# SUPPLEMENTARY TABLES, FIGURES AND FILES FOR:

# GBS-derived SNP catalogue unveiled wide genetic variability and geographical relationships of Italian olive cultivars.

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## Supplementary Tables

**Table S1.** List of the 94 olive cultivars analysed by genotyping-by-sequencing. From left to right we reported for each cultivar possible synonyms, geographical area of cultivation, drupe weight (average weight of 100 drupes), STRUCTURE and AWclust cluster membership for SNP dataset called by TASSEL-UNEAK ($T^U$) and TASSEL-GBS ($T^G$).

| Accession | Synonyms | Geographic area of cultivation | Drupe weight (g) | STRUCTURE | | Awclust | |
|---|---|---|---|---|---|---|---|
| | | | | $T^U$ | $T^G$ | $T^U$ | $T^G$ |
| Dolce di Cassano | / | Puglia | 4.66 | Adm | Adm | $I^u$b | $I^r$ |
| Oliastro | Lezze, Oliva rossa; Olivastro del Gargano, Olivastro di Conversano | Puglia | 2.03 | Adm | Adm | $IV^u$b | $IV^r$ |
| San Francesco | Sanfrancescana | Toscana/ Sicilia/ Marche/ Puglia | 5.76 | Adm | Adm | $IV^u$b | $IV^r$ |
| Vallanella | / | Lazio | 3.20 | Adm | Adm | $IV^u$b | $IV^r$ |
| Dritta di Loreto | Dolce, Grossa di Acquasparta, Loretana, Moscufese, San Felice | Marche | 1.82 | K1 | K1 | $I^u$a | $II^r$ |
| Marzio | / | Toscana | 2.25 | K1 | K1 | $I^u$a | $II^r$ |
| Pendolino | Mashio, Maurino fiorentino, Olivo passerino, Piangente | Toscana/ Marche | 1.65 | K1 | K1 | $I^u$a | $II^r$ |
| Piangente | Pendolino | Toscana | 2.16 | K1 | K1 | $I^u$a | $II^r$ |
| Rosciola laziale | Rosciola del Lazio | Lazio | 1.71 | K1 | K1 | $I^u$a | $II^r$ |
| Americano | Firenzuolo | Toscana | 2.56 | K1 | K1 | $I^u$a | $II^r$ |
| Carboncella | Roscina, Palombara, Moraiolo; Caravogna, Carbogna, Carbognola, Carbona, Carbonchio, Carbonchiola, Carboncina, Carbone, Carbonella, Marsella, Moretta, Morelo, Oliva nera, Oliva tonda, Ritornella | Lazio | 1.94 | K1 | K1 | $I^u$a | $II^r$ |
| Colombina | (Leccino) | Emilia Romagna | 2.39 | K1 | K1 | $I^u$a | $II^r$ |
| Leccino | Colombina, Leccio, Toscana, Verolana | Toscana | 2.60 | K1 | K1 | $I^u$a | $II^r$ |
| Leccio del Corno | Grappolo | Toscana | 2.30 | K1 | K1 | $I^u$a | $II^r$ |
| Maurino | Laurino, Maschio | Toscana | 2.16 | K1 | K1 | $I^u$a | $II^r$ |
| Dolce di Andria | Mele | Puglia | | K1 | Adm | $I^u$b | $I^r$ |
| Termite di Bitetto | Cima di Bitetto, Mele di Bitetto, Oliva mele, Termite | Puglia | 4.16 | K1 | Adm | $I^u$b | $I^r$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zimbimbo | Zimbimbolo | Puglia | 2.12 | K1 | K1 | $I^{u}b$ | $I^{r}$ |
| Frantoio | Casaliva, Correggiolo, Corsicana, Ogliarola del Bradano, Paesana, Raggia, Raggiola, Taggiasca, Razzola; Frantoiano, Gentile, Grugnola, Larcianese, Mandolina, Nostrato, Oliva lunga, Pendaglio, Radara, Raggia, Rasaro, Razzo, Resana, Sargano, Solciaro, Strangona, Vergiola | Toscana | 2.38 | K1 | K1 | $I^{u}b$ | $I^{r}$ |
| Ogliarola barese | Cima di Bitonto, Marinese, Ogliarola del Gargano; Baresana, Bitontina, Nostrana, Ogliarola, Paesana | Puglia | 2.42 | K1 | Adm | $I^{u}b$ | $I^{r}$ |
| Taggiasca | Lavagnina, Pignola di Oneglia, Rapuina | Liguria | 2.46 | K1 | K1 | $I^{u}b$ | $I^{r}$ |
| Cazzinicchio | / | Puglia | 3.17 | K1 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Cima di Melfi | Donna Francesca | Basilicata | 2.51 | K1 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Coratina | Racioppa, Cima di Corato, Coratese, Olivo a grappoli, Racemo | Puglia | 2.76 | K1 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Cerasuola | Palermitana, Marfia; Gruppusa, Nocellara, Ogliara, Ogliarola, Olivedda, Zimmusa | Sicilia | 3.25 | K2 | Adm | $III^{u}a$ | $IV^{r}$ |
| Bosana | Aliva dolci, Meliddu, Olia de Ozzu, Peranzana; Palma, Coroncina, Ogliastrina, Olieddu, Sassarese, Cerasa di Montenero | Sardegna | 3.13 | K2 | Adm | $II^{u}a$ | $IV^{r}$ |
| Caiazzana | Carica, Oliva a sauce, Vernacciola | Campania | 2.24 | K2 | K3 | $II^{u}a$ | $III^{r}a$ |
| Gentile di Chieti | Paesana bianca, Rosciola di Rotello; Biancucci, Nostrana, Olivastro | Abruzzo | 2.71 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Maiatica Ferrandina | Gentile, Materana, Oliva di Ferandina, Oliva dolce, Paesana, Pasola | Basilicata | 3.70 | K2 | K3 | $II^{u}a$ | $III^{r}a$ |
| Nebbio di Chieti | Comune, Gentile, Ordinaria | Abruzzo | 2.36 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Ogliarola del Vulture | / | Basilicata | 1.83 | K2 | K1 | $II^{u}a$ | $III^{r}a$ |
