Table S1. Latin and English names and synonyms, taxonomy and natural area of examined *Pinus* taxa

Taxon (species, subspecies, variety), English name and synonyms	Subgenus	Section	Subsection	Natural area
1. *Pinus albicaulis* *Engelm.* - **Whitebark pine,** white bark pine, white pine, pitch pine, scrub pine, creeping pine Synonyms: *Pinus cembroides, P. flexilis var. albicaulis, P. flexilis ssp. albicaulis, P. shasta*	*Strobus*	*Quinquefoliae*	*Strobus*	Western USA, Canada
2. *Pinus aristata* *Engelm.* - **Rocky Mountain bristlecone pine**, Colorado bristlecone pine. Synonyms: *P. balfouriana ssp. aristata, P. balfouriana var. aristata*	*Strobus*	*Parrya*	*Balfourianae*	Colorado, New Mexico, Arizona
3. *Pinus arizonica* *Engelm.* - **Arizona pine** Synonyms: *P. ponderosa* var. *arizonica*	*Pinus*	*Trifoliae*	*Ponderosae*	Mexico, Arizona, New Mexico, Texas
4. *Pinus armandii* Franch. - **Armand pine**, Chinese white pine Synonyms: *P. armandii* var. *amamiana, P. armandii* var. *farjonii, P. armandii* ssp. *yuana, P. armandii* var. *mastersiana, P. levis, P. mastersiana, P. quinquefolia, P. scipioniformis*	*Strobus*	*Quinquefoliae*	*Strobus*	China, Taiwan, Burma
5. *Pinus armandii* ssp. *xuannhaensis* - Xuan nha pine	*Strobus*	*Quinquefoliae*	*Strobus*	Xua Nha, Nature Reserve, Vietnam
6. *Pinus attenuata* Lemmon - **Knobcone pine** Synonyms: *P. tuberculate, P. californica*	*Pinus*	*Trifoliae*	*Australes*	Oregon, Baja California, California
7. (E)*Pinus balfouriana* ssp. *balfouriana*– Foxtail pine	*Strobus*	*Parrya*	*Balfourianae*	California (Klamath Mts.)
8. *Pinus banksiana* Lamb.– **Jack pine**, grey pine, scrub pine Synonyms: *P. divaricata, P. hudsonica, P. rupestris, P. sylvestris* var. *divaricata*	*Pinus*	*Trifoliae*	*Contortae*	Canada, New Scotia, Minessota, Pensylvania
9. *Pinus brutia* Ten. – **Turkish pine**, Calabrian pine, East Mediterranean pine, Afghan pine, Brutia pine Synonyms: *P. halepensis* var. *brutia, P. pyrenaica*	*Pinus*	*Pinus*	*Pinaster*	Turkey, Afghanistan, East Mediterran
10. *Pinus brutia* ssp. *eldarica* - Afghan Pine	*Pinus*	*Pinus*	*Pinaster*	Azerbaijan, Georgia
11. *Pinus brutia* var. *stankewiczii* (ssp. ***brutia***)	*Pinus*	*Pinus*	*Pinaster*	Crimea
12. *Pinus bungeana* Zucc. ex Endl.- **Bunge's pine,** lacebark pine, white-barked pine Synonyms:/	*Strobus*	*Quinquefoliae*	*Gerardianae*	China
13. (E)*Pinus canariensis* C.Sm. ex D.C. - **Canary Island pine** Synonyms:/	*Pinus*	*Pinus*	*Pinaster*	Canary Islands
14. *Pinus caribaea* Morelet - **Caribbean pine** Synonyms: *P. hondurensis, P. bahamensis*	*Pinus*	*Trifoliae*	*Australes*	Central America, West Indies
15. *Pinus caribaea* var. *bahamensis* - Bahamas pine, Caicos pine, Caribbean pine	*Pinus*	*Trifoliae*	*Australes*	Bahamas, Turks, Caicos Islands
16. *Pinus caribaea* var. *caribaea* - Nicaragua pine, Caribbean pine, pitch pine	*Pinus*	*Trifoliae*	*Australes*	western Cuba (two islands)
