sowing dates, population densities in terms of spacing and levels of fertilization and irrigation. This information may be collected from exclusive trials conducted at selected centers by agronomists.
- ii. Examine the reaction to additional pest and diseases of relatively lesser importance to the crop, including nematodes and bacteria.
- iii. Make an effort to identify genes responsible for resistance/tolerance in new strains, wherever feasible.
- iv. Conduct a thorough evaluation of specific DUS test characteristics of parameters relevant to the onion, garlic and multiplier onion (Format as **Annexure 5**). This assessment should be carried out in fields/ laboratories with the necessary facilities specified by the workshop.
- v. Record the responses to relevant abiotic stresses and other important characteristics with the collaboration of Project Director and Scientist/ Breeder from respective disciplines.
- vi. Generate supplementary information regarding farmer/ consumer/ market acceptance through verification/ on-farm trials, wherever feasible.

4. Variety Identification Procedure

Outstanding and eligible test entries will be selected based on their performance in specific zone(s) during the workshop/ group meeting. The committee responsible for this task, known as the "Variety Identification Committee," will be established/ formulated prior to the annual workshop/group meeting with the approval of the Deputy Director General (Hort. Sci). The identified variety shall be submitted to the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops for release and notification.

a. Constitution of Variety Identification Committee

The Variety Identification Committee shall comprise the following.

Deputy Director General (Hort. Sci.) or his nominee	Chairman
Assistant Director General (Vegetables)	Member
Three Eminent Scientists from Crop Improvement	Member
One Eminent Scientist from Plant Protection	Member
One Eminent Scientist from Crop Production	Member
Director Research/ Joint Director or his nominee or HOD of host University/ Institute	Member
One representative from private seed industries	Member
Project Director, ICAR-DOGR	Member Secretary

The compiled report will be presented in the group meeting and before the committee by the scientist (s) nominated by the Project Director. The committee member will be nominated by DDG (Hort. Sci.). A quorum of five members needs to be present (Chairman or his nominee and Member Secretary are essential members). There may be provision to include one or two additional members with the permission of the Chairman as and when required.

b. Process of identification of variety

Eligibility for Identification

- i. A candidate variety becomes eligible for identification when it meets the following minimum requirements:
 - a. Three years of yield or other specific trait data from Network trials within a specified ecology/zones are mandatory.
 - b. It is essential to have at least two years of data on disease and pest reactions under field or hot spot/artificial epiphytotic conditions within the networking project.
- ii. The availability of a sufficient quantity of pure seed is necessary for planting a minimum of one acre (Onion and Garlic). If the specified

quantity is unavailable, the identification process may be postponed to a later stage, but not exceeding one year. Buffer stock of atleast 2 kg should be kept looking to the environmental calamities.

- iii. The breeder must possess pure/nucleus seed of high quality for the cultivation of atleast 0.5 acre. The nucleus seed should have been produced in adherence to the prescribed guidelines for each crop.

Data Compilation & Presentation

The Project Director will nominate the scientist who will compile the data based on three years trials using the prescribed proforma (**Annexure A&B**) and guidelines as mentioned at the beginning and should be submitted atleast 20 days before the workshop. The compiled report will be presented during the group meeting before the Variety Identification Committee.

c. Criteria for Identification of Variety/ Hybrid

Varietal identification will be done according to the criteria for identification of variety/ hybrid under AINRPOG approved by the DDG(HS)(Part A)

d. Relaxation in Minimum Years of Testing for Identification under special circumstances:

The Variety Identification Committee may consider a one-year relaxation in the testing period under the networking system in the following circumstances:

- i. A genotype that represents a recognized or identifiable major breakthrough in yield potential.
- ii. A genotype capable of mitigating substantial yield losses by containing a major epidemic of any disease or insect-pest to which existing varieties are susceptible.
- iii. A genotype capable of providing protection against a widely occurring disease or insect-pest of major importance, leading to economic losses on a large scale, especially when resistance is unavailable in already released varieties.
- iv. A genotype possessing a distinctive and crucial feature not present in

existing varieties, with broader implications for agricultural exports or processing industries or other specific trait.