| Ortolana | Bella di san Lorenzo maggiore, Melella | Campania | 4.31 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Pampagliosa | / | Campania | 3.33 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Pignola | Pinola, Arbequina mendocina, Crova, Liguria, Merletta, Negretta, Olivo del povero, Pigneux, Pignola, Premice | Liguria | 2.41 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Pisciottana | Ogliastrina, Olivo dell'ascea, | Campania | 2.05 | K2 | Adm | $II^{u}a$ | $IV^{r}$ |
| Puntella | / | Abruzzo | 2.06 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Racioppella | Racioppa, Bella di san Lorenzo, Cacaccella, Favecotte, Grappetella, La ricca, Olivo a raciuppe, Racioppella di guardia Sanframondi, Rappocella, Spruarella | Campania | 2.49 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Raja | Oliva dolce, olivo di Macciano, Ortana, Raggia, Razza, Secolare di Giano | Umbria/ Lazio/ Marche | 2.32 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Rosciola | Caprigna, ogliarola, Ragiola, Risciola, Rossa, Rossaia, Rossolo, Rusciola, Rosciola del Lazio | Lazio/ Marche/ Toscana | 1.74 | K2 | Adm | $II^{u}a$ | $III^{r}a$ |
| Tendellone | Fecciaro, Pallottona, Raggio bastardo, Fezzalupo (Catanzaro) | Umbria | 3.77 | K2 | Adm | $II^{u}a$ | $IV^{r}$ |
| Zinzifarica | / | Calabria | 3.50 | K2 | K3 | $II^{u}a$ | $III^{r}a$ |
| Bottoni di Gallo | Sperone di gallo, Oliva torta | Molise | 1.46 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Cima di Mola | Ogliarola di Lecce, Chiarita, Cima di Fasano, Cima di Mola, Cima di Monopoli, Fasanese, Giuggiolara, Mennedda, Molese, Monopolese, Nasuta, Ogliarola salentina, Pizzuta, Salentina, Tarantina | Puglia | 1.43 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Mignola | Laurina, Sargana, Sarganella, Suricina; Carbonella, Laura, Migliola, Mignolo, Mindola, Mindulina, Miola, Sargano | Marche | 1.53 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Canino | Caninese, Oliva di Canino, Montignoso | Lazio | 1.29 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Cellina di Nardò | Asciulo, Cafredda, Gasciola, Inchiastra, Leccese, Morella, Oliva di Lecce, Oliva di Nardò, Saracena, Scorrano, Vosciola | Puglia (Libia) | 1.39 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Ciciarello | Ciccarella, Olivo amaro, Olivo minuto, Resta | Calabria | 1.87 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Dolce Agogia | Nerello, Olivella | Umbria | 2.19 | K2 | Adm | $II^{u}b$ | $III^{r}a$ |
| Ottobratica | Probably is an libyan origin (Gharyan)/ Dolce, Mirtoleo, Perciatella | Calabria | 1.67 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Rastellina | Rastrellina | Umbria/ Toscana | 1.67 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Sargano | Frantoio | Toscana | 1.49 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Sinopolese | Calabrese, Chianota, Coccitano, Oleastrela, Pizzocorno, Scialorea, Seminara | Calabria | 1.66 | K2 | K2 | $II^{u}b$ | $III^{r}b$ |
| Pasola | Maiatica, Fasola, Pasola d'Andria | Puglia/ Basilicata | 3.73 | K2 | Adm | $I^{u}b$ | $I^{r}$ |
| Toscanina | Oliva a grappa | Puglia | 1.64 | K2 | Adm | $I^{u}b$ | $I^{r}$ |
| Bianchella | Bianchetta, Bianchella del Trasimeno | Umbria | 2.32 | K2 | Adm | $I^{u}b$ | $I^{r}$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Salvia | / | Lazio | 1.66 | K2 | Adm | $I^{u}b$ | $I^{r}$ |
| Frangivento | Cipressino, Olivo di Pietrafitta | Puglia | 2.71 | K2 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Marina | Ogliarola barese | Lazio | 2.71 | K2 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Monaca | Calabrese, Monachella | Sicilia | 4.27 | K2 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Nociara | Fra' Michele | Puglia | 2.70 | K2 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Racioppa | Spinoso, Cioppella del Melfese, di Venosa, Racioppa di Rivello, di Vietri, Racioppella di Lavello, di Venosa | Basilicata | 3.50 | K2 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Simona | Simone | Puglia | 1.71 | K2 | K2 | $IV^{u}b$ | $IV^{r}$ |
