Supplementary

1 Supplementary Figures and Tables

1.1 Supplementary Figures
Supplementary Figure 1. (Left) ITS2 and (right) combined ITS (I) + matK (M) + rbcL (R) + psbM-petN (P) maximum likelihood trees for *Aegilops*. Posterior probability values are shown above the branches. Colored bars indicate sections.
## 1.2 Supplementary Tables

### Supplementary Tables 1. Detailed descriptions of 84 *Aegilops* accessions. (1/4)

| No. | Sample No. | Taxon         | Geographical distribution* | Acc. No. | Section | Origin | ITS2  | matK     | rbcL     | psbM-petN |
|-----|------------|---------------|----------------------------|----------|---------|--------|-------|----------|----------|-----------|
| 1   | W-2        | *Ae. biuncialis* | DZA, LBY, MAR, TUN, CYP, IRN, IRQ, LBN, SYR, TUR, ARM, AFG, IRN, IRQ, JOR, LBN, SYR, TUR, ARM, AFG, IRN, IRQ, JOR, LBN, SYR, TUR, ARM, | K024016  | Aegilops | -      | MW447521 | OM314822 | OM22954 | OL417401 |
| 2   | W-3        | *Ae. biuncialis* | IRQ, ISR, JOR, LBN, SYR, TUR, | 801590  | Aegilops | RUS    | MW447522 | OM314823 | OM22955 | OL417402 |
| 3   | W-4        | *Ae. biuncialis* | RUS, ARM, AZE, GEO, RUS, UKR, | 801589  | Aegilops | RUS    | MW447523 | OM314824 | OM22956 | OL417403 |
| 4   | W-6        | *Ae. biuncialis* | ALB, BGR, GRC, HRV, ITA, MKD, | 208976  | Aegilops | UKR    | MW447524 | OM314825 | OM22957 | OL417404 |
| 5   | W-7        | *Ae. biuncialis* | ROU, SRB, ESP, FRA           | 204618  | Aegilops | -      | MW447525 | OM314826 | OM22958 | OL417405 |
| 6   | W-10       | *Ae. columnaris* | IRN, IRQ, LBN, SYR, TUR, ARM, | 208980  | Aegilops | ARM    | MW447526 | OM314827 | OM22959 | OL417406 |
| 7   | W-11       | *Ae. columnaris* | IRN, IRQ, LBN, SYR, TUR, ARM, | 189841  | Aegilops | ARM    | MW447527 | OM314828 | OM22960 | OL417407 |
| 8   | W-12       | *Ae. columnaris* | AZE, GRC                    | 189839  | Aegilops | AZE    | MW447528 | OM314829 | OM22961 | OL417408 |
| 9   | W-14       | *Ae. comosa*   | CYP, TUR, BGR, GRC          | K024000  | Comopyrum | -      | MW447529 | OM314830 | OM22962 | OL417409 |
| 10  | W-15       | *Ae. comosa*   | -                           | K024002  | Comopyrum | -      | MW447530 | OM314831 | OM22963 | OL417410 |
| 11  | W-17       | *Ae. comosa*   | -                           | K024000  | Comopyrum | -      | MW447531 | OM314832 | OM22964 | OL417411 |
| 12  | W-18       | *Ae. comosa*   | -                           | K023999  | Comopyrum | -      | MW447532 | OM314833 | OM22965 | OL417412 |
| 13  | W-19       | *Ae. comosa*   | CYP, TUR, BGR, GRC          | K023998  | Comopyrum | -      | MW447533 | OM314834 | OM22966 | OL417413 |
| 14  | W-20       | *Ae. comosa*   | -                           | 801749  | Comopyrum | CHE   | MW447534 | OM314835 | OM22967 | OL417414 |
| 15  | W-22       | *Ae. comosa*   | -                           | 208974  | Comopyrum | -      | MW447535 | OM314836 | OM22968 | OL417415 |
| 16  | W-23       | *Ae. comosa*   | -                           | 206900  | Comopyrum | TUR   | MW447536 | OM314837 | OM22969 | OL417416 |
| 17  | W-24       | *Ae. comosa*   | -                           | 206898  | Comopyrum | TUR   | MW447537 | OM314838 | OM22970 | OL417417 |
| 18  | W-27       | *Ae. crassa*   | AFG, IRN, IRQ, JOR, LBN, SYR, | 801574  | Vertebra | RUS   | MW447538 | OM314839 | OM22971 | OL417418 |
| 19  | W-28       | *Ae. crassa*   | TUR, ARM, KAZ, KGZ, TJK, TKM, | 801599  | Vertebra | RUS   | MW447539 | OM314840 | OM22972 | OL417419 |
| 20  | W-29       | *Ae. crassa*   | UZB                         | 801598  | Vertebra | RUS   | MW447540 | OM314841 | OM22973 | OL417420 |
| 21  | W-30       | *Ae. crassa*   | UZB                         | 208983  | Vertebra | UZB   | MW447541 | OM314842 | OM22974 | OL417421 |

