

Table S1: Details of the surveyed apple germplasm and isolation thereof

| L | S | P | P ₁ | I | S _v | F |
|----------------|----------------|---|----------------|-----------------------------------|----------------------------|-----------------------------------|
| A ₂ | R _d | T | 4.70 | DS1, DS2, DS7 | DS2 | NWHA-1 |
| | | L | 5.90 | DS5, DS6 | | |
| | | R | 6.12 | DS3, DS4, DS9, DS8 | DS4 | NWHA-2 |
| | G _d | T | 5.67 | DS10, DS13, DS15, DS11, DS12 | DS10, DS15, DS11 | NWHA-3, WHA-4, NWHA-5 |
| | | L | 5.97 | DS14, DS16, DS19 | DS14, DS16, DS19 | NWHA-6 NWHA-7 NWHA-8 |
| | | R | 7.27 | DS17, DS18, DS20, DS23, DS24 | DS17, DS18, DS23 | NWHA-9, NWHA-10 NWHA-11 |
| | R _c | T | 6.31 | DS21,DS22, DS25 | DS25 | NWHA-12 |
| | | L | 6.02 | DS26, DS29 | | |
| | | R | 6.89 | DS28, DS30,DS31 | DS31 | NWHA-13 |
| | G _r | T | 6.33 | DS27,DS32,DS35 | DS35 | NWHA-14 |
| | | L | 5.49 | DS34,DS37,DS38 | DS33 | NWHA-15 |
| | | R | 6.55 | DS33, DS36,DS39 | | |
| | F ₂ | T | 5.07 | DS41,DS42, DS45 | DS45 | NWHA-16 |
| | | L | 6.19 | DS40 | | |
| | | R | 7.12 | DS43, DS44,DS46 | | |
| | M _j | T | 6.32 | DS49,DS51 | DS51 | NWHA-17 |
| | | L | 7.83 | DS48, DS53 | DS48, DS53 | NWHA-18, NWHA-19 |
| | | R | 8.27 | DS47,DS50 | DS50 | NWHA-20 |
| P ₁ | R _v | T | 5.36 | DS52, DS57 | DS57, DS54 | NWHA-21, NWHA-22 |
| | | L | 5.72 | DS56,DS55 | | |
| | | R | 7.42 | DS54 | | |
| | G _m | T | 5.38 | DS59,DS61 | DS60 | NWHA-23 |
| | | L | 5.89 | DS57,DS60 | | |
| | | R | 6.39 | DS58, | | |
| | M _b | T | 6.48 | DS63,DS71, DS75 | DS63, DS71, DS75 | NWHA-24,NWHA-25, NWHA-26 |
| | | L | 7.29 | DS67,DS72, DS74 | DS74 | NWHA-27 |
| | | R | 7.88 | DS64,DS66,DS73 | DS66, DS73 | NWHA-28,NWHA-29 |
| | G _d | T | 5.39 | DS69, DS76 | DS76 | NWHA-30 |
| | | L | 5.35 | DS65, DS68 | | |
| | | R | 6.44 | DS62, DS70,DS77 | DS77 | NWHA-31 |
| | S _r | T | 4.78 | DS79, DS83 | DS81 | NWHA-32 |
| | | L | 5.41 | DS82, DS81 | | |
| | | R | 5.84 | DS80, DS84,DS78 | DS78 | NWHA-33 |
| | R _f | T | 5.11 | DS84, DS85, DS90 | DS90 | NWHA-34 |
| | | L | 5.65 | DS87, DS88 | DS88 | NWHA-35 |
| | | R | 7.06 | DS86, DS89, DS91 | | |
| B ₁ | P _s | T | 6.48 | DS93, DS97 | DS93 | NWHA-36 |
| | | L | 6.09 | DS95,DS98, DS99 | DS95, DS99 | NWHA-37, NWHA-38 |
| | | R | 7.51 | DS92, DS94, DS96, DS100 | DS92, DS94, DS100 | NWHA-39, NWHA-40, NWHA-41 |
| | O _s | T | 5.19 | DS102, DS104, DS106 | DS106, DS101 | NWHA-42, NWHA-43 |
| | | L | 5.92 | DS105, DS107 | | |
| | | R | 6.38 | DS101, DS103 | | |
| | G _v | T | 5.29 | DS108, DS114 | DS113, DS111, DS115 | NWHA-44, NWHA-45, NWHA-46 |
| | | L | 6.71 | DS112, DS113, | | |
| | | R | 6.68 | DS109, DS110, DS111, DS115 | | |