| Ascolana Tenera | Noce, Oliva dolce, Oliva grossa, Oliva noce, Spanish Queen | Marche | 7.34 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Borgese | Carolea | Calabria | 8.65 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Carolea | Catanzarese, Becco di corvo, Borgese, Colarè, Convitè, Coriolese, Cortalese, Cumignana, Nicastrese, Oliva dolce, Olivona, Policastrese, Squillaciota, Verdella | Calabria | 5.96 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Giarraffa | Nocellara del Belice, Ogliarola messinese, Tonda iblea; Becco di corvo, Cefalutana, Giardara, Giuliana, Mammona, Pizzo di corvo | Sicilia | 6.67 | K3 | K4 | $III^{u}a$ | $V^{r}$ |
| Grappolo | Leccio del corno | Toscana | 2.53 | K3 | Adm | $III^{u}a$ | $IV^{r}$ |
| Moresca | Jannusa, Minnulara, Morghetana, Nerba; Bianculidda, Catanisa, Francofontese, Giandalora, Imperiale, Maioana, Marsalisa, Mendolara, Nostrale, Ogliarola, Passulunara, Polina, Reale, Tortella, Ugghialara | Sicilia | 4.58 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Nocellara etnea | Bianca, Forte, Ghiandolara, Marmorina, Nerba catanese, Patornese, Pizzuta, Rappara, Tortella, Verdesca, Verdese | Sicilia | 4.81 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Ogliarola messinese | Castriciana, Calamigna, Castranese, Giarraffa, Messinese, Nostrale, Oliva di Termini, Passuliuara, Pattese, Paturnisa, Pllinese, Raffa, Terminese | Sicilia | 5.87 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Orbetana | Marchigiana; Corva, Oliva di san Franceso, Razzo, Sarga, Urbitana | Marche | 4.51 | K3 | Adm | $III^{u}a$ | $V^{r}$ |
| Pennullara | Nostrale di Caccuri | Calabria | | K3 | Adm | $III^{u}a$ | $V^{r}$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Piantone Mogliano | Limoncella, Oliva riccia, Piantone di Macerata, Raggiola, Rosciola, Rosciola di Tolentino | Marche | 3.05 | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Pizz'e Carroga | Becco di Cornacchia, Bianca, Olia bianca, Oliva di Villacidro, Puntuda, Sarda | Sardegna | | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Romanella | Rotondella | Calabria | 4.93 | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Sant'Agostino | Oliva grossa, Grossa di Andria, Oliva di Andria, Oliva pane, Cazzarola | Puglia | 3.61 | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Tonda di Filadelfia | / | Calabria | 3.60 | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Tonda Iblea | Marmorina; Caloria, Cetral, Ferlese, Comune, Giarraffa; Grossaia, Nuciddara, Prunara, Raffiuna, Siracusna, Tunna, Vitriolo | Sicilia | 5.49 | K3 | Adm | III$^{u}$a | V$^{r}$ |
| Nera di Gonnos | Maiorca (1078/ 1363), Confetto, Tonda di Cagliari; Niedda, Oliva di Gonnos | Sardegna | 6.30 | K3 | Adm | III$^{u}$b | V$^{r}$ |
| Nocellare messinese | Nuciddara, Turdunazza antimosca, Verdella | Sicilia | 5.68 | K3 | Adm | III$^{u}$b | V$^{r}$ |
| Tonda di Cagliari | Majorca, Nera di Gonnos; Tonda Coma de Ilisci | Sardegna | 5.84 | K3 | Adm | III$^{u}$b | V$^{r}$ |
| Semidana | Terza, Olia de Riola, Olivo terzo grande | Sardegna | 4.43 | K3 | Adm | II$^{u}$a | IV$^{r}$ |
| Cerasella | Mele, Amele, Annolca, Culmona, Dolce, Dolce di Andia, Dolce di Puglia, Dolce di Sannicandro, Dolce Mele, Dolce piccola, Innolache, Noce, Nolca, Nura, Oliva nocella, Oliva roccella | Puglia | 3.86 | K3 | Adm | IV$^{u}$a | I$^{r}$ |
| Mele | Cerasella, Dolce di Andria, Nolca, Dolce | Puglia | | K3 | Adm | IV$^{u}$a | I$^{r}$ |
| Mora | / | Puglia | 5.01 | K3 | Adm | IV$^{u}$a | I$^{r}$ |
| Nolca | Mele | Puglia | 3.55 | K3 | Adm | IV$^{u}$a | I$^{r}$ |
| Augellina | Angellina, Cellina delle Murge, Cellina di Cassano | Basilicata | 4.57 | K3 | Adm | IV$^{u}$b | IV$^{r}$ |
| Calatina | Galatina, Montagna | Sicilia | 3.48 | K3 | Adm | IV$^{u}$b | IV$^{r}$ |
| Cassanese | Grossa di Cassano, Precoce di Cassano | Calabria | 3.93 | K3 | Adm | IV$^{u}$b | IV$^{r}$ |
| Corniola | Cornale, Cornulara, Farisana, Oliva minuta, Passula | Calabria/ Puglia/ Croazia | 3.26 | K3 | Adm | IV$^{u}$b | IV$^{r}$ |
| Crastu | Cristoraffo, Pizzulidda, Rizziteddu | Sicilia | | K3 | Adm | IV$^{u}$b | IV$^{r}$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Itrana | Aitana, Cicerone, Gaetana, Esperia, Oliva di Gaeta, Oliva di Itri, Oliva di Formia, Oliva grossa, Strano, Tanella, Tanesca, Velletrana | Lazio | 3.78 | K3 | Adm | $IV^{u}b$ | $IV^{r}$ |
| San Benedetto | Sanbenedettese Termitana | Sicilia | 3.84 | K3 | Adm | $IV^{u}b$ | $IV^{r}$ |
| Tondina | Ottobratica rotondella, Roggianella, Cicinella, Amaro, Gaetana, Marinella, Oliva di Cariati, di Cosmo albanese, Spezzanota, Vernile | Calabria | 2.88 | K3 | Adm | $IV^{u}b$ | $IV^{r}$ |