*Source: USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN Taxonomy). http://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=100015. [Accessed September 7 2022].

The country code (ISO 3166-1 alpha-3 code)
Supplementary Tables 1. Detailed descriptions of 84 *Aegilops* accessions. (2/4) (Continued)

| No. | Sample No. | Taxon | Geographical distribution | Acc. No. | Section | Origin | ITS2 | matK | rbcL | psbM | petN |
|-----|------------|-------|---------------------------|----------|---------|--------|------|------|------|------|------|
| 22  | W-31       | *Ae. crassa* |                            | 208982   | Vertebrata | KAZ    | MW447542 | OM314843 | OM222975 | OL417422 |
| 23  | W-32       | *Ae. crassa* |                            | 206909   | Vertebrata | RUS    | MW447543 | OM314844 | OM222976 | OL417423 |
| 24  | W-33       | *Ae. crassa* |                            | 189843   | Vertebrata | UZB    | MW447544 | OM314845 | OM222977 | OL417424 |
| 25  | W-34       | *Ae. cylindrica* | AFG, IRN, IRQ, ISR, JOR, LBN, TUR, RUS, ARM, AZE, GEO, RUS, | 801618   | Cylindropyrum | RUS    | MW447545 | OM314846 | OM222978 | OL417425 |
| 26  | W-35       | *Ae. cylindrica* |                            | 801617   | Cylindropyrum | RUS    | MW447546 | OM314847 | OM222979 | OL417426 |
| 27  | W-36       | *Ae. cylindrica* | KAZ, KGZ, TJK, TKM, UZB, PAK, HUN, SVK, MDA, RUS, UKR, | 204621   | Cylindropyrum | -      | MW447547 | OM314848 | OM222980 | OL417427 |
| 28  | W-37       | *Ae. cylindrica* | BGR, GRC, HRV, MKD, ROU, SRB, SVN | 189845   | Cylindropyrum | UKR    | MW447549 | OM314850 | OM222981 | OL417428 |
| 29  | W-38       | *Ae. cylindrica* |                            | 189844   | Cylindropyrum | TKM    | MW447550 | OM314851 | OM222983 | OL417430 |
| 30  | W-39       | *Ae. cylindrica* |                            | 158190   | Cylindropyrum | -      | MW447551 | OM314852 | OM222984 | OL417431 |
| 31  | W-40       | *Ae. cylindrica* |                            | 208979   | Aegilops | LBN    | MW447552 | OM314853 | OM222985 | OL417432 |
| 32  | W-5        | *Ae. geniculata* | ESP, DZA, EGY, LBY, MAR, TUN, CYP, IRQ, ISR, JOR, LBN, SYR, | K024018  | Aegilops | -      | MW447553 | OM314854 | OM222986 | OL417433 |
| 33  | W-41       | *Ae. geniculata* |                            | 231189   | Aegilops | ROM    | MW447554 | OM314855 | OM222987 | OL417434 |
| 34  | W-42       | *Ae. geniculata* | MKD, MLT, MNE, ROU, SRB, SVN, ESP, FRA, PRT, USA | 208975   | Aegilops | AZE    | MW447555 | OM314856 | OM222988 | OL417435 |
| 35  | W-110      | *Ae. geniculata* |                            | 204630   | Vertebra | -      | MW447557 | OM314857 | OM222989 | OL417436 |
| 36  | W-43       | *Ae. juvenalis* |                            | 204630   | Vertebra | -      | MW447557 | OM314858 | OM222990 | OL417437 |
| 37  | W-44       | *Ae. juvenalis* | IRQ, SYR, AZE | 158208   | Vertebra | -      | MW447558 | OM314859 | OM222991 | OL417438 |
| 38  | W-45       | *Ae. longissima* |                            | 801576   | Sitopsis | RUS    | MW447559 | OM314860 | OM222992 | OL417439 |
| 39  | W-50       | *Ae. longissima* | EGY, ISR, JOR | 800260   | Sitopsis | JOR    | MW447560 | OM314861 | OM222993 | OL417440 |
| 40  | W-51       | *Ae. neglecta* |                            | 206890   | Sitopsis | ISR    | MW447561 | OM314862 | OM222994 | OL417441 |
| 41  | W-52       | *Ae. neglecta* |                            | 206896   | Aegilops | ITA    | MW447562 | OM314863 | OM222995 | OL417442 |