e. Availability of Test Stock and Nucleus Seed

At the time of submitting a proposal for identification, there must be available test stock of seed/planting material (pure high-quality seed produced by the relevant breeder/institute) for planting in one-acre area for production, demonstrations and adaptive trials.

f. Molecular Fingerprinting of Identified Variety

DNA profiling of the variety, its parental lines and the hybrid, along with information about the molecular markers (if available in the public domain), should be conducted subsequently for identification of a specific variety. This process should be completed before the submission of release and notification proposals to CVRC.

g. Variety Release and Notification

Central Release Procedure

Upon identification of the variety/hybrid, it is imperative to deposit seeds of the variety/hybrid and its parental lines to NBPGR for preservation in the gene bank to get the IC number. The IC number of testing entry may be obtained before identification from the NBPGR during initial stage of trials as per procedure. After obtaining the acknowledgment with IC No. from the NBPGR, the proposal for release and notification of the variety/hybrid must be submitted to the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops. This submission should include DNA fingerprinting data and high-quality photographs of bulbs, cloves, plants and field views. Proforma for submitting a proposal to the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops is attached as **Annexure 6**.

Note: AINRPOG data can be used to prepare proposal for release to the State Seed Sub-Committee. Once the variety is released by the State Seed Sub-Committee, a proposal should be submitted to the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops for notification and copy of proposal should be submitted to ICAR-DOGR, Pune for information and record.

Annexure-1a

Proforma for submission of New Entry of Onion in Network trial

Name of organization	:	
Name of entry	:	
Name of crop	:	
Colour of bulb	:	
Year/Season of data reported	:	
Purpose of testing	:	(Specify character (s) for which it is to be tested)
Description of new entries (describe in 5-10 lines)	:	

Following traits data may be provided for onion entry to be evaluated under AINRPOG-IET trials:

Table 1. Total yield (q/ha)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV(%)						

Table 2. Marketable yield (q/ha)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Table 3. Average bulb weight (g/ bulb)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Table 4. Trait specific character i.e., earliness or bolting tolerance or bulb storability or TSS or resistant/ tolerant to disease (*Stemphylium* leaf-blight or Purple blotch or Anthracnose) or pest (thrips)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Signature of Scientist

Signature of Head of Department/Organization

Annexure-1b

Proforma for submission of New Entry of Garlic in Network trial

Name of organization	:	
Name of entry	:	
Name of crop	:	
Colour of bulb and clove	:	
Season of data reported	:	
Purpose of testing	:	(Specify character(s) for which it is to be tested)
Description of new entries (describe in 5-10 lines)	:	

Following characters may be given for garlic entry for evaluation under AINRPOG-IET trials:

Table 1. Total yield (q/ha)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Table 2. Marketable yield (q/ha)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Table 3. Average bulb weight (g/ bulb)

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Table 4. Trait specific character i.e., earliness or Average weight of 10 cloves (g) or Average number of cloves/ bulb or bulb storability or TSS or resistant/ tolerant to disease (*Stemphylium* leaf-blight or Purple blotch or pest (thrips).

Entry	Year 1	Year 2	Mean	% increase over best check of year 1	% increase over best check of year 2	% increase over best check of mean
New Entry						
Check(s) (National)						
Check (Local)						
S.E.						
CD at 5%						
CV (%)						

Signature of Scientist

Signature of Head of Department/Organization

Annexure-2

Zones for Evaluation of Onion & Garlic

Revised during 3rd AINRPOG Group Meeting held at JAU, Junagadh (22-23 June, 2012)

Zone 1: Srinagar, Almora, Mukteshwar, Palampur, Ooty

Zone 2: Jammu, Ludhiana, Delhi, Karnal, Hissar, Durgapura

Zone 3: Varanasi, Kanpur, Samastipur, Kalyani, Imphal

Zone 4: Jabalpur, Raipur, Chiplima, Akola, Jhalawar

Zone 5: Junagadh, Nashik, Rahuri, Pune

Zone 6: Bagalkot, Bengaluru, Coimbatore, Dharwad

***Zone 1** was considered as Hill Zone hence Ooty was considered as in hill zone*

Note: Further if new centers are included or deleted during the trials besides the above identified centers in the zones, the newly added center will be included in respective zones or deleted center will be removed from the respective zone

Present Position of Zone-Wise Existing Centers Under AINRPOG

Zone I: Srinagar, Mukteshwar, Almora, Palampur, Ooty

Zone II: Durgapura (Jobner), Karnal, Ludhiana, Delhi

Zone III: Kalyani, Kanpur, Banda*, Boudh*, Tripura, Sikkim

Zone IV: Akola, Jabalpur, Raipur, Mandsaur.

