**Supplementary Table S1.** Accession numbers from species of *Globodera*  and *Heterodera* used to create the consensus sequences.

|  |  |
| --- | --- |
| Species | Accession numbers |
| *G. artemisiae* | AF274415.1, MT233312.1, EU855121.1, MT233311.1, OQ625803.1, MT395361.1, AY519127.1, AY519126.1 |
| *G. capensis* | JQ595411.1, JQ595409.1, JQ595410.1, JQ595413.1, JQ595412.1 |
| *G. Mexicana* | HQ260406.1, MN258872.1, MN258869.1, MN258873.1, MN258871.1, MN258874.1, MN258870.1, MN116522.1, HQ260405.1, EU006708.1, MN258868.1, EU006709.1, EU006707.1, OQ318153.1, OQ318154.1 |
| *G. tabacum* | HQ260392.1, HQ260393.1, HQ260394.1, HQ260395.1, HQ260396.1, HQ260391.1, HQ260390.1, HQ260389.1, MN508956.1, FJ667946.1, HQ260388.1, HQ260387.1, HQ260386.1, HQ260398.1, HQ260399.1, HQ260404.1, HQ260397.1, HQ260401.1, AB207272.1, HQ260403.1, FJ667945.1, HQ260400.1, HQ260402.1 |
| *G. zelandica* | HQ260410.1, HQ260411.1 |
| *G. pallida* | HQ670263.1, HQ260427.1, GU084818.1, EU006704.1, HQ670270.1, HQ670264.1, HQ670265.1, HQ670262.1, HQ670261.1, EU006706.1, HQ670280.1, GU084803.1, HQ670277.1, HQ670260.1, HQ260428.1, LC310800.1, HQ670256.1, HQ670254.1, HQ670268.1, HQ670243.1, HQ670242.1, HF968449.1, GU084802.1, GU084811.1, GU084813.1, GU084814.1, GU084816.1, HQ670279.1, KY513117.1, KY513113.1, KY513112.1, LT159833.1, ON496987.1, KJ409615.1, HQ670275.1, HQ670269.1, HQ670267.1, HQ670266.1, HQ670257.1, HQ670249.1, HQ670245.1, MT251890.1, HQ260426.1, GU084806.1, GU084804.1, EF622533.1, HQ670278.1, GU084799.1, GU084812.1, GU084817.1, GU084805.1, KY513114.1, EF153834.1, LC096097.1, KJ409623.1, JQ692594.1, HQ670271.1, HQ670252.1, HQ670253.1, HQ670259.1, HQ670251.1, HQ670248.1, HQ670255.1, HQ670247.1, HQ670246.1, MT251891.1, GU084819.1, GQ294522.1, GQ355975.1, EU006705.1, EF153837.1, DQ847111.1, DQ847109.1, KY660056.1, GU084800.1, GU084797.1, MN475962.1, LT159835.1, HQ670244.1, GQ294523.1, DQ847110.1, MH389990.1, MH389989.1, MH389988.1, MH389986.1, MH389985.1, MH389983.1, MH389982.1, MH389981.1, MH389980.1, MH389979.1, MH389978.1, MH389976.1, MH389975.1, MH389974.1, MH389973.1, MH389972.1, MH389971.1, MH389970.1, MH389969.1, MH389968.1, MH389967.1, MH389965.1, MH389964.1, MH389963.1, MH389962.1, MH389961.1, HQ670276.1 |
| *G. rostochiensis* | MT270444.1, LC310801.1, LC030412.1, ON739173.1, ON739172.1, ON739171.1, OL670175.1, OL670173.1, OL670171.1, OL670170.1, OL670169.1, OL670168.1, OL670166.1, KJ409617.1, MZ569630.1, MZ569624.1, JF907541.1, JF907551.1, FJ212166.1, GQ294515.1, GQ294516.1, DQ847117.1, MZ042368.1, KJ409612.1, MZ569629.1, MZ569626.1, FJ212164.1, MT270485.1, MK791260.1, JF907550.1, KJ409616.1, MZ613153.1, JF907544.1, MT193705.1, MT193700.1, MT193696.1, MT193691.1, OL670167.1, OL670165.1, MT193710.1, MT193703.1, MT193701.1, MT193699.1, MT193698.1, MT193697.1, MT193694.1, MT193692.1, MT193690.1, MT193689.1, MT193688.1, MZ042367.1, OL670174.1, OL670172.1, GQ294513.1, KY513118.1, MT193717.1, MT193715.1, MT193709.1, MT193707.1, MT193706.1, MT251882.1, LC030414.1, LC030413.1, DQ847118.1, AB207271.1, MT193716.1, MT193714.1, MT193713.1, MT193712.1, MT193711.1, MT193708.1, MT193704.1, MT193702.1, MT193695.1, MT193693.1, MN493790.1, LT159840.1, ON496988.1, KJ409618.1, GQ294521.1, GQ294518.1, GQ294517.1, FJ212167.1, GQ294520.1, FJ212162.1, DQ847120.1, EF153839.1, KJ409620.1, JF907543.1, KY513120.1, MT270100.1, MT270180.1, JF907546.1 |