*Source: USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN Taxonomy). http://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=100015. [Accessed September 7 2022].

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**Supplementary Tables 1.** Detailed descriptions of 84 *Aegilops* accessions. (3/4) (Continued)

| No. | Sample No. | Taxon            | Geographical distribution                  | Acc. No. | Section     | Origin | ITS2     | matK     | rbcL     | psbM-petN |
|-----|------------|------------------|-------------------------------------------|----------|-------------|--------|----------|----------|----------|-----------|
| 43  | W-62       | *Ae. neglecta*   | DZA, MAR, TUN, IRN, IRQ, ISR, SYR, TUR    | 206895   | *Aegilops*  | TUR    | MW447563 | OM314864 | OM222996 | OL417443 |
| 44  | W-63       | *Ae. neglecta*   | IRQ, ISR, SYR, TUR                        | 189838   | *Aegilops*  | AZE    | MW447564 | OM314865 | OM222997 | OL417444 |
| 45  | W-70       | *Ae. searsii*    | ISR, JOR                                  | 800259   | *Sitopsis*  | SYR    | MW447565 | OM314866 | OM222998 | OL417445 |
| 46  | W-71       | *Ae. searsii*    | LBN, SYR                                  | 900131   | *Sitopsis*  | -      | MW447566 | OM314867 | OM222999 | OL417446 |
| 47  | W-72       | *Ae. searsii*    |                                           | 206891   | *Sitopsis*  | ISR    | MW447567 | OM314868 | OM230000 | OL417447 |
| 48  | W-74       | *Ae. sharonensis*|                                           | 801581   | *Sitopsis*  | RUS    | MW447568 | OM314869 | OM230001 | OL417448 |
| 49  | W-75       | *Ae. sharonensis*|                                           | 206892   | *Sitopsis*  | -      | MW447569 | OM314870 | OM230002 | OL417449 |
| 50  | W-82       | *Ae. sharonensis*|                                           | 900130   | *Sitopsis*  | -      | MW447570 | OM314871 | OM230003 | OL417450 |
| 51  | W-81       | *Ae. speltoides* | IRN, IRQ, ISR, LBN                       | 801583   | *Sitopsis*  | RUS    | MW447571 | OM314872 | OM230004 | OL417451 |
| 52  | W-83       | *Ae. speltoides* | SYR, TUR, BGR, GRC                       | 204625   | *Sitopsis*  | -      | MW447572 | OM314873 | OM230005 | OL417452 |
| 53  | W-90       | *Ae. tauschii*   |                                           | 302677   | *Vertebrata*| TUR    | MW447573 | OM314874 | OM230006 | OL417453 |
| 54  | W-91       | *Ae. tauschii*   |                                           | 269551   | *Vertebrata*| TUR    | MW447574 | OM314875 | OM230007 | OL417454 |
| 55  | W-92       | *Ae. tauschii*   | AFG, IRN, IRQ, SYR                       | 269550   | *Vertebrata*| TUR    | MW447575 | OM314876 | OM230008 | OL417455 |
| 56  | W-93       | *Ae. tauschii*   | TUR, RUS, ARM, AZE                       | 269549   | *Vertebrata*| TUR    | MW447576 | OM314877 | OM230009 | OL417456 |
| 57  | W-94       | *Ae. tauschii*   | GEO, KAZ, KGZ, TJK                      | 269555   | *Vertebrata*| AFG    | MW447577 | OM314878 | OM230100 | OL417457 |
| 58  | W-95       | *Ae. tauschii*   | TKM, UZB, CHN, IND                     | 302676   | *Vertebrata*| CHN    | MW447578 | OM314879 | OM230111 | OL417458 |
| 59  | W-96       | *Ae. tauschii*   | PAK, UKR, USA                           | 302675   | *Vertebrata*| CHN    | MW447579 | OM314880 | OM230112 | OL417459 |
| 60  | W-104      | *Ae. tauschii*   |                                           | 900129   | *Vertebrata*| -      | MW447580 | OM314881 | OM230103 | OL417460 |
| 61  | W-105      | *Ae. tauschii*   |                                           | K204006  | *Vertebrata*| -      | MW447581 | OM314882 | OM230104 | OL417461 |
| 62  | W-97       | *Ae. triuncialis*|                                           | 801614   | *Aegilops*  | RUS    | MW447582 | OM314883 | OM230105 | OL417462 |
| 63  | W-98       | *Ae. triuncialis*|                                           | 801613   | *Aegilops*  | RUS    | MW447583 | OM314884 | OM230106 | OL417463 |