Zone V: Junagadh, Nashik, Rahuri, Pune, Dahod*

Zone VI: Chitradurga*, Coimbatore, Bengaluru, Dharwad, Hyderabad

*Cooperating Centre: (Without Financial support)

Monitoring Report of All India Network Research Project on Onion and Garlic Trials

Name of Centre: ----- Name of PI of the Centre: ----- Date of Monitoring: -----

1. Crop Improvement

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
1.1	GERMPLASM								
1.2	VARIETAL TRIALS								
1.2.1	ONION VARIETAL TRIALS								

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
1.2.2	GARLIC VARIETAL TRIALS								
1.2.3									

* A=Out Standing, B=Very Good, C=Good, D=Average, E=Poor

Signature			
	Monitoring Team leader	Monitoring team member 1	Monitoring team member 2
			Signature of PI/Co-PI

2. Crop Production

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions

3. Plant Health Management

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
3.1	DISEASE MANAGEMENT IN ONION & GARLIC								

S. No.	Trial	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
3.2	PEST MANAGEMENT IN ONION AND GARLIC								

4. Post Harvest Technology

S. No.	Trial	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions

Signature			
	Monitoring Team leader	Monitoring team member 1	Monitoring team member 2
			Signature of PI/Co-PI

5. Onion Seed Production

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
	Seed production status of Onion & Garlic								

6. Extension

S. No.	Trials	Allotted/ Not allotted	If Allotted Conducted or not conducted	No. of entries or treatments	Date of Sowing/ planting	No. of replications	Condition of the crop*	Status of Experiments	Remarks/ problems/ suggestions
		Allotted	conducted	--	--	--	--	Progress	

Signature			
	Monitoring Team leader	Monitoring team member 1	Monitoring team member 2
			Signature of PI/Co-PI

Summary of report by Monitoring Team (Confidential):

	Grade	Remarks
Grading for Crop Improvement trials*		
Grading for Crop Production trials*		
Grading for Crop Protection trials*		
Grading for Infrastructure facilities*		
Over all Grading of the Centre*		

* A=Out Standing, B=Very Good, C=Good, D=Average, E=Poor

	Monitoring Team leader	Monitoring team member 1	Monitoring team member 2
Signature			
Name			
Date			

	Nodal Officer (AINRPOG)	Director, ICAR-DOGR
Signature		
Name		
Date		

Infrastructure Facility Developed, if any

S. No.	Equipment/Works	Purchased or not	If not, reason for not purchasing	If Yes, in Use or Not	Remarks

Manpower in position:

SRF/ YPs	Appointed or not	If yes, date of appointment	Qualification	If resigned, Date of resignation	If not appointed, Action taken if any	Remarks
1.						
2.						

Signature of PI/Co-PI of the Centre

Annexure-4

Important specific traits regarding Criteria for Identification

1. Marketable yield(q/ha)
2. Earliness(days)
3. Bulb storability(% total weight loss)
4. TSS(%)
5. Reaction to major disease (*Stemphylium* leaf blight or purple blotch or Anthracnose)(PDI)
6. Reaction to major pest(thrips)(% damage)

Observations to be recorded in Onion

1. Marketable yield(q/ha)
2. % Double bulbs
3. % Bolter bulbs
4. Total yield(q/ha)
5. Neck thickness(cm)
6. Average weight of marketable bulbs(g)
7. Total Soluble Solids(%)
8. Days to maturity after transplanting
9. Days to harvest after transplanting
10. Disease intensity of Purple blotch/ *Stemphylium* leaf blight/Anthracnose (PDI)
11. Thrips damage(%)
12. Colour of bulb after curing
13. Shape of bulb
14. Pyruvic acid
15. Reducing sugar(%)
16. Non reducing sugar(%)
17. Bulb Storability(% loss)