| *G. millefolii* | HQ260407.1 |
| *H. koreana* | LC202133.1, LC202150.1, LC202149.1, LC202147.1, LC202137.1, LC202135.1, LC202138.1, LC202134.1, JN971093.1, LC202143.1, LC202136.1, LC202144.1, KX640828.1, LC202152.1, LC202148.1, KR818911.1, LC202139.1, LC202146.1, AY569016.1, EU284042.1, LC202145.1, LC202140.1, LC202142.1, LC202141.1, EU284043.1, MZ031305.1, LC202151.1, MW642447.1, MW642448.1, MW642446.1 |
| *H. aucklandica* | AF274398.1, AY148379.1, AY148380.1 |
| *H. australis* | AY148396.1, AY148395.1 |
| *H. avenae* | OP217019.1, OP217018.1, HM560755.1, HM560770.1, OP217014.1, KC152906.1, KR704298.1, OP217015.1, KF225719.1, KR704296.1, KR704294.1, KR704300.1, OP217016.1, KF225722.1, KF225720.1, KF225721.1, KF225724.1, MH477279.1, MH477283.1, MH477282.1, MH477280.1, OP216992.1, HM560754.1, MH477284.1, OP216990.1, OP216984.1, HM560745.1, HM560751.1, MT254743.1, OP217010.1, OP217009.1, OP217008.1, OP217007.1, OP217002.1, OP216996.1, OP216995.1, OP216989.1, OP216987.1, OP216985.1, OP216981.1, OP216979.1, OP216978.1, OP216977.1, OP216975.1, OP216973.1, OP216950.1, OP216947.1, OP216937.1, OP216930.1, OP216924.1, OP216916.1, HQ450292.1, KR704309.1, OP217044.1, OP217041.1, OP217039.1, MW785793.1, MW785792.1, MW785791.1, MW785789.1, MW785786.1, MW785784.1, MW785781.1, HM560740.1, GU377252.1, EU623614.1, EU623625.1, GU377235.1, GU377240.1, GU377243.1, GU377247.1, GU377248.1, GU377249.1, GU377251.1, GU595418.1, GU595419.1, GU595424.1, GU595426.1, GU083590.1, HM370406.1, HM370407.1, HM370410.1, HM370411.1, HM370414.1, HM370415.1, HM370416.1, HM370417.1, HM370419.1, HM370424.1, HM370426.1, HM370428.1, HM560733.1, HM560735.1, HM560738.1, HM560739.1, HM560742.1, HM560746.1, HM560748.1, HM560750.1, HM560753.1, HM560758.1, HM560759.1, HM560765.1, HM560771.1, HM560772.1, HM560773.1, HM560774.1, HQ450293.1, HQ450308.1, HQ456214.1, JF712589.1, JF712596.1, JF712601.1, JF712605.1, JF712607.1, JF712611.1, HQ697363.1, JN657197.1, JN657199.1, JN657203.1, JN831600.1, JN831608.1, JQ067679.1, KC428096.1, KC428098.1, KC428099.1, MH477281.1, OP217012.1, OP217011.1, OP217005.1, OP217003.1, OP217000.1, OP216999.1, OP216994.1, OP216993.1, OP216991.1, OP216988.1, OP216986.1, OP216983.1, OP216982.1, OP216980.1, OP216976.1, OP216970.1, OP216957.1, OP216952.1, OP216951.1, OP216948.1, OP216944.1, OP216936.1, OP216935.1, OP216934.1, OP216933.1, OP216932.1, OP216922.1, OP216917.1, OP216914.1, OP216911.1, OP216909.1 |
| *H. betae* | LC208689.1, LC208690.1, EF611117.1, EF611122.1, LC208691.1 |
| *H. bifenestra* | AY569020.1, AF274384.1, AF274385.1 |