*Source: USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN Taxonomy). http://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=100015. [Accessed September 7 2022].

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**Supplementary Tables 1.** Detailed descriptions of 84 *Aegilops* accessions. (4/4) (Continued)

| No. | Sample No. | Taxon               | Geographical distribution                      | Acc. No. | Section | Origin | ITS2    | matK   | rbcL   | psbMpetN |
|-----|------------|---------------------|------------------------------------------------|----------|---------|--------|---------|--------|--------|----------|
| 64  | W-99       | *Ae. triuncialis*   | DZA, MAR, KWT, AFG, CYP, IRN, IRQ, ISR, LBN, SYR, TUR, ARM, BGR, GRC, ITA, MKD, SVN, ESP, FRA, PRT | 801612   | Aegilops | RUS    | MW447584 | OM314885 | OM223017 | OL417464 |
| 65  | W-100      | *Ae. triuncialis*   | IRQ, ISR, LBN, SYR, TUR, ARM, BGR, GRC, ITA, MKD, SVN, ESP, FRA, PRT | 801611   | Aegilops | RUS    | MW447585 | OM314886 | OM223018 | OL417465 |
| 66  | W-101      | *Ae. triuncialis*   | AZE, GEO, RUS, KAZ, KGZ, TJK, BGR, GRC, ITA, MKD, SVN, ESP, FRA, PRT | 208985   | Aegilops | CHE    | MW447586 | OM314887 | OM223019 | OL417466 |
| 67  | W-102      | *Ae. triuncialis*   | TKM, UZB, PAK, UKR, ALB, BGR, GRC, ITA, MKD, SVN, ESP, FRA, PRT | 208984   | Aegilops | ESP    | MW447587 | OM314888 | OM223020 | OL417467 |
| 68  | W-103      | *Ae. triuncialis*   | IRA, IRQ, LBN, SYR, BGR, GRC, ITA, MKD, SVN, ESP, FRA, PRT | 204619   | Aegilops | -      | MW447588 | OM314889 | OM223021 | OL417468 |
| 69  | W-9        | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 208981   | Aegilops | IRN    | MW447589 | OM314890 | OM223022 | OL417469 |
| 70  | W-106      | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 801591   | Aegilops | RUS    | MW447590 | OM314891 | OM223023 | OL417470 |
| 71  | W-108      | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 801579   | Aegilops | RUS    | MW447591 | OM314892 | OM223024 | OL417471 |
| 72  | W-109      | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 208976   | Aegilops | TUR    | MW447592 | OM314893 | OM223025 | OL417472 |
| 73  | W-111      | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 189840   | Aegilops | AZE    | MW447593 | OM314894 | OM223026 | OL417473 |
| 74  | W-112      | *Ae. umbellulata*   | IRA, IRQ, LBN, SYR, | 158191   | Aegilops | TUR    | MW447594 | OM314895 | OM223027 | OL417474 |
| 75  | W-113      | *Ae. uniaristata*   | IRA, IRQ, LBN, SYR, | 801573   | Aegilops | TUR    | MW447595 | OM314896 | OM223028 | OL417475 |
| 76  | W-114      | *Ae. uniaristata*   | IRA, IRQ, LBN, SYR, | 801572   | Aegilops | TUR    | MW447596 | OM314897 | OM223029 | OL417476 |
| 77  | W-115      | *Ae. uniaristata*   | IRA, IRQ, LBN, SYR, | 208977   | Aegilops | TUR    | MW447597 | OM314898 | OM223030 | OL417477 |
| 78  | W-116      | *Ae. uniaristata*   | IRA, IRQ, LBN, SYR, | 206903   | Aegilops | TUR    | MW447598 | OM314899 | OM223031 | OL417478 |
| 79  | W-118      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 801573   | Aegilops | TUR    | MW447599 | OM314900 | OM223032 | OL417479 |
| 80  | W-119      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 801572   | Aegilops | TUR    | MW447600 | OM314901 | OM223033 | OL417480 |
| 81  | W-120      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 801571   | Aegilops | TUR    | MW447601 | OM314902 | OM223034 | OL417481 |
| 82  | W-121      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 206913   | Aegilops | TUR    | MW447602 | OM314903 | OM223035 | OL417482 |
| 83  | W-122      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 206912   | Aegilops | TUR    | MW447603 | OM314904 | OM223036 | OL417483 |
| 84  | W-123      | *Ae. ventricosa*    | IRA, IRQ, LBN, SYR, | 204629   | Aegilops | TUR    | MW447604 | OM314905 | OM223037 | OL417484 |

