**Supplementary table 1**. Sampling sites and collection of RKN-infested roots of BRRIDhan28 from different AEZs of Bangladesh with GenBank accession number.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | AEZs | GenBank accession number | District | Location of collection |
| 01 | AEZ-01 | - | Thakurgaon | Thakurgaonsador, chotokhochbari, Baliadangi |
| 02 | AEZ-02 | OR921570 | Rangpur | Kaoniaupazila, Pazorbhanga, Balapara |
| 03 | AEZ-03 | OR921571 | Rangpur  Dinajpur | Rangpur Sador  Birampur, Prostompur |
| 04 | AEZ-04 | OR921572 | Sirajgonj | Sirajgonjsador, Balkuchi, Rajapur |
| 05 | AEZ-05 | OR921573 | Naogaon  Natore | Atrai- shahgola  Singairpourosova- baluvora, ninguin |
| 06 | AEZ-06 | - | Naogaon | Porsha, Nitpur, Sapahar |
| 07 | AEZ-07 | - | Sirajgonj | Balkuchi, Shomserpur |
| 08 | AEZ-08 | - | Mymensingh  Kishoregonj | Mymensingh sador-Alalpur  Bajidpur, Shushuti |
| 09 | AEZ-09 | - | Netrakona  Mymensingh | Netrokonasador, purbodhola  Muktagacha-kumergata |
| 10 | AEZ-10 | OR921574 | Munshigonj  Sirajgonj  Natore | Sreenagor-bhagra  Tarash makorshone  Gurudaspur |
| 11 | AEZ-11 | - | Natore  Rajshahi | Natoresador, Borohorispur, nowdapara  Rajshahisador |
| 12 | AEZ-12 | OR921575 | Natore  Sirajgonj | Gurudaspur,  Ullahpara, purniagat |
| 13 | AEZ-13 | - | Khulna  Bhola | Fultola,  Bhola sador south vaduria |
| 14 | AEZ-14 | - | Khulna  Gopalgonj | Fultola,  Gopalgonjsador, Beltolisador |
| 15 | AEZ-15 | OR921576 | Munshigonj | Pourosova, Sholaghor, Sirajdikhan, Rajanagor |
| 16 | AEZ-16 | OR921577 | Brahmambaria | B. Baria sador, Nandonpur, Shantinagor |
| 17 | AEZ-17 | - | Noakhali  Laxkmipur | Noakhali sador,  Laxkmipursador, Uttorhamchadi |
| 18 | AEZ-18 | - | Noakhali  Bhola | Noakhali sador,  Bhola guptamukhi, Ilisha |
| 19 | AEZ-19 | OR921578 | B.Baria | B. Baria sador, Bijoynagor, upazillapourosova |
| 20 | AEZ-20 | OR921579 | Hobigonj | HobigonjBahubalupazila,Komalgonj |
| 21 | AEZ-21 | - | Netrakona  Sunamgonj | Kalmakandapourosova, Chandpur,Sunamgonjjamalgonj |
| 22 | AEZ-22 | - | Netrakona  Hobigonj | Durgapur- kullahgora, BirisiriChandighor,  Bahubal |
| 23 | AEZ-23 | OR921580 | Feni  Chittagong | Feni sador, foleshor,  Mirsorai, Naspada, Durgapur |
| 24 | AEZ-24 | - | Saint Martin | Paschim konapara,Tatia,wahid nagor |
| 25 | AEZ-25 | - | Naogaon  Dinajpur | NaogaonsadorPatnitolaMatindor,  Hakimpur Khotta |
| 26 | AEZ-26 | OR921581 | Naogaon | Porsha Anantapur, sapaharpourosova |
| 27 | AEZ-27 | - | Rangpur  Dinajpur | Ghaghatpara, matro  HakimpurTulsigonga Nadi |
| 28 | AEZ-28 | OR921582 | Mymensingh  Gazipur | Muktagachha, BhalukaHobirbari,  Gazipur Sreepur |
| 29 | AEZ-29 | OR921583 | Feni  Chittagong  Hobigonj | Feni sador, Mathbaria,  Mirsorai,  HobigonjBahubal |
| 30 | AEZ-30 | OR921584 | B. Baria, Akhaura | Akhaura Sador Pourosova, Basudeb, Dharkhar |

**Supplementary table 2.** Amplification conditions and Sequencing of Primer which used in this study for molecular identification of *Meloidogyne* species of Bangladesh