17. *Pinus caribaea* var. *hondurensis* - Caribbean pine	*Pinus*	*Trifoliae*	*Australes*	Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua
18. *Pinus cembra* L. - **Swiss pine,** Swiss stone pine, Arolla pine, Austrian stone pine, stone pine Synonyms:/	*Strobus*	*Quinquefoliae*	*Strobus*	Alps and Carpathian Mts. in Europe
19. *Pinus cernua* P.K.Lôc ex Aver., K.S.Nguyen & T.H.Nguyên Synonyms: *P. armandii* ssp. *xuannhaensis*	*Strobus*	*Quinquefoliae*	*Strobus*	Vietnam

20. ***Pinus contorta* ssp. *contorta*** - **Shore pine,** Lodgepole pine, twisted pine, contorta pine	*Pinus*	*Trifoliae*	*Contortae*	Pacific Coast, Alaska, California
21. ***Pinus contorta* ssp. *latifolia*** - **Lodgepole pine**, shore pine, twisted pine, contorta pine	*Pinus*	*Trifoliae*	*Contortae*	western North America
22. ***Pinus contorta* ssp. *murrayana*** - **Tamarak pine,** Siera lodgepole pine	*Pinus*	*Trifoliae*	*Contortae*	California, Sierra Nevada
23. ***Pinus coulteri*** D. Don - **Coulter pine,** big-cone pine Synonyms: *P. macrocarpa*	*Pinus*	*Trifoliae*	*Ponderosae*	California, Mexico
24. (E)***Pinus culminicola*** Andresen & Beaman - **Potosí pinyon,** Potosí Piñón Synonyms: /	*Strobus*	*Parrya*	*Cembroides*	Northeast Mexico
25. (E)***Pinus dalatensis*** Ferré - **Dalat pine**, Vietnamese white pine Synonyms: *P. wallichiana* var. *dalatensis*	*Strobus*	*Quinquefoliae*	*Strobus*	Vietnam, Laos
26. (E)***Pinus densata*** Mast. - **Sikang pine** Synonyms: /	*Pinus*	*Pinus*	*Pinus*	China
27. ***Pinus densiflora*** Siebold & Zucc. - **Japanese red pine**, Japanese pine, Korean red pine Synonyms: *P. funebris, P. japonica, P. scopifera*	*Pinus*	*Pinus*	*Pinus*	East Asia, Siberia
28. ***Pinus elliottii*** Engelm. – **Slash pine** Synonyms: *P. taeda* var. *heterophylla*, *P. heterophylla*	*Pinus*	*Trifoliae*	*Australes*	Southeastern USA
29. ***Pinus flexilis*** E.James, 1824 - **Limber pine,** Rocky Mountain white pine Synonyms: *Apinus flexilis, P. cembra* var. *flexilis, P. lambertiana* var. *brevifolia, P. novaemexicana, P. reflexa*	*Strobus*	*Quinquefoliae*	*Strobus*	Western USA, Mexico, Canada
30. (E)***Pinus fenzeliana*** Hand.-Mazz. - Hainan white pine or Fenzel's pine Synonyms*: P. kwangtungensis*	*Strobus*	*Quinquefoliae*	*Strobus*	Island of Hainan, China
31. ***Pinus gerardiana*** Wall. ex D. Don - **Chilghoza pine**, neja Synonyms: *P.aucklandii, P. chilghoza, P. gerardii, P. neosa*	*Strobus*	*Quinquefoliae*	*Gerardianae*	Southern Asia
32. ***Pinus halepensis*** Mill. - **Aleppo pine**, Jerusalem pine Synonyms: *P. abasica, P. arabica, P. genuensis, P. hispanica, P. parolinii*	*Pinus*	*Pinus*	*Pinaster*	Mediterranean region
33. ***Pinus hartwegii*** Lindl. - **Hartweg's pine**, Mexican mountain pine Synonyms: *P. rudis*	*Pinus*	*Trifoliae*	*Ponderosae*	Mexico, Central America