| | L _c | T | 6.05 | DS116, DS121, DS124 | DS116, DS124 | NWHA-47, NWHA-48 |
| | | L | 6.39 | DS119, DS120 | DS119, DS120 | NWHA-49, NWHA-50 |
| | | R | 7.28 | DS117, DS123, DS118,DS122 | DS117, DS122 | NWHA-51, NWHA-52 |
| | M _n | T | 6.11 | DS127, DS128, DS133, DS134 | DS128, DS133, DS134 | NWHA-53, NWHA-54, NWHA-55 |
| | | L | 5.89 | DS130, DS131 | DS130 | NWHA-56 |
| | | R | 7.69 | DS125, DS126, DS129, DS132 | DS125, DS129, DS132 | NWHA-57, NWHA-58, NWHA-59 |
| | F _n | T | 7.21 | DS135, DS143, DS144 | DS135, DS144 | NWHA-60,NWHA-61 |
| | | L | 6.11 | DS137, DS139, DS140 | DS137, DS140 | NWHA-62,NWHA-63 |
| | | R | 7.96 | DS136, DS138, DS141, DS142, DS145 | DS136, DS141, DS142, DS145 | NWHA-64, NWHA-65 NWHA-66, NWHA-67 |
| S _p | A _b | T | 5.67 | DS146, DS148, DS152 | DS152 | NWHA-68 |
| | | L | 6.49 | DS149, DS150, DS154, DS155 | DS149, DS155 | NWHA-69, NWHA-70 |
| | | R | 6.87 | DS147, DS151, DS153 | DS147 | NWHA-71 |

****L:Location;S: Sampling variety/cultivar; P: Plant part;P₁ :Population Log₁₀ ×10⁵ CFU/mL; I: Isolated strains; S_v:Strains with antifungal behavior; F: Final code of isolate; A_g: Anantnag; P₁: Pulwama; B₁: Baramula; S_n:Shopian; R_d:Red delicious; G_d: Golden delicious; R_c:Red chief; G_r: Gala Redlum; F₂: Fuji Zehn Aztech; M_j: Maharaji; R_v: Red velox; G_m: Gala mast; M_b: Malus floribunda; S_r: Summer red; R_f: Red fuji; P_s: Priscella; O_s: Oregon spur; G_v:Gavin; L_c: Lal cider; M_n:Manchurian; F_n:Fenna; A_b:Ambri; T:Twigs;L:Leaf; R:Root**

Table S2. Details of the sequenced microflora with antifungal behavior against *Venturia inaequalis*

| Isolate | Bacterial species | Accession number | Max. Identity |
|---------|--|------------------|---------------------|
| NWHA-1 | <i>Bacillus aryabhatai</i> strain DST scab | MH718825 | 1533/1533, (100%) |
| NWHA-2 | <i>Pseudomonas veronii</i> strain DST scab2 | MH718842 | 1520/1521, (99%) |
| NWHA-3 | <i>Bacillus cereus</i> strain DST scab3 | MH725572 | 1563/1563, (100%) |
| NWHA-4 | <i>Bacillus amyloliquefaciens</i> strain DST scab4 | MH725637 | 1553/1553, (100%) |
| NWHA-5 | <i>Bacillus siamensis</i> strain DST scab5 | MH732922 | 1533/1533, (100%) |
| NWHA-6 | <i>Bacillus amyloliquefaciens</i> strain DST scab6 | MH732929 | 1557/1557, (100%) |
| NWHA-7 | <i>Bacillus velezensis</i> strain DST scab7 | MH734811 | 1560/1560, (100%) |
| NWHA-8 | <i>Bacillus siamensis</i> strain DST scab8 | MH734812 | 1524/1524, (100%) |
| NWHA-9 | <i>Bacillus aryabhatai</i> strain DST scab9 | MT150705 | 1533/1533, (100%) |
| NWHA-10 | <i>Bacillus subtilis</i> strain DST10 | MT150715 | 1543/1543, (100%) |
| NWHA-11 | <i>Ochrobactrum pecoris</i> strain DST11 | MT750122 | 1399/1399, (100%) |