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Species | Universal primer for ITS | Sequence (5´-3´) | Fragment  (bp) | Reference |
| *M.graminicola* | 18SF  26SR | TGATTACGTCCCTGCCTTT  TTTCACTCGCCGTTACTAAGG | 800 | Vrain et al., 1992;  Fanelli et al.,2017 |

**Supplementary table 3.** PCR amplification conditions

|  |  |  |  |
| --- | --- | --- | --- |
| PCR condition | Name of Primer | Amplification conditions | Reference |
| 18SF  26SR | Initial Denaturation 94⁰c or 5 min----1 Cycle  Denaturation at 94⁰c for 50 sec  Annealing at 55⁰c for 50 sec 35 cycle  Extension at 72⁰c for 1 min  Final step at 72⁰c for 7 min 1 cycle | Ye et al. 2007;  Fanelli et al.  2017 |

**Supplementary table 4.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Isolates | Close relatives | Accession no. and origin | GenBank accession number. | Alignments | Bp | Percentage |
| MG-01 | *Meloidogyne graminicola* | OL546750.1  India | - | 252/312 | 785 | 80.77 |
| MG02 | *M. graminicola* | OL546769.1  India | OR921570 | 658/676 | 788 | 97.34 |
| MG03 | *M. graminicola* | OL546746.1  India | OR921571 | 650/671 | 788 | 96.98 |
| MG04 | *M. graminicola* | OL546743.1  India | OR921572 | 635/670 | 788 | 94.78 |
| MG-05 | *M. graminicola* | OL546748.1 India | OR921573 | 657/676 | 788 | 97.19 |
| MG-06 | *M. graminicola* | MT159688.1 China | - | 22/25 | 579 | 88 |
| MG-07 | *M. graminicola* | OQ306537.1  Philippines | - | 19/19 | 553 | 100 |
| MG08 | *M. graminicola* | OL546744.1 India | - | 20/20 | 787 | 100 |
| MG-09 | *M. graminicola* | MN049602.1 China | - | 560/621 | 771 | 91.25 |
| MG-10 | *M. graminicola* | OL546746.1 India | OR921574 | 646/670 | 788 | 96.42 |
| MG-11 | *M. graminicola* | OL546758.1 India | - | 539/694 | 788 | 77.67 |
| MG-12 | *M. graminicola* | OL546746.1 India | OR921575 | 697/715 | 788 | 97.48 |
| MG-14 | *M. graminicola* | MN647543.1 China | - | 559/616 | 635 | 90.75 |
| MG-15 | *M. graminicola* | OL546754.1 India | OR921576 | 676/709 | 788 | 95.25 |
| MG-16 | *M. graminicola* | OL546746.1 India | OR921577 | 688/697 | 788 | 98.71 |
| MG-18 | *M. graminicola* | OL546743.1 India | - | 616/664 | 788 | 92.77 |
| MG-19 | *M. graminicola* | OL546769.1 India | OR921578 | 661/715 | 788 | 92.45 |
| MG-20 | *M. graminicola* | OL546746.1 India | OR921579 | 684/712 | 788 | 96.07 |
| MG-21 | *M. graminicola* | OL546746.1 India | - | 620/715 | 788 | 86.71 |
| MG-22 | *M. graminicola* | OL546746.1 India | - | 698/732 | 788 | 95.36 |
| MG-23 | *M. graminicola* | OL546770.1 India | OR921580 | 468/518 | 788 | 90.18 |
| MG-26 | *M. graminicola* | >OL546750.1 India | OR921581 | 652/716 | 785 | 91-06 |
| MG-27 | *M. graminicola* | MN049602.1 China | - | 526/577 | 771 | 91.16 |
| MG-28 | *M. graminicola* | OL546769.1 India | OR921582 | 683/714 | 788 | 95’66 |
| MG-29 | *M. graminicola* | OL546766.1 India | OR921583 | 673/721 | 788 | 93.34 |
| MG-30 | *M. graminicola* | OL546754.1 India | OR921584 | 707/717 | 788 | 98.61 |