30

31 **Table S2**. Mean squares of olive drupe weight of cultivars in AWclust and STRUCTURE groups derived from two different SNP calling pipeline (TASSEL-UNEAK and
32 TASSEL-GBS)

| Source of variation | d.f. | TASSEL-UNEAK | | d.f. | TASSEL-GBS | |
|---|---|---|---|---|---|---|
| | | STRUCTURE | AWclust | | STRUCTURE | AWclust |
| Between clusters | 3 | 37.922*** | 34.173*** | 4 | 17.726*** | 29.156*** |
| Within cluster | 85 | 1.007 | 1.139 | 84 | 1.529 | 0.985 |

33 *** Significant differences at 0.001 P value; d.f.= degrees of freedom

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35

36 **Table S3.** List of ten SNP *loci* selected for validation by PCR amplifications and Sanger sequencing in three cultivars.

| Marker | Alleles | Scaffold | Position | Forward Primer 5'-3' | Reverse primer 5'-3' | $T_m$ | Product size (bp) | Ascolana Tenera | Leccino | Tendellone |
|---|---|---|---|---|---|---|---|---|---|---|
| S1_5476481 | A/T | OE6_S00005 | 420334 | AAGAAAAGCAAAATGCCTCG | CATTTCGTGTCATTGCTCGT | 53 | 164 | n.a. | T | A |
| S1_5746249 | C/T | OE6_S00005 | 690102 | TTGGAGACTTTTATGCTCAC | TAGGTAAGTGGGTTCAGTAA | 54 | 205 | Y | C | T |
| S1_6673237 | C/G | OE6_S00006 | 112909 | TGCACCAATGTAGCCATCAA | TTTCATCAGGTTTTTTCACG | 53 | 205 | C | G | S |
| S1_9032471 | C/A | OE6_S00007 | 1010134 | GAGCCAAGAACACAAGTGCA | AGACGTTTTGTTCCCTGTGC | 59 | 233 | M | A | C |
| S1_11378373 | C/A | OE6_S00009 | 638848 | AAATACCACGTGTGCCTGTG | CAAGTGCGATTCTATGGGGC | 58 | 163 | C | A | M |
| S1_1112173174 | G/A | OE6_S09619 | 463721 | TCTCTCGAGCAATGCCAAAC | TGTTGTGGCCTATTTTATGCATT | 57 | 212 | A | R | G |
| S1_1160752348 | A/G | OE6_S09678 | 373891 | GGTGAATCCCATAAAATGTGCG | TGGGGTAACTTCAGGTCGTC | 58 | 221 | G | R | A |
| S1_1225811364 | A/T | OE6_S09824 | 82650 | TGTGGTCGAAAAGGAATTGCA | TGGCTTTGTGGGTCCTATTCT | 58 | 196 | T | W | n.a. |
| S1_1232287062 | C/G | OE6_S09844 | 260124 | TCGCAAATTGTTAATGCACGA | GAGGTCAATCTTCAAAAGCATCG | 58 | 202 | C | G | S |
| S1_1235619693 | A/T | OE6_S09855 | 137493 | TGGAGGGGTTGTTTAAGAAGGA | ACTCTTCCTTGCCGAATATGC | 58 | 177 | A | A | T |

37 n.a.= not available

38

39 **Table S4. List of pairs of cultivars with identity-by-state (IBS) allele-sharing estimates >0.95.** Stars indicate novel cases of synonymy.