34. (R)***Pinus heldreichii*** H. Christ. - **Bosnian pine,** Heldreich's pine Synonyms: *P. leucodermis*, *P. laricio* var. *heldreichii*	*Pinus*	*Pinus*	*Pinaster*	Balkans, Southern Italy
35. ***Pinus heldreichii* var. *leucodermis***	*Pinus*	*Pinus*	*Pinaster*	Southern Italy
36. (E)***Pinus henryi*** Mast. - **Henry's pine** Synonyms: *Pinus tabuliformis* var. *henryi*	*Pinus*	*Pinus*	*Pinus*	China, Vietnam
37. ***Pinus jeffreyi*** Balf. - **Jeffrey pine,** Jeffrey's pine, yellow pine, black pine Synonyms: *P. ponderosa* var. *jeffreyi*	*Pinus*	*Trifoliae*	*Ponderosae*	Nothern America
38. (R)***Pinus koraiensis*** Siebold & Zucc. - **Korean pine** Synonyms: *P. mandshurica*	*Strobus*	*Quinquefoliae*	*Strobus*	Eastern Asia
39. (E)***Pinus krempfii*** Lecomte - **Krempf's pine** Synonyms: *Ducampopinus krempfii*	*Strobus*	*Quinquefoliae*	*Krempfianae*	Vietnam
40. ***Pinus latteri*** Mason - **Tenasserim pine** Synonyms: *P. ikedae, P. latteri* ssp. *tonkinensis, P. merkusiana, P. merkusii* var. *latteri, P. merkusii* ssp. *latteri, P. merkusii* var. *tonkinensis, P. tonkinensis*	*Pinus*	*Pinus*	*Pinus*	Mainland Southeast Asia

41. *Pinus lambertiana* Douglas - **sugar pine** or sugar cone pine Synonyms: /	*Strobus*	*Quinquefoliae*	*Strobus*	Pacific coast of North America
42. *Pinus massoniana* Lamb. - **Masson's pine**, Chinese red pine, horsetail pine Synonyms: *P. canaliculata, P. sinensis*	*Pinus*	*Pinus*	*Pinus*	Taiwan, China, Vietnam
43. *Pinus massoniana* var. *massoniana* Synonyms: *P. crassicorticea*	*Pinus*	*Pinus*	*Pinus*	Taiwan, China
44. *Pinus merkusii* Jungh. & de Vriese - **Merkus pine,** Sumatran pine Synonyms: *P. merkiana, P. sumatrana*	*Pinus*	*Pinus*	*Pinus*	Malesia, Southeast Asia
45. *Pinus monophylla* Torr. & Frém. - **Single-leaf pinyon** Synonyms: *Caryopitys monophylla, P. cembroides* var. *monophylla, P. cembroides* ssp. *monophylla P. edulis* var. *monophyla, P. fremontiana*	*Strobus*	*Parrya*	*Cembroides*	North America
46. *Pinus monticola* *Douglas ex D. Don* - **Western white pine,** silver pine, California mountain pine Synonyms: *Pinus grozelieri, Pinus monticola var. digitata, P. monticola var. minima, P. monticola f. porphyrocarpa, P. porphyrocarpa, P. strobus var. monticola,, P. strobus ssp. monticola, Strobus monticola*	*Strobus*	*Quinquefoliae*	*Strobus*	North America
47. *Pinus mugo* Turra - **Dwarf Mountain pine**, mountain pine, scrub mountain pine, Swiss mountain pine, bog pine, creeping pine, mugo pine Synonyms: *P. × obliqua* var. *centrapedunculata, P. applanata, P. digenea, P. echinata, P. fischeri, P. magellensis, P. montana, P. mugho, P. mughus, P. obliqua* var. *centrapedunculata, P. pumilio, P.rostrata, P. rubriflora, P. sanguinea, P. squamosa, P. sylvestris* var. *montana, P. sylvestris* var. *palustris, P. sylvestris* var. *pumilio, P. wettsteinii*	*Pinus*	*Pinus*	*Pinus*	Central and Southeast Europe
48. *Pinus mugo* ssp. *mugo*	*Pinus*	*Pinus*	*Pinus*	Alps, Balkan Mts.