| *H. cajani* | AF274389.1, MN988832.1, MN988835.1, MN988831.1, MN988829.1, MN988826.1, MN988827.1, MN988836.1, MN988830.1, MN988834.1, MN988833.1, MN988828.1 |
| *H. carotae* | MK840644.1, MK840643.1, AY347917.1, MG976790.1, KX463298.1, KX463297.1, KX463296.1, AF274413.1, KX463295.1, MG563237.1, MG563236.1, AY045754.1, KY046310.1, OP602412.1 |
| *H. ciceri* | AY045758.1, AF274393.1 |
| *H. cruciferae* | MK848393.1, MK848394.1, MK848395.1, AF274411.1, GU126667.1, KP114545.1, JX402415.1, MG298948.1, MG800686.1, ON007089.1, MG693179.1, ON007091.1, ON007094.1, ON007090.1, ON007092.1, ON007097.1, ON007096.1, ON007095.1, ON007093.1, ON007088.1 |
| *H. cyperi* | AF274388.1, MG825344.1 |
| *H. daverti* | KT163232.1, KT163234.1, ON870657.1, KT163233.1, KT163231.1 |
| *H. elachista* | HM560778.1, HM560779.1, KM017067.1, AF498391.1, MW785776.1, MH712504.1, MN699476.1, PP234978.1, MK387340.1, JN864884.1, JN202914.1, MG845126.1, KC618469.1, KC618468.1, MW785775.1, JN864882.1, KC618466.1, MW785774.1, JN202916.1, KF430208.1, KF430210.1, KF430211.1, MG845128.1, KF430207.1, KC618467.1, PP234980.1, KF430209.1, JN202917.1, JN202915.1, KU896213.1, KF430205.1, KF430204.1, KF430206.1, MT579616.1, JN864883.1, JN202913.1, KU896214.1, KF430212.1, JN257082.1, JN257081.1, PP256340.1, PP234979.1, KF430213.1, OP735528.1, OP735527.1, MG845124.1, MG845125.1, MG845127.1, KX622692.1, MK408613.1 |
| *H. fici* | AF498385.1, KY381871.1, KY635987.1, AF274409.1, AY045755.1, MT804359.1 |
| *H. filipjevi* | AY148399.1, MT254744.1, MT235924.1, MT235923.1, MT235922.1, MT235921.1, MT235920.1, MT235919.1, MT235918.1, MT235917.1, MT235914.1, MT235910.1, MT235909.1, MT235908.1, MT235907.1, MT235906.1, MT235905.1, MT235904.1, MT235902.1, MT235901.1, MT235900.1, MT235899.1, MT235898.1, MT235897.1, MT235896.1, MT235895.1, MT235894.1, OQ421501.1, OQ362004.1, OQ362003.1, OQ362002.1, OQ362000.1, OQ361999.1, OQ361997.1, OQ361996.1, OQ361995.1, OQ361994.1, OQ361993.1, OQ361992.1, OQ361990.1, OQ361989.1, OP712203.1, MW560461.1, ON112099.1, ON112097.1, ON112096.1, ON112095.1, ON112094.1, ON112093.1, ON112092.1, ON112091.1, ON112090.1, ON112089.1, ON112088.1, OL828544.1, OL828543.1, OL828542.1, OL828541.1, OL828540.1, OL828539.1, OL828538.1, MZ425542.1, MZ425541.1, MZ425540.1, MZ425539.1, MZ425538.1, MZ425537.1, MZ425536.1, MZ425535.1, MZ425534.1, MZ425533.1, MZ425532.1, MZ425531.1, MZ425530.1, MZ425529.1, MZ425528.1, MZ425527.1, MZ425526.1, MZ425525.1, MZ425524.1, MZ425523.1, MZ425522.1, MZ425521.1, MZ425520.1, MZ425519.1, MZ425518.1, MZ425517.1, MZ425516.1, MZ425515.1, MZ425514.1, MZ425513.1, MZ425512.1, MW785816.1, MW785811.1, MW785809.1, MW785807.1, MW785806.1, MW785805.1, MW282848.1, MW282845.1 |