| Cultivar A | Cultivation Area | Cultivar B | Cultivation Area | IBS |
|---|---|---|---|---|
| Borgese | Calabria | Pennullara | Calabria | 0.980 |
| Bottoni di Gallo* | Molise | Cima di Mola | Apulia | 0.951 |
| Bottoni di Gallo* | Molise | Mignola | Marche | 0.966 |
| Cerasella | Apulia | Mele | Apulia | 0.957 |
| Cerasella | Apulia | Nolca | Apulia | 0.953 |
| Cima di Mola* | Apulia | Mignola | Marche | 0.962 |
| Dolce di Andria | Apulia | Termine di Bitetto | Apulia | 0.954 |
| Dritta di Loreto* | Marche | Marzio | Tuscany | 0.981 |
| Dritta di Loreto* | Marche | Rosciola laziale | Lazio | 0.982 |
| Frantoio | Tuscany | Ogliarola barese | Apulia | 0.977 |
| Frantoio | Tuscany | Taggiasca | Liguria | 0.983 |
| Marzio* | Tuscany | Rosciola laziale | Lazio | 0.980 |
| Mele | Apulia | Nolca | Apulia | 0.963 |
| Nebbio di Chieti* | Abruzzo | Pignola | Liguria | 0.971 |
| Nera di Gonnos | Sardinia | Nocellare messinese | Sicily | 0.980 |
| Nera di Gonnos | Sardinia | Tonda di Cagliari | Sardinia | 0.977 |
| Nocellare messinese | Sicily | Tonda di Cagliari | Sardinia | 0.981 |
| Ogliarola barese | Apulia | Taggiasca | Liguria | 0.976 |
| Pendolino* | Tuscany | Piangente | Tuscany | 0.975 |

40

**Table S5.** Analysis of the TREEMIX log-likelihood values for 0 to 3 migrations revealed that b the highest log-likelihood 2 migration events were assumed. Relative migration weights are indicated.

| M | ln(lik) | Added migration events | |
|---|---|---|---|
| 0 | -892,18498 | | |
| 1 | -30,414103 | 0.269 $C3^u \rightarrow C4^u$ | |
| 2 | 80,178093 | 0.278 $C3^u \rightarrow C4^u$ | 0.448 $C1^u \rightarrow C4^u$ |
| 3 | 80,207574 | 0.277 $C3^u \rightarrow C4^u$ | 0.487 $C1^u \rightarrow C4^u$ |

45 **Table S6.** List of the 30 longest olive scaffolds including SNPs used for LD decay estimation.

| Scaffold ID | Lenght (bp) |
|---|---|
| Oe6_s01922 | 2580346 |
| Oe6_s03843 | 2536859 |
| Oe6_s05764 | 2523920 |
| Oe6_s07686 | 2240446 |
| Oe6_s09607 | 2096410 |
| Oe6_s09608 | 2089551 |
| Oe6_s07687 | 1923341 |
| Oe6_s05765 | 1885776 |
| Oe6_s03844 | 1855288 |
| Oe6_s01923 | 1842151 |
| Oe6_s00002 | 1827728 |
| Oe6_s07688 | 1794324 |
| Oe6_s09609 | 1710228 |
| Oe6_s05766 | 1709168 |
| Oe6_s03845 | 1695730 |
| Oe6_s01924 | 1676923 |
| Oe6_s00003 | 1664807 |
| Oe6_s09610 | 1647348 |
| Oe6_s07689 | 1631851 |
| Oe6_s03846 | 1601848 |
| Oe6_s09611 | 1570811 |
| Oe6_s00004 | 1563312 |
| Oe6_s07690 | 1555990 |
| Oe6_s05768 | 1547260 |
| Oe6_s03847 | 1528064 |
| Oe6_s01926 | 1506713 |
| Oe6_s00005 | 1504081 |
| Oe6_s09612 | 1487753 |
| Oe6_s07691 | 1478965 |
| Oe6_s03848 | 1469283 |

46

47 **Table S7**. Potential cases of synonymy identified by allele frequency estimates on 94 Italian olive varieties. Stars
48 indicate novel cases of synonymy.

49

| **Possible cases of synonymy** | **Cultivation area** |
|---|---|
| Cerasella, Mele and Nolca | Apulia |
| Rosciola Laziale and Marzio* | border between Lazio and Tuscany |
| Pennulara and Borgese | Calabria |
| Maiatica di Ferrandina and Zinzifarica* | Basilicata and Calabria |
| Ogliarola Messinese, Nocellara Messinese and Sant'Agostino* | Sicily and Apulia |
| Nera di Gonnos, Tonda di Cagliari and Tonda Iblea | Sardinia and Sicily |
| Cima di Mola, Bottoni di Gallo and Mignola* | Apulia, Molise and Marche |
| Ogliarola barese, Taggiasca and Frantoio | Apulia, Liguria and Tuscany |

50

**Supplementary Figures**

**Figure S1.** Bar chart describing the distribution across 94 olive cultivars of SNP types (%) called by TASSEL-UNEAK and TASSEL-GBS.