*Source: USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN Taxonomy). http://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=100015. [Accessed September 7 2022].

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Supplementary Tables 2. The best-fit replacement model used to construct the maximum likelihood tree for candidate DNA barcode.

| Regions | Best-fit replacement model |
|---------|---------------------------|
| I       | K2P                       |
| M       | TN + F + I + G4           |
| R       | K2P + I                   |
| P       | F81+ F                    |
| I + M   | TN + F + I + G4           |
| I + R   | TIM3e + I + G4            |
| I + P   | TPM2u + F + G4            |
| M + R   | TN + F + I + G4           |
| M + P   | TIM3 + F + I + G4         |
| R + P   | TN + F + I                |
| I + M + R| TIM3 + F + I + G4      |
| I + M + P| TN + F + I + G4      |
| I + R + P| TIM3 + F + I + G4      |
| M + R + P| TN + F + I + G4      |
| I + M + R + P| TN + F + I + G4 |
Supplementary Tables 3. Number of intraspecific variable characters per species in ITS2, \textit{matK}, \textit{rbcL}, \textit{psbM-petN}.

| Species            | Intraspecific variations | ITS2 | \textit{matK} | \textit{rbcL} | \textit{psbM-petN} |
|--------------------|--------------------------|------|---------------|---------------|-------------------|
| \textit{Aegilops biuncialis} |                          | 0    | 2             | 2             | 2                 |
| \textit{Aegilops columnaris} |                          | 0    | 1             | 1             | 0                 |
| \textit{Aegilops comosa}      |                          | 0    | 9             | 2             | 7                 |
| \textit{Aegilops crassa}      |                          | 1    | 8             | 1             | 0                 |
| \textit{Aegilops cylindrica}   |                          | 0    | 5             | 2             | 0                 |
| \textit{Aegilops geniculata}   |                          | 0    | 6             | 2             | 0                 |
| \textit{Aegilops juvenalis}    |                          | 0    | 2             | 1             | 0                 |
| \textit{Aegilops longissima}   |                          | 0    | 5             | 1             | 1                 |
| \textit{Aegilops neglecta}     |                          | 0    | 4             | 1             | 0                 |
| \textit{Aegilops searsii}      |                          | 0    | 4             | 2             | 0                 |
| \textit{Aegilops sharonensis}  |                          | 0    | 1             | 2             | 0                 |
| \textit{Aegilops speltoides}   |                          | 0    | 1             | 1             | 1                 |
| \textit{Aegilops tauschii}     |                          | 0    | 9             | 2             | 1                 |
| \textit{Aegilops triuncialis}  |                          | 0    | 9             | 3             | 0                 |
| \textit{Aegilops umbellulata}  |                          | 0    | 9             | 4             | 2                 |
| \textit{Aegilops uniaristata}  |                          | 0    | 6             | 1             | 0                 |
| \textit{Aegilops ventricosa}   |                          | 0    | 13            | 3             | 0                 |
| All 17 species         |                          | 26   | 28            | 6             | 10                |
Supplementary Tables 4. The Best match, Best close match and All species barcodes analysis comparing the identification ability of 15 candidate barcodes. Correct, both sequences were from the same species. Incorrect, Any mismatch. Ambiguous, Several cases with equally good best matches from different species.