| *H. glycines* | HM560783.1, AF498387.1, KY794764.1, KY794756.1, KU160508.1, KT988105.1, KT988101.1, KT988097.1, KT988095.1, KT988094.1, KT988091.1, KT988090.1, KT988087.1, KT988086.1, KT988085.1, KT988081.1, OQ923643.1, KF055926.1, JX024213.1, HM560780.1, HM560788.1, EF611124.1, HM560785.1, HM560786.1, JQ067678.1, JQ067681.1, KY794755.1, AY590280.1, MH375376.1, KY794765.1, KY794763.1, KY794762.1, LC208697.1, LC208696.1, KT988104.1, KT988100.1, KT988096.1, KT988092.1, KT988089.1, OQ923641.1, KF745929.1, JX561139.1, HM560789.1, HM560782.1, HM560781.1, HM370413.1, MG845079.1, JQ068766.1, JQ340487.1, MT254745.1, MK292129.1, KY964273.1, KT988107.1, KT988103.1, OQ923642.1, OQ923640.1, KF055927.1, GU595427.1, GU595433.1, GU595434.1, GU595435.1, HM370412.1, JQ067682.1, JQ067685.1, KF447768.1, KF745931.1, GU595428.1, HM560784.1, MG845040.1, MG836310.1, MG836299.1, JQ068767.1, JQ340488.1, JQ068764.1, JQ340486.1, KY794761.1, KU896218.1, GU595431.1, EU106169.1, MT254749.1, MT254746.1, MG845123.1, MG845055.1, MG845022.1, MG836304.1, MH371375.1, KU896217.1, KT988102.1, KT988093.1, KP324915.1, GU595432.1, GU595430.1, EU106168.1, MG845121.1, MG845113.1, MG845091.1, MG845051.1, MG845050.1, MG845021.1, KT988080.1, KP324914.1, AF274390.1, MK817508.1, MG845066.1, MG845062.1, MG845053.1, MG845037.1, MG845025.1, MG836322.1, KY794760.1 |
| *H. goettingiana* | EU623624.1, EU623623.1, KY129827.1, MW361365.1, HM370423.1, HM370425.1, AF498374.1, AF274414.1, KY129826.1, KY129828.1, JX024214.1, U89388.1, U89389.1, MH032550.1, MH031374.1, MH032549.1 |
| *H. goldeni* | EF143606.1, EF143607.1, EF143608.1, EF143609.1, EF143610.1 |
| *H. guangdongensis* | JX081324.1, KM224881.1, KM224880.1 |
| *H. hordecalis* | AF274401.1, AF498381.1, MK840642.1, MK840641.1, MK840640.1, MK840639.1, MK840638.1, MK840637.1, MK848399.1, MK848400.1, MK848401.1, MK848402.1, AY347923.1, AY347924.1, AY692356.1, KX574309.1, KX574307.1, KX574306.1, KX574293.1, KX574289.1, KX574287.1, MH745136.1, MH745137.1, MG523150.1, MG523148.1, MG523153.1, MG523152.1, MG523149.1, MG523147.1, JX024215.1, MG523151.1, JX024216.1 |
| *H. humili* | AY347926.1, AF274408.1, AF498384.1, OP236521.1, OP236520.1, MG598811.1, MT804361.1, JX024217.1, MG598812.1, MT804360.1, MT840682.1, MT840681.1, MT840680.1, MT840678.1, MT840679.1 |
| *H. latipons* | MT393914.1, MT393913.1, MT393908.1, MT393907.1, MT393904.1, KR704301.1, OL828561.1, OL828560.1, OL828559.1, OL828558.1, OL828557.1, OL828555.1, JX024185.1, AF274402.1, MT393915.1, MT393910.1, MT393912.1, MT393911.1, MT393905.1, MT027361.1, JQ319037.1, MT393917.1, MT393916.1, MT393909.1, MT758687.1, MT758686.1, MT393906.1, MT393902.1, MT758684.1, HM560790.1, JQ319036.1, JQ319035.1, MT393903.1, OL828556.1, OL828554.1, MN621882.1, MN621881.1, MN621880.1, MK431036.1, MK431040.1, MK431037.1, MN621872.1, MK431039.1, KR704288.1, MN621879.1, MN621878.1, MN621877.1, MK431035.1, JX024183.1, MK431038.1, KM199827.1, MT393923.1, MT393920.1, MT393919.1, MT393918.1, MT393922.1, MT393921.1, MT758685.1, AF498382.1, KY352355.1, KY352356.1, KY352357.1, KY352359.1, KY352360.1, KY352364.1, KY352365.1, KY352366.1, KY352372.1, KY352375.1, KY352376.1, KY352377.1, KY352381.1, KY352382.1, KY352384.1, KY352385.1, KY352387.1, KY352389.1, KY352390.1, KY352391.1, KY352392.1, KY352393.1, KY352395.1, KY352396.1, MT393926.1, MT393925.1, MT393924.1, KY352371.1, KY352379.1, KY352380.