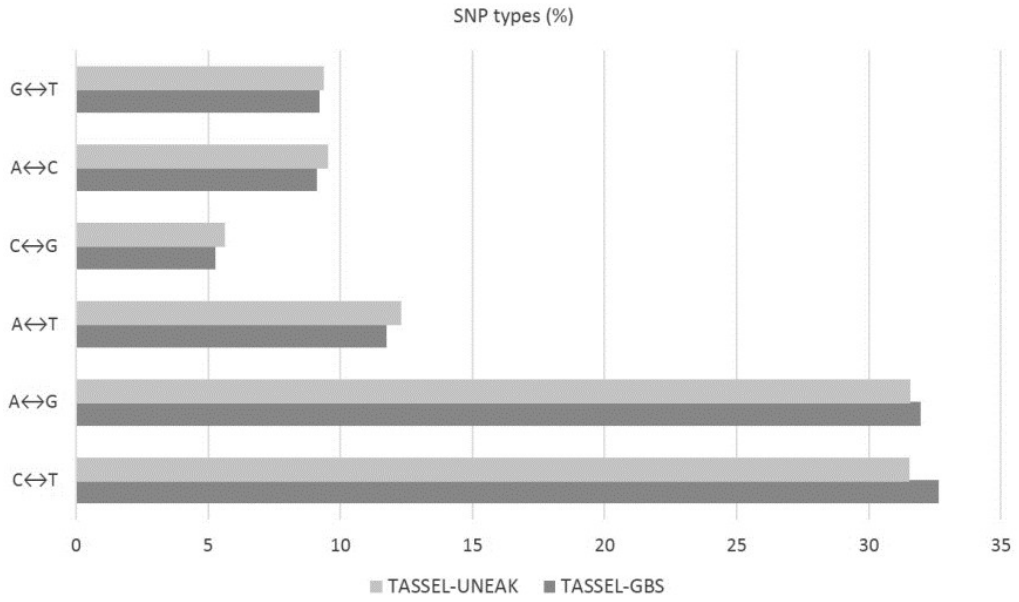


**Figure S2.** Stacked bar charts describing the distribution of 8,088 and 37,792 high quality SNPs called by TASSEL-UNEAK (A) and TASSEL-GBS (B) in the following categories: reference allele, alternate allele, heterozygous allele and missing values.