| Regions | Best match, n (%) | Best close match, n (%) | All species barcode |
|---------|-------------------|-------------------------|---------------------|
|         | Correct | Ambiguous | Incorrect | Correct | Ambiguous | Incorrect | No match | Correct | Ambiguous | Incorrect | No match |
| I       | 49 (56.97%) | 35 (40.69%) | 2 (2.32%) | 49 (56.97%) | 35 (40.69%) | 2 (0.0%) | 82 (95.34%) | 4 (4.65%) | 0 (0.0%) | 0 (0.0%) |
| M       | 32 (37.2%) | 46 (53.48%) | 8 (9.3%) | 32 (37.2%) | 46 (53.48%) | 8 (0.0%) | 14 (16.27%) | 72 (83.72%) | 0 (0.0%) | 0 (0.0%) |
| R       | 5 (5.81%) | 79 (91.86%) | 2 (2.32%) | 5 (5.81%) | 79 (91.86%) | 2 (0.0%) | 1 (1.16%) | 85 (98.83%) | 0 (0.0%) | 0 (0.0%) |
| P       | 15 (17.44%) | 70 (81.39%) | 1 (1.16%) | 15 (17.44%) | 69 (80.23%) | 1 (1.16%) | 49 (56.97%) | 36 (41.86%) | 0 (0.0%) | 1 (1.16%) |
| I + M   | 60 (69.76%) | 20 (23.25%) | 6 (6.97%) | 60 (69.76%) | 20 (23.25%) | 6 (0.0%) | 40 (46.51%) | 46 (53.48%) | 0 (0.0%) | 0 (0.0%) |
| I + R   | 60 (69.76%) | 23 (26.74%) | 3 (3.48%) | 60 (69.76%) | 23 (26.74%) | 3 (0.0%) | 34 (39.53%) | 52 (60.46%) | 0 (0.0%) | 0 (0.0%) |
| I + P   | 70 (81.39%) | 14 (16.27%) | 2 (2.32%) | 70 (81.39%) | 14 (16.27%) | 2 (0.0%) | 60 (69.76%) | 24 (27.9%) | 0 (0.0%) | 2 (2.32%) |
| M + R   | 32 (37.2%) | 44 (51.16%) | 10 (11.62%) | 32 (37.2%) | 44 (51.16%) | 10 (0.0%) | 11 (12.79%) | 75 (87.2%) | 0 (0.0%) | 0 (0.0%) |
| M + P   | 49 (56.97%) | 26 (30.23%) | 11 (12.79%) | 49 (56.97%) | 26 (30.23%) | 11 (0.0%) | 16 (17.9%) | 69 (80.23%) | 0 (0.0%) | 1 (1.16%) |
| R + P   | 27 (31.39%) | 50 (60.6%) | 9 (10.46%) | 27 (31.39%) | 50 (60.23%) | 9 (0.0%) | 10 (11.62%) | 75 (87.2%) | 0 (0.0%) | 1 (1.16%) |
| I + M + R | 62 (72.09%) | 13 (15.11%) | 11 (12.79%) | 62 (72.09%) | 13 (15.11%) | 11 (0.0%) | 37 (43.02%) | 49 (56.97%) | 0 (0.0%) | 0 (0.0%) |
| I + M + P | 73 (84.88%) | 9 (10.46%) | 4 (4.65%) | 73 (84.88%) | 9 (10.46%) | 4 (0.0%) | 51 (59.3%) | 33 (38.37%) | 0 (0.0%) | 2 (2.32%) |
| I + R + P | 70 (81.39%) | 11 (12.79%) | 5 (5.81%) | 70 (81.39%) | 11 (12.79%) | 5 (0.0%) | 53 (61.62%) | 31 (36.04%) | 0 (0.0%) | 2 (2.32%) |
| M + R + P | 51 (59.3%) | 20 (23.25%) | 15 (17.44%) | 51 (59.3%) | 20 (23.25%) | 15 (0.0%) | 13 (15.11%) | 72 (83.72%) | 0 (0.0%) | 1 (1.16%) |
| I + M + R + P | 76 (88.37%) | 4 (4.65%) | 6 (6.97%) | 76 (88.37%) | 4 (4.65%) | 6 (0.0%) | 50 (58.13%) | 34 (39.53%) | 0 (0.0%) | 2 (2.32%) |