| NWHA-12 | <i>Paenibacillus amylolyticus</i> strain DST12 | MT154258 | 1511/1511, (100%) |
| NWHA-13 | <i>Paenibacillus tundrae</i> strain DST13 | MT158221 | 1526/1526, (100%) |
| NWHA-14 | <i>Paenibacillus xylanexedens</i> strain DST14 | MT154260 | 1526/1526, (100%) |
| NWHA-15 | <i>Rahnella aquatilis</i> strain DST15 | MT154261 | 1505/1505, (100%) |
| NWHA-16 | <i>Pseudomonas mosselii</i> strain DST16 | MT154264 | 1430/1430, (100%) |
| NWHA-17 | <i>Sphingomonas wittichii</i> strain DST17 | MT165895 | 1498/1498, (100%) |
| NWHA-18 | <i>Variovorax boronicumulans</i> strain DST18 | MT163368 | 1483/1483, (100%) |
| NWHA-19 | <i>Rhizorhabdus dicambivorans</i> strain DST19 | MT163374 | 1470/1470, (100%) |
| NWHA-20 | <i>Ramlibacter ginsenosidimutans</i> strain DST20 | MT163375 | 1470/1470, (100%) |
| NWHA-21 | <i>Pseudomonas veronii</i> strain DST21 | MT166342 | 1503/1503, (100%) |
| NWHA-22 | <i>Pseudomonas fluorescens</i> strain DST22 | MT163392 | 1512/1515, (99.99%) |
| NWHA-23 | <i>Pantoea agglomerans</i> strain DST23 | MT176480 | 1503/1503, (100%) |
| NWHA-24 | <i>Povalibacter uvarum</i> strain DST24 | MT163394 | 1507/1508, (99.99%) |
| NWHA-25 | <i>Enterobacter hormaechei</i> subsp. <i>xiangfangensis</i> strain DST25 | MT163395 | 1500/1500, (100%) |
| NWHA-26 | <i>Bacillus foraminis</i> strain DST26 | MT176179 | 1533/1534, (99.99%) |
| NWHA-27 | <i>Pseudomonas chlororaphis</i> strain DST27 | MT163397 | 1365/1365, (100%) |
| NWHA-28 | <i>Pseudomonas psychrophila</i> strain DST28 | MT163428 | 1537/1537, (100%) |
| NWHA-29 | <i>Pseudomonas fragi</i> strain DST29 | MT176180 | 1458/1462, (99.99%) |
| NWHA-30 | <i>Bacillus flexus</i> strain DST30 | MT163343 | 1500/1500, (100%) |
| NWHA-31 | <i>Paenibacillus lautus</i> strain DST31 | MT163448 | 1499/1499, (100%) |
| NWHA-32 | <i>Paenibacillus peoriae</i> strain DST32 | MT163453 | 1515/1515, (100%) |
| NWHA-33 | <i>Bacillus subtterraneus</i> strain DST33 | MT163452 | 1522/1522, (100%) |
| NWHA-34 | <i>Paenibacillus polymyxa</i> strain DST34 | MT163461 | 1519/1519, (100%) |
| NWHA-35 | <i>Enterobacter cloacae</i> strain DST35 | MT163464 | 1481/1481, (100%) |
| NWHA-36 | <i>Klebsiella pneumoniae</i> strain DST36 | MT163466 | 1498/1498, (100%) |
| NWHA-37 | <i>Cedecea neteri</i> strain DST37 | MT176181 | 1463/1465, (99.99%) |
| NWHA-38 | <i>Enterobacter cloacae</i> strain DST338 | MT176765 | 1516/1516, (100%) |
| NWHA-39 | <i>Leclercia adecarboxylata</i> strain DST39 | MT176482 | 1449/1449, (100%) |
| NWHA-40 | <i>Enterobacter ludwigii</i> strain DST40 | MT176481 | 1454/1454, (100%) |
| NWHA-41 | <i>Bacillus amyloliquefaciens</i> strain DST41 | MT176484 | 1473/1473, (100%) |