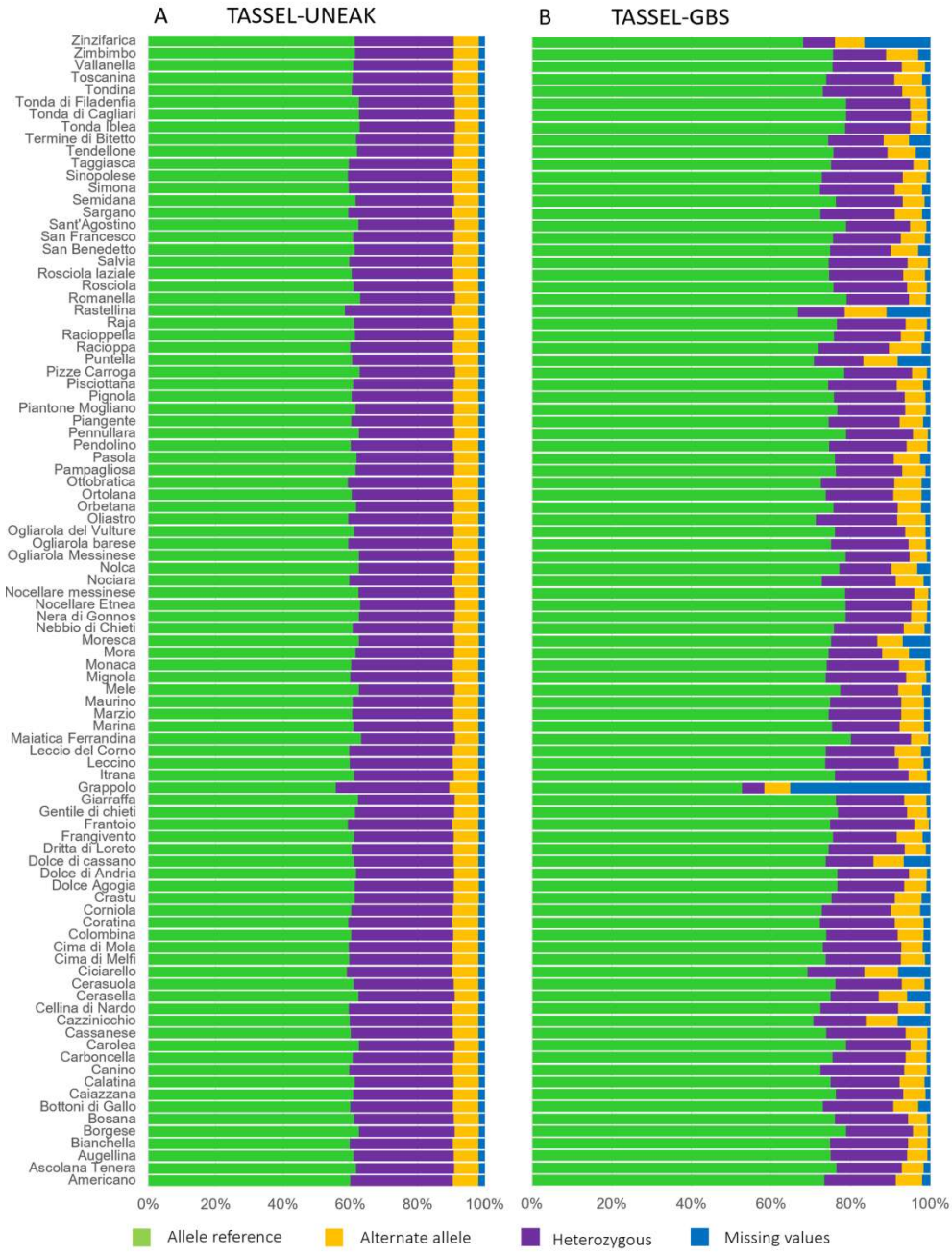


**Figure S3**. A) Evaluation of the best number of genetic clusters (K) using Evanno's method for population structure inferred from SNPs called by TASSEL-UNEAK. On the left it is shown the plot of mean likelihood L(K) and variance for 10 independent runs for each value of K (2-10); on the right it is reported Evanno's plot generated by STRUCTURE HARVESTER for the detection of the most likely value of K. The best value was at K=3, portioning the 94 olive cultivars into 3 genetic clusters. B) Evaluation of the best grouping number (K) using Evanno's method for population structure inferred from SNPs called by TASSEL-GBS. On the left it is shown the plot of mean likelihood L(K) and variance for 10 independent runs for each value of K (1-15); on the right it is reported Evanno's plot generated by STRUCTURE HARVESTER for the detection of the most likely value of K. The highest value was at K=4, indicating that the 94 cultivars likely form 4 sub-populations.

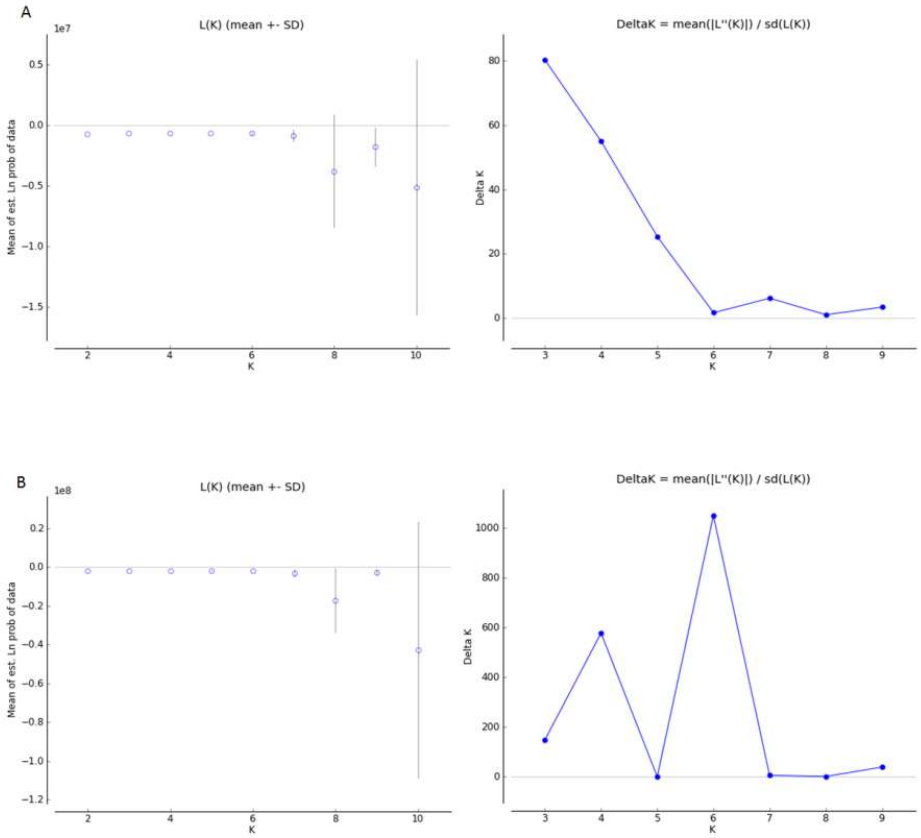


**Figure S4.** Gap statistic plots to estimate the best number of genetic cluster (K) in two populations whose structure was derived using SNP markers called by TASSEL-UNEAK (A) and TASSEL-GBS (B). The number of inferred Ks ranging from 1 to 15 is shown in the graphs. The estimated expectation of log (Wk) and the observed log (Wk) are indicated by the blue and red curves, respectively. As shown by the x- and y-axes representing different possible Ks and the corresponding gap values, individuals in both populations could be partitioned into K=4 (A) and K=5 (B) genetic clusters.