49. *Pinus mugo* var. *prostrata*	*Pinus*	*Pinus*	*Pinus*	Pyrenees to Poland
50. *Pinus mugo* var. *pumilio*	*Pinus*	*Pinus*	*Pinus*	Central and Southern Europe
51. *Pinus mugo* ssp. *uncinata* Synonyms: *P. uncinata*	*Pinus*	*Pinus*	*Pinus*	Subalpine Europe and Balkan
52. *Pinus muricata* D.Don - **Bishop pine** Synonyms: *P. edgariana, P. remorata*	*Pinus*	*Trifoliae*	*Australes*	California, Mexico
53. *Pinus nigra* J.F.Arnold - **Austrian pine,** black pine Synonyms: *P. austriaca, P. hispanica, P. laricio, P. laricio* var. *austriaca, P. laricio* var. *nigricans, P. nigricans, P. pyrenaica*	*Pinus*	*Pinus*	*Pinus*	Iberian Peninsula, Mediterranean, Turkey, Corsica, Cyprus, Crimea, northwest Africa
54. *Pinus nigra* ssp. *banatica*	*Pinus*	*Pinus*	*Pinus*	Banat (Serbia) and Romania
55. *Pinus nigra* var. *calabrica*	*Pinus*	*Pinus*	*Pinus*	Southern Italy
56. *Pinus nigra* ssp. *caramanica*	*Pinus*	*Pinus*	*Pinus*	Turkey, Cyprus, southern Greece
57. *Pinus nigra* ssp. *dalmatica*	*Pinus*	*Pinus*	*Pinus*	Croatia
58. *Pinus nigra* ssp. *gocensis*	*Pinus*	*Pinus*	*Pinus*	Serbia

59. *Pinus nigra* ssp. *laricio*	*Pinus*	*Pinus*	*Pinus*	Corse, Italy
60. *Pinus nigra* ssp. *mauritanica*	*Pinus*	*Pinus*	*Pinus*	Morocco, Algeria
61. *Pinus nigra* ssp. *nigra*	*Pinus*	*Pinus*	*Pinus*	Austria, Balkans
62. *Pinus nigra* ssp. *pallasiana*	*Pinus*	*Pinus*	*Pinus*	Balkans, Southern Carpathians, Crimea
63. *Pinus nigra* ssp. *salzmannii*	*Pinus*	*Pinus*	*Pinus*	Pyrenees, Southern France Northern Spain
64. (E)*Pinus occidentalis* Sw. - Hispaniolan pine, Hispaniola pine, pino criollo Synonyms: *P. cubensis, P. wrightii*	*Pinus*	*Trifoliae*	*Australes*	Dominican Republic, Haiti
65. *Pinus palustris* Mill. - **Longleaf pine** Synonyms: *P. australis, P. georgica, P. longifolia, P. palmeri*	*Pinus*	*Trifoliae*	*Australes*	Southeastern USA
66. *Pinus parviflora* Siebold & Zucc.- **Japanese white pine,** five-needle pine Synonyms: *P. himekomatsu, P. nyematsui, P. parviflora* var. *penthaphylla, P. pentaphylla, Strobus parviflora*	*Strobus*	*Quinquefoliae*	*Strobus*	Japan