I, ITS2; M, matK; R, rbcL; P, psbM-petN.
Supplementary Tables 5. Analyze the identification efficiency of candidate DNA barcodes based on the maximum likelihood (ML) tree results.

| DNA barcode | Classified species | Number of species classified |
|-------------|--------------------|------------------------------|
| I           | Ae. searsii, Ae. comosa, Ae. crassa, Ae. tauschii, Ae. speltoides, Ae. uniaristata, Ae. ventricosa, Ae. columnaris, Ae. neglecta, Ae. sharonensis | 10 |
| M           | Ae. longissima, Ae. searsii, Ae. triuncialis, Ae. cylindrica, Ae. tauschii | 5 |
| R           | Ae. speltoides | 1 |
| P           | Ae. geniculata, Ae. uniaristata, Ae. speltoides | 3 |
| I+M         | Ae. longissima, Ae. triuncialis, Ae. crassa, Ae. uniaristata, Ae. ventricosa, Ae. sharonensis, Ae. columnaris, Ae. cylindrica, Ae. tauschii, Ae. speltoides | 10 |
| I+R         | Ae. triuncialis, Ae. speltoides, Ae. tauschii, Ae. uniaristata, Ae. crassa, Ae. columnaris, Ae. sharonensis | 7 |
| I+P         | Ae. searsii, Ae. sharonensis, Ae. columnaris, Ae. neglecta, Ae. geniculata, Ae. triuncialis, Ae. cylindrica, Ae. tauschii, Ae. ventricosa, Ae. crassa, Ae. speltoides, Ae. uniaristata | 12 |
| M+R         | Ae. triuncialis, Ae. cylindrica, Ae. tauschii, Ae. speltoides, Ae. searsii, Ae. longissima | 6 |
| M+P         | Ae. searsii, Ae. longissima, Ae. triuncialis, Ae. speltoides | 4 |
| R+P         | Ae. speltoides, Ae. geniculata, Ae. uniaristata | 3 |
| I+M+R       | Ae. columnaris, Ae. uniaristata, Ae. ventricosa, Ae. crassa, Ae. sharonensis, Ae. longissima, Ae. searsii, Ae. triuncialis, Ae. speltoides, Ae. cylindrica, Ae. tauschii | 11 |
| I+M+P       | Ae. longissima, Ae. columnaris, Ae. sharonensis, Ae. uniaristata, Ae. triuncialis, Ae. crassa, Ae. speltoides, Ae. cylindrica, Ae. tauschii, Ae. ventricosa, Ae. geniculata | 11 |
| I+R+P       | Ae. columnaris, Ae. sharonensis, Ae. geniculata, Ae. speltoides, Ae. crassa, Ae. triuncialis, Ae. cylindrica, Ae. tauschii, Ae. ventricosa, Ae. uniaristata | 10 |
| M+R+P       | Ae. cylindrica, Ae. tauschii, Ae. searsii, Ae. triuncialis, Ae. longissima | 5 |
| I+M+R+P     | Ae. uniaristata, Ae. cylindrica, Ae. tauschii, Ae. ventricosa, Ae. crassa, Ae. speltoides, Ae. neglecta, Ae. sharonensis, Ae. geniculata, Ae. triuncialis, Ae. longissima, Ae. searsii, Ae. columnaris | 13 |

I, ITS2; M, matK; R, rbcL; P, psbM-petN.