**Supplementary table 5.** Comparative study table for *Meloidogyne graminicola*

|  |  |  |
| --- | --- | --- |
| Variable | Characters | References |
| Molecular identification | DNA Extraction from nematodes | Liu, M. Y.et al, 2023  <https://doi.org/10.1094/PDIS-08-22-1796-RE>  Singh, A. K.et al., 2023  <https://doi.org/10.56093/ijas.v93i7.135351>  Sukalpa Das S., 2021  <https://doi.org/10.1080/03235408.2021.1983383>  Jabbar A.et al., 2021  DOI:[**https://doi.org/10.21307/jofnem-2020-123**](https://doi.org/10.21307/jofnem-2020-123)  Htay, C. C.et al., 2016  <https://link.springer.com/article/10.1007/s10658-016-0913-y>  Adam, M.A.M., et al.,2007  <https://doi.org/10.1111/j.1365-3059.2006.01455.x> |
| Primers | Leidy R.et al., 2021  <https://doi.org/10.3390/biology10111163>  Luo, M.et al., 2020  <https://doi.org/10.5423/PPJ.NT.02.2020.0034>  Vrain et al., 1992 https://www.cabidigitallibrary.org/doi/full/10.5555/19922327291.  Fanelli et al., 2017  <https://doi.org/10.1007/s10658-017-1196-7>  Cabasan, M. T. N., 2017  <https://doi.org/10.1163/15685411-00003142>  McClure, M. A.et al., 2012  Doi/pdf/10.1094/PDIS-09-11-0808  Ou S. et al.,2008 <https://doi.org/10.1163/156854108783900212> |
| Phylogenetic study | Distribution | Liu, M. Y.et al, 2023  <https://doi.org/10.1094/PDIS-08-22-1796-RE>  Luo, M.et al, 2020  <https://doi.org/10.5423/PPJ.NT.02.2020.0034>  Fanelli et al., 2017  [**https://doi.org/10.1002/ece3.9326**](https://doi.org/10.1002/ece3.9326)  Tian et al., 2018  <https://doi.org/10.1016/S2095-3119(18)61971-9>  Hesar, A., M. et al., 2011  <https://www.researchgate.net/publication/269785063>  Ye, W. et al., 2007 <https://doi.org/10.1016/j.ympev.2007.02.006> |
| Pathogenicity study | Disease parameter | Mukesh et al., 2024  <https://doi.org/10.1016/j.heliyon.2024.e34752>  Sukalpa Das S., 2021  <https://doi.org/10.1080/03235408.2021.1983383>  Hussey H.et al.,2002  <https://doi.org/10.1079/9780851994666.0043>  PokharelR.R.et al.,2010  10.1071/AP09100 0815-3191/10/040326  Golden, A. M., & Birchfield, W. (1965)  <http://bionames.org/bionames-archive/issn/0018-0130/32/228.pdf> |
| Growth and yield parameters | Kumar A.et al.,2022  DOI: [10.5958/0974-4576.2022.00094.9](http://dx.doi.org/10.5958/0974-4576.2022.00094.9" \t "_blank)  Galeng-Lawilao, J.et al.,2020  <https://doi.org/10.1007/s11032-020-01137-5>  Cabasan, M. T. N.,2017  <https://doi.org/10.1163/15685411-00003142>  De Waele, D.et al.,2013  <http://dx.doi.org/10.1080/03235408.2012.749702> |
| Hatching | Hatching ability | Sukalpa Das S., 2021  <https://doi.org/10.1080/03235408.2021.1983383>  Khokon, M.A.R. et al.,2009  <https://doi.org/10.1271/bbb.90392> |
| Occurrences | Yield loss | Narasimhamurthy H.B.et al.,2023  DOI:<http://dx.doi.org/10.5772/intechopen.107752>  Singh, S. K.et al.,2023  doi: 10.1111/aab.12739  Ali, M.P.,et al.,2021  doi.org/10.3329/brj.v25i1.55176 |
| Phenotypic symptom | Narasimhamurthy H.B.et al.,2023  DOI:<http://dx.doi.org/10.5772/intechopen.107752>  Leidy R.et al.,2021  <https://doi.org/10.3390/biology10111163> |
| others | BBS., 2024  www.bbs.gov.bd  2024-06-13-05-41-8d348db80ecf814b6f1876432643639e.p |

**Supplementary fig. 1:** Correlation between gall/root system and different vegetative and yield parameters of rice plant inoculated with *M. graminicola*.

|  |  |
| --- | --- |
| **A.** | **B.** |
| **C.** | **D.** |
| **E.** | **F.** |
| **G.** | **H.** |
| **I.** | **J.** |
| **K.** | **L.** |
| **M.** | **N.** |
| **O.** |  |