67. *Pinus patula* Schiede ex Schltdl. & Cham. - **Mexican weeping pine**, patula pine, Synonyms: *P. oocarpa* var. *ochoterenai, P. subpatula*	*Pinus*	*Trifoliae*	*Australes*	Mexico
68. (R,E)*Pinus peuce* Griseb. - **Macedonian pine,** Balkan pine Synonyms: /	*Strobus*	*Quinquefoliae*	*Strobus*	Balkan
69. *Pinus pinaster* Aiton - **Maritime pine,** cluster pine Synonyms: *P. glomerata, P. hamiltonii, P. maritima, P. mesogeensis, P. sylvestris*	*Pinus*	*Pinus*	*Pinaster*	Atlantic Europe, Mediterranean
70. *Pinus pinaster* var. *maghrebiana*	*Pinus*	*Pinus*	*Pinaster*	North Africa
71. *Pinus pinaster* var. *renoui*	*Pinus*	*Pinus*	*Pinaster*	North Africa
72. *Pinus pinea* L. – **Italian stone pine**, stone pine, Mediterranean stone pine, umbrella pine, parasol pine Synonyms: *P. fastuosa, P. maderensis, P. sativa*	*Pinus*	*Pinus*	*Pinaster*	Mediterranean
73. *Pinus ponderosa* Douglas ex C.Lawson - **Ponderosa pine**, bull pine, blackjack pine, western yellow-pine, filipinus pine Synonyms: *P. beardsley, P. benthamiana, P. brachyptera, P. craigana, P. parryana, P. peninsularis, P. sinclariana*	*Pinus*	*Trifoliae*	*Ponderosae*	Western North America
74. *Pinus ponderosa* var. *brachyptera*	*Pinus*	*Trifoliae*	*Ponderosae*	Colorado, Utah, New Mexico, Arizona, Texas, Oklahoma
75. *Pinus ponderosa* var. *ponderosa*	*Pinus*	*Trifoliae*	*Ponderosae*	Southeast British Columbia, etc.
76. *Pinus pumila* (Pall.) Regel - **Siberian dwarf pine**, dwarf Siberian pine, dwarf stone pine, Japanese stone pine, creeping pine Synonyms: *P. cembra* ssp. *pumila, P. cembra* var. *pumila, P. cembra* var.	*Strobus*	*Quinquefoliae*	*Strobus*	Siberia, Mongolia, China, Japan, Korea

pygmaea P. nana, P. pumila var. *mongolica, P. pumila* f. *auriamentata, P. cembra nana, P. mandschurica*				
77. *Pinus pungens* Lamb – Table Mountain pine, hickory pine, prickly pine, mountain pine Synonyms: /	*Pinus*	*Trifoliae*	*Australes*	USA, Appalachian Mts.