Observations to be recorded in Garlic

1. Average bulb weight(g)
2. Average number of cloves per compound bulb
3. Average weight of 10 cloves(g)
4. Total yield(q/ha)
5. Marketable yield(q/ha)
6. Days to 50% neck fall/ yellowing
7. Days to harvesting
8. Disease intensity of Purple blotch/ *Stemphylium* leaf blight/Anthracnose (PDI)
9. Thrips damage(%)
10. Shape of mature bulb in longitudinal section(Elliptic/Ovate/Circular)
11. Bulb Skin Colour(White, Violet Stripes, Violet)
12. Clove Skin Colour(White, Violet Stripes, Violet)
13. Bulb Storability(% loss)

Observations to be recorded in Multiplier Onion

1. Bulblet-polar diameter(cm)
2. Bulblet-equatorial diameter(cm)
3. Number of bulblets/plant(i.e. per hill)
4. Weight of bulblets/plant(g)(i.e. per hill)
5. Average bulblet weight(g)
6. Days to harvest after planting
7. % Bolter plants(on basis of number of bolted plants(i.e. per hill)
8. Total yield(q/ha)(with leaves after curing)
9. Marketable yield(q/ha)(without leaves after curing)
10. % Total Soluble Solids
11. % Storage loss after 4 months of storage(on weight basis)
12. *Stemphylium* incidence(PDI)
13. Purple blotch incidence(PDI)
14. Thrips damage(%)
15. Bulblet colour(Dark Red, Medium Red, Light Red, Pink, Yellow and White)
16. Bulblet shape(Globe /Oval /Elliptic)

Annexure-5

DUS Testing Characteristics Notified by PPV&FRA

(<https://plantaauthority.gov.in/crop-dus-guidelines>)

1. DUS Test Characteristics of Onion

S. No	Characteristics	States
A. For common onion varieties		
1	Plant: Number of leaves per pseudo-stem	Few(<10)
		Medium(10-15)
		Many(>15)
2	Foliage: Length(from pseudostem to tip of leaf)	Short (<30 cm)
		Medium(30-45 cm)
		Long(>45 cm)
3	Bulb: Time of maturity(from date of sowing)	Early(<140 days)
		Medium(140-160 days)
		Late(>160 days)
4	Bulb: Height	Short(<3 cm)
		Medium(3-5 cm)
		Tall(>5 cm)
5	Bulb: Diameter	Small(<4.5 cm)
		Medium(4.5-6.0 cm)
		Large(>6.0 cm)
B. For multiplier onion varieties		
6	Total number of leaves /hills	Few(<10)
		Medium(10-15)
		Many(>15)
7	Total number of shoots/plants	Few(<10)
		Medium(10-15)
		Many(>15)

S. No	Characteristics	States
8	Foliage: Length from pseudostem to tip of leaf	Short(<30)
		Medium(30-45)
		Long(>45)
9	Bulb: Time of maturity(from date of sowing)	Early(<65 days)
		Medium(65-80 days)
		Late(>80 days)
10	Bulb: Compound bulb- polar diameter	Small(<3 cm)
		Medium(3-4 cm)
		Large(>4 cm)
11	Bulb: Compound bulb- equatorial diameter	Small(<3.5 cm)
		Medium(3.5-5.0 cm)
		Large(>5.0 cm)
12	Bulblet: Polar diameter	Small(<1.5 cm)
		Medium(1.5-2.0 cm)
		Large(>2.0 cm)
13	Bulblet: Equatorial diameter	Small(<2.0 cm)
		Medium(2.0-2.5 cm)
		Large(>2.5 cm)
14	Bulblet: Number of bulblet per bulb	Few(<6)
		Medium(6-8)
		Many(>8)
C. For all varieties		
15	Foliage: Attitude	Erect
		Semi-erect
16	Leaf: Diameter (maximum)	Small(<1.0 cm)
		Medium(1.0 - 1.5 cm)
		Large(>1.5 cm)