1, KY352394.1, JX024184.1, JX024175.1, KY352378.1, AY347925.1, KM199825.1, KY352386.1, JX024179.1, KP708713.1, JX024181.1, JX024180.1, JX024178.1, KM199826.1, JX024177.1, JX024182.1, KY352373.1, KY352383.1, KY352362.1, KY352358.1, KY352361.1, KY352363.1, KY352367.1, KY352368.1, KY352369.1, KY352370.1, KY352374.1, KY352388.1, JX024176.1, MN621887.1, MK291223.1, MK291211.1, MK291206.1, MK431034.1, MK431031.1, MK431026.1, MN621886.1, MN621885.1, MN621869.1, MN621868.1, MK291205.1, MK291204.1, MK431025.1, MK431024.1, KP708720.1 |
| *H. mani* | AY148377.1, AY148378.1, AY148376.1, AY148375.1, MG523157.1, ON402856.1 |
| *H. medicaginis* | AF274391.1, MK093185.1, MK093189.1, MK093188.1, MK093192.1, MK093186.1, MK093184.1, MN308440.1, MK093191.1, MK093190.1, MK093187.1, MW346596.1 |
| *H. mediterranea* | AY347921.1, AY347919.1, AY347920.1, LT990248.1, MW346561.1, LT990247.1, MW346559.1, MW346558.1, AY045757.1, MW346563.1, MW346560.1, MW346564.1, MW346556.1, MW346562.1, MW346557.1, MW346565.1, MW346553.1, MW346554.1 |
| *H. mothi* | AF498392.1, MH144206.1 |
| *H. orientalis* | EU284038.1, MK292130.1, EU284039.1, EU284040.1, EU284041.1 |
| *H. pratensis* | AY148351.1, AY148384.1, AY148387.1 |
| *H. ripae* | AF393840.1, AY347927.1, AF274407.1, OQ048459.1, DQ846902.1, OR468061.1, KM114205.1 |
| *H. sacchari* | EF143604.1, AF274403.1 |
| *H. salixophila* | MT804363.1, MT804362.1, AF274405.1, MN480559.1, AF274406.1 |
| *H. schachtii* | EF611118.1, EF611119.1, EF611121.1, KT874522.1, KT874521.1, KT874524.1, KT874520.1, JX024218.1, KT874519.1, EF611123.1, KT874527.1, KT874518.1, EF611108.1, EU616693.1, EF611102.1, MW856648.1, MW834323.1, EF611103.1, MF754150.1, EF611101.1, EF611114.1, EF611107.1, EF611106.1, MW856650.1, MW856649.1, EF611105.1, EF611110.1, EF611104.1, EF611100.1, EF611116.1, EF611109.1, EU616694.1, EF611115.1, KT874526.1, KT874523.1, KT874525.1, KT874517.1, JX024219.1, EF611120.1, EF611113.1, KF225726.1, LC208692.1, LC421659.1, KT874516.1, EF611111.1, LC208693.1, EF611112.1, AY590282.1 |
| *H. trifolii* | LC208683.1, LC208684.1, MT020783.1, LC208686.1, LC030417.1, MZ882162.1, MZ882161.1, LC208688.1, MZ882160.1, LC208685.1, AY590283.1, LC030416.1, LC208687.1, MN068930.1, MN720082.1, MN720081.1, MG682350.1 |
| *H. ustinovi* | AY148406.1, AY148407.1, AY148405.1 |
| *H. vallicola* | AF393841.1, OR399075.1 |
| *H. zeae* | GU145616.1, OP692769.2, GU145611.1, MW785772.1, OR811029.1, OP692770.2, MW785771.1, MN314870.1, GU145613.1, MW785773.1, GU145615.1, GU145614.1, OQ449658.1, OQ449657.1, OQ449656.1, OQ449655.1, KU922122.1, U89390.1, U89394.1, U89391.1, U89395.1, U89393.1, U89392.1 |
| *H. scutellariae* | AY368994.1 |
| *H. circeae* | AY368995.1 |
| *H. urticae* | AF274412.1 |
| *H. cynodontis* | AF274386.1 |
| *H. hainanensis* | JX081326.1 |
| *H. sorghi* | AF274404.1 |
| *H. sinensis* | AY873803.1 |
| *H. arenaria* | AF274396.1 |
| *H. fengi* | JX566452.1 |
| *H. oryzicola* | AF274387.1 |
| *H. turcomanica* | AF498386.1 |
| *H. litoralis* | AF274410.1 |