78. *Pinus radiata* D.Don - **Monterey pine**, insignis pine, radiata pine Synonyms: *P. adunca, P. californiana, P. insignis, P. montereyensis, P. tuberculata*	*Pinus*	*Trifoliae*	*Australes*	Central Coast of California and Mexico
79. *Pinus resinosa* Sol. ex Aiton - **Norway pine,** red pine Synonyms: /	*Pinus*	*Pinus*	*Pinus*	Eastern North America
80. *Pinus rigida* Mill. - **Pitch pine** Synonyms: *P. frazeri, P. loddigesii, P. serotina, P. taeda* var. *rigida*	*Pinus*	*Trifoliae*	*Australes*	North America
81. *Pinus roxburghii* Sarg. - **Chir pine,** longleaf Indian pine Synonyms: *P. longifolia, P. serenagensis*	*Pinus*	*Pinus*	*Pinaster*	Himalayas
82. (E) *Pinus sabiniana* Douglas ex D.Don - **Towani pine,** foothill pine, gray pine, bull pine, digger pine Synonyms: /	*Pinus*	*Trifoliae*	*Ponderosae*	California
83. *Pinus sibirica* Du Tour - ***Siberian pine*** Synonyms: *P. arolla, P. cembra f. coronans, P. cembra subsp. sibirica, P.cembra var. sibirica, P. coronans, P. hingganensis*	*Strobus*	*Quinquefoliae*	*Strobus*	Siberia
84. (E) *Pinus strobiformis* Engelm. - **Chihuahua white pine** Synonyms: *P. ayacahuite* var. *strobiformis, P. ayacahuite* var. *brachyptera, P. ayacahuite* var. *novogaliciana, P. flexilis* var. *reflexa, P. reflexa*	*Strobus*	*Quinquefoliae*	*Strobus*	Western Mexico
85. *Pinus strobus* L. - **Eastern white pine,** northern white pine, white pine, Weymouth pine, soft pine Synonyms: *P. canadensis* var. *quinquefolia, P. tenuifolia*	*Strobus*	*Quinquefoliae*	*Strobus*	Eastern North America
86. *Pinus sylvestris* L. - **Scots pine**, Scotch pine, Baltic pine, European red pine Synonyms: *P. rubra*	*Pinus*	*Pinus*	*Pinus*	Eurasia
87. *Pinus sylvestris* ssp. *scotica*	*Pinus*	*Pinus*	*Pinus*	Scotland
88. *Pinus sylvestris* var. *mongolica*	*Pinus*	*Pinus*	*Pinus*	Mongolia, Siberia, China
89. *Pinus tabuliformis* Carr. - **Chinese red pine,** Manchurian red pine, Southern Chinese pine Synonyms: *P. tabulaeformis, P. funebris, P. henry, P. leucosperma, P. mongolica, P. sinensis, P. wilssonii*	*Pinus*	*Pinus*	*Pinus*	Northern China, Northern Korea
90. *Pinus tabuliformis* var. *mukdensis*	*Pinus*	*Pinus*	*Pinus*	Northern Korea
91. *Pinus tabuliformis* f. *shekanensis*	*Pinus*	*Pinus*	*Pinus*	Korea
92. *Pinus tabuliformis* var. *umbraculifera*	*Pinus*	*Pinus*	*Pinus*	Korea
93. *Pinus taeda* (Carl Linnaeus, 1753) - **Loblolly pine** Synonyms: *P. lutea*	*Pinus*	*Trifoliae*	*Australes*	Southeastern USA
94. (E) *Pinus taiwanensis* Hayata - **Taiwan red pine** Synonyms: /	*Pinus*	*Pinus*	*Pinus*	Taiwan
95. (E) *Pinus teocote* Schiede ex Schltdl. & Cham.- **Teocote pine**	*Pinus*	*Trifoliae*	*Australes*	Mexico

Synonyms: /				
96. *Pinus thunbergii* Parl. - **Japanese black pine,** black pine, Japanese pine Synonyms: *P.thunbergiana, P. massoniana*	*Pinus*	*Pinus*	*Pinus*	Japan, South Korea
97. (E)*Pinus torreyana* Parry ex Carr. - **Torrey pine** Synonyms: /	*Pinus*	*Trifoliae*	*Ponderosae*	California coastal sage
98. *Pinus torreyana* ssp. *insularis*	*Pinus*	*Trifoliae*	*Ponderosae*	Santa Rosa Island
99. *Pinus torreyana* ssp. *torreyana*	*Pinus*	*Trifoliae*	*Ponderosae*	San Diego County
100. *Pinus uliginosa* Neuman ex Wimm Synonyms: *Pinus mugo* ssp. *rotundata*	*Pinus*	*Pinus*	*Pinus*	Europe
101. *Pinus wallichiana* A.B.Jacks. - **Himalayan pine,** Bhutan pine, Himalayan white pine Synonyms: *P. griffithii, P. excelsa, P. chylla, P. dicksonii, P. nepalnsis*	*Strobus*	*