| NWHA-42 | <i>Bacillus velezensis</i> strain DST42 | MT176485 | 1380/1380, (100%) |
| NWHA-43 | <i>Pseudomonas synxantha</i> strain DST43 | MT176487 | 1245/1249, (99.99%) |
| NWHA-44 | <i>Pseudomonas libanensis</i> strain DST44 | MT176512 | 1518/1518, (100%) |
| NWHA-45 | <i>Pseudomonas libanensis</i> strain DST45 | MT176513 | 1516/1516, (100%) |
| NWHA-46 | <i>Bacillus amyloliquefaciens</i> strain DST46 | MT176523 | 1427/1427, (100%) |
| NWHA-47 | <i>Pseudomonas grimontii</i> strain DST47 | MT176524 | 1470/1472, (99.99%) |
| NWHA-48 | <i>Bacillus siamensis</i> Strain DST48 | MT176526 | 1467/1467, (100%) |
| NWHA-49 | <i>Bacillus amyloliquefaciens</i> strain DST49 | MT176527 | 1509/1509, (100%) |
| NWHA-50 | <i>Bacillus subtilis</i> strain DST50 | MT176530 | 1499/1499, (100%) |
| NWHA-51 | <i>Curvibacter gracilis</i> strain DST51 | MT254903 | 1484/1484, (100%) |
| NWHA-52 | <i>Delftia acidovorans</i> strain DST52 | MT254906 | 1515/1515, (100%) |
| NWHA-53 | <i>Enterobacter asburiae</i> strain DST53 | MT180564 | 1406/1408, (99.99%) |
| NWHA-54 | <i>Enterobacter ludwigii</i> strain DST54 | MT180566 | 1492/1492, (100%) |
| NWHA-55 | <i>Salinivibrio costicola</i> strain DST55 | MT180567 | 1483/1487, (99.99%) |
| NWHA-56 | <i>Vibrionaceae bacterium</i> strain DST56 | MT180709 | 1466/1466, (100%) |
| NWHA-57 | <i>Leclercia adecarboxylata</i> strain DST57 | MT180610 | 1514/1514, (100%) |
| NWHA-58 | <i>Enterobacter asburiae</i> strain DST58 | MT180710 | 1424/1424, (100%) |
| NWHA-59 | <i>Ochrobactrum pecoris</i> strain DST59 | MT180711 | 1389/1389, (100%) |

| | | | |
|---------|--|----------|-------------------|
| NWHA-60 | <i>Ochrobactrum tritici</i> strain DST60 | MT180712 | 1474/1474, (100%) |
| NWHA-61 | <i>Ochrobactrum anthropi</i> strain DST61 | MT180723 | 1445/1445, (100%) |
| NWHA-62 | <i>Rahnella aquatilis</i> strain DST62 | MT180745 | 1472/1474, (100%) |
| NWHA-63 | <i>Curtobacterium herbarum</i> strain DST63 | MT186202 | 1492/1492, (100%) |
| NWHA-64 | <i>Pseudomonas libanensis</i> strain DST64 | MT271984 | 1518/1518, (100%) |
| NWHA-65 | <i>Bacillus simplex</i> strain DST65 | MT186229 | 1525/1525, (100%) |
| NWHA-66 | <i>Glutamicibacter endophyticus</i> strain DST66 | MT186238 | 1583/1583, (100%) |
| NWHA-67 | <i>Glutamicibacter halophytocola</i> strain ST67 | MT186239 | 1524/1524, (100%) |
| NWHA-68 | <i>Comamonas terrigena</i> strain DST68 | MT186246 | 1466/1466, (100%) |
| NWHA-69 | <i>Delftia acidovorans</i> strain DST69 | MT186247 | 1509/1509, (100%) |
| NWHA-70 | <i>Micrococcus yunnanensis</i> strain DST70 | MT186248 | 1493/1493, (100%) |
| NWHA-71 | <i>Pseudomonas fluorescens</i> strain DST71 | MT186249 | 1470/1470, (100%) |