S. No	Characteristics	States
17	Foliage: Waxiness	Absent
		Present
18	Foliage: Intensity of green colour	Light
		Medium
		Dark
19	Foliage: Cranking	Absent
		Weak
		Strong
20	Pseudostem: Length (up to last emerged green leaf)	Small (<7 cm)
		Medium (7-10 cm)
		Large (>10 cm)
21	Pseudostem: Diameter (at midpoint of length)	Small (<1.5 cm)
		Medium (1.5-2.0 cm)
		Large (>2.0 cm)
22	Bulb: Thickness of neck	Thin (<0.5 cm)
		Medium (0.5-1.0 cm)
		Thick (>1.0 cm)
23	Bulb: General shape (in longitudinal section)	Elliptic
		Oval
		Globe
		Flat globe
		Flat
24	Bulb: Basic colour of dry skin	White
		Yellow
		Pink
		Light red
		Dark red
		Brown
		Purple

S. No	Characteristics	States
25	Bulb: Adherence of skin after harvest	Weak
		Medium
		Strong
26	Bulb: Thickness of rings (average of all the rings)	Thin (< 3 mm)
		Medium (3-3.5 mm)
		Thick (>3.5 mm)
27	Bulb: Firmness of flesh (to be measured by pressure tester)	Weak (<70 lbf)
		Medium (70-100 lbf)
		Strong (>100 lbf)
28	Bulb: Colour of epidermis of fleshy scale	Whitish
		Yellowish
		Reddish
		Purplish
29	Bulb: Position of root disc	Inserted
		At surface (flat)
		Exerted
30	Bulb: Predominant number of axes	Single
		Multiple
31	Bulb: Cross section	Asymmetrical
		Symmetrical
32	Bulb: Degree of splitting into bulblets (with dry skin around each bulblet)	Absent
		Medium (<20%)
		High (>20%)
33	Bulb: Total soluble solids (to be measured by refractometer)	Low (<10%)
		Medium (10-15%)
		High (>15%)
34	Male sterility (to be tested under microscope)	Absent
		Present

2. DUS Test Characteristics of Garlic

S. No.	Characteristics	States
1	Plant: Density of leaves	Sparse
		Medium
		Dense
2	Plant: Number of leaves per pseudostem	Few (<9)
		Medium (9-12)
		Many (>12)
3	Foliage: Attitude	Erect
		Semi-erect
		Drooping
4	Leaf: Intensity of green colour	Light
		Medium
		Dark
5	Leaf: Waxiness	Absent
		Present
6	Leaf: Length (longest leaf)	Short (>25 cm)
		Medium (25-35 cm)
		Long (> 35 cm)
7	Leaf: Width (widest leaf)	Narrow (< 1.5 cm)
		Medium (1.5-2.5 cm)
		Broad (>2.5 cm)
8	Leaf: Shape in cross section (in middle of the longest leaf)	Flat
		Slightly concave
		Strongly concave
9	Pseudostem: Length (up to first emerged green leaf)	Small (<5 cm)
		Medium (5-10 cm)
		Long (>10 cm)

S. No.	Characteristics	States
10	Pseudostem: Width of the base	Narrow (<1.0 cm)
		Medium (1.0-1.5 cm)
		Broad (>1.5 cm)
11	Pseudostem: Intensity of anthocyanin colouration at base	Absent
		Present
12	Flowering stem	Absent
		Present
13	Flowering stem: Curvature	Absent
		Present
14	Flowering stem: Length (special characteristics for temperate condition)	Short (<70 cm)
		Medium (70-90 cm)
		Long (>90 cm)
15	Flowering stem: Bulbils	Absent
		Present
16	Time of maturity (from date of planting)	Early (<130 days)
		Medium (130-160 days)
		Late (>160 days)
17	Bulb: Size (diameter)	Small (< 2.5 cm)
		Medium (2.5-3.5 cm)
		Large (3.5-5.0 cm)
		Very large (>5.0 cm)
18	Bulb: Shape in longitudinal section	Elliptic
		Ovate
		Circular
19	Bulb: Shape in cross section	Elliptic
		Circular
20	Bulb: Position of cloves at tip of bulb	Inserted
		Exerted