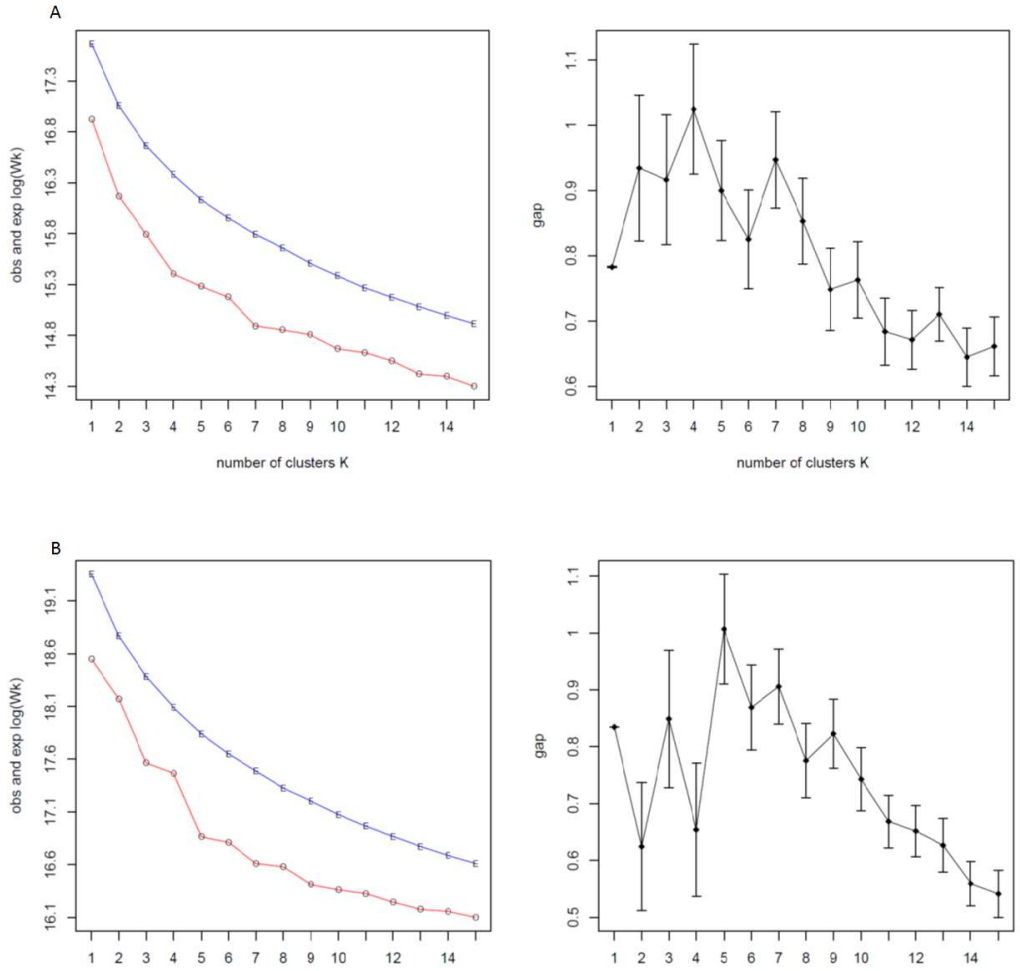
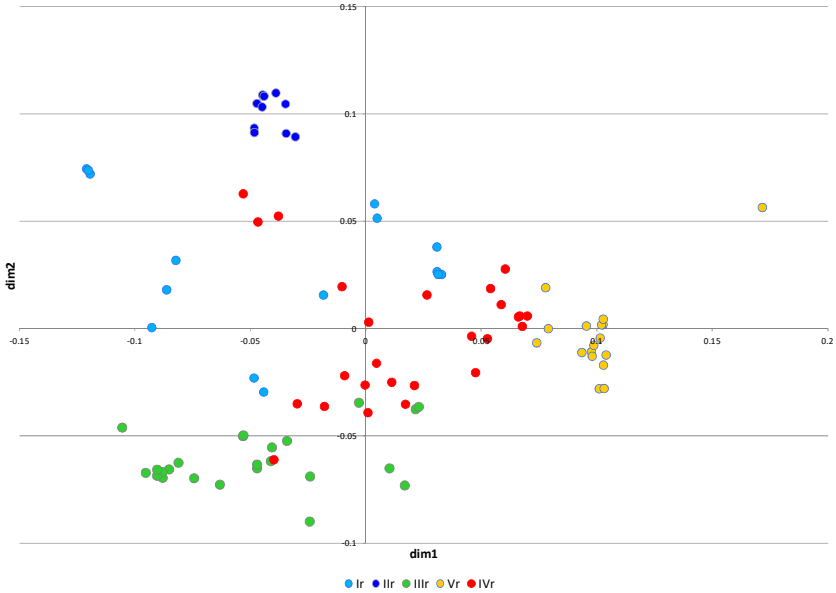


**Figure S5.** Multi-dimensional scaling (MDS) plot of the IBS distance matrix calculated using 22,088 unlinked SNPs (TASSEL-GBS SNP calling pipeline). Colours refer to different sub-populations. The 94 olive cultivars were clearly grouped into three clusters, while members of two other groups (i.e. Ir and IVr) are scattered in the multidimensional space. The clustering pattern is collinear with the population structure as inferred by STRUCTURE and AWclust.



## Supplementary Files

**File S1.** Unfiltered VCF file including SNPs called by the TASSEL-GBS pipeline.

**File S2.** Unfiltered VCF file including SNPs called by the TASSEL-UNEAK pipeline.