S. No.	Characteristics	States
21	Bulb: Position of root disc	Inserted
		At surface (flat)
		Exerted
22	Bulb: Shape of base	Recessed
		Flat
		Rounded
23	Bulb: Compactness of cloves	Loose
		Medium
		Compact
24	Bulb: Ground colour of dry external scales	White
		Yellowish white
		Reddish white
		Purple
25	Bulb: Anthocyanin stripes on dry external scales	Absent
		Present
26	Bulb: Number of cloves	Few (<10)
		Medium (11-20)
		Many (>20)
27	Bulb: Distribution of cloves	Radial
		Non-radial
28	Bulb: External cloves	Absent
		Present
29	Bulb: Skin adherence of dry external scales	Weak
		Medium
		Strong

S. No.	Characteristics	States
30	Clove: Size (diameter)	Small (<1 cm)
		Medium (1-2 cm)
		Large (>2 cm)
31	Clove: Colour of scale	White
		Cream
		Pink
		Brown
		Purple
32	Clove: Colour of flesh	White
		Yellowish

Annexure-6

Proforma for Release Proposal Submitted to Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops

1.	Name of the crop with scientific name	:	
2.	(a) Name/ code/ designation under which tested	:	
	(b) IC Number	:	
	(c) Proposed name of the variety	:	
3.	Sponsored by	:	
4.	(a) Institution or agency responsible for development of variety (with address)	:	
	(b) Name of persons responsible for development of the variety	:	
	(c) Place(s) where testing/ evaluation trials were conducted	:	
5.	(a) Parentage with details of its pedigree	:	
	(b) Source of material in case of introduction	:	
	(c) Breeding method	:	
	(d) Breeding objective	:	
6.	State the varieties, which most closely resemble the proposed variety in general with characteristics	:	
7.	(a) Whether recommended by Seminar/ Conference/Workshop/ State Seed Sub- Committee	:	
	(b) If so, its recommendations with specific justification for the release of proposed variety	:	
	(c) Specific areas of its adaption	:	
8.	Recommended ecology including suitability under controlled/ field conditions	:	

9.	Description of variety	:	
	a. Distinguishing morphological characters of the proposed variety/hybrid		
	b. Description of variety	:	
10.	Description of parents of the hybrids	:	
11.	Reaction to biotic stress and agronomic features	:	
	(a) Reaction to major diseases	:	
	(b) Reaction to major pests	:	
	(c) Agronomic features	:	
12.	(a) Yield data in regional/ district trials	:	
	(b) Yield data in Front Line Demonstrations	:	
13.	(a) Agency responsible for production of breeder seed	:	
	(b) Quantity of breeder seed in stock	:	
14.	Specific recommendations, if any for seed production	:	
15.	Any other pertinent information	:	
16.	Acknowledgement particulars about the submission of germplasm samples with NBPGR	:	

Signature of
Sponsoring Breeder

Signature of Head
of Institute

Date:

Place:

Annexure-7

Description of variety as per DUS (it will be applicable for both onion and garlic)

1.	Plant: Number of leaves per pseudostem	:	
2.	Foliage: Plant height (cm)	:	
3.	Bulb: Time of maturity	:	
4.	Bulb: Height (cm)	:	
5.	Bulb: Diameter (cm)	:	
6.	Foliage: Attitude	:	
7.	Leaf: Diameter (maximum)(cm)	:	
8.	Foliage: Waxiness	:	
9.	Foliage: Intensity of green colour	:	
10.	Foliage: Cranking	:	
11.	Pseudostem: Length (up to last emerged green leaf)(cm)	:	
12.	Pseudostem: Diameter (at midpoint of length)(cm)	:	
13.	Bulb: Thickness of neck (cm)	:	
14.	Bulb: General shape (in longitudinal section)	:	
15.	Bulb: Basic colour of dry skin	:	
16.	Bulb: Adherence of skin after harvest	:	
17.	Bulb: Thickness of rings (mm)*	:	
18.	Bulb: Firmness of flesh (to be measured by pressure meter)	:	
19.	Bulb: Colour of epidermis of fleshy scale	:	
20.	Bulb: Position of root disc	:	
21.	Bulb: Predominant number of axes*	:	
22.	Bulb: Cross section	:	
23.	Bulb: Degree of splitting into bulblets* (with dry skin around each bulblet)	:	
24.	Bulb: Total soluble solids (%)	:	
25.	Male Sterility (to be tested under microscope)*	:	

* Indicate data only for onion, not for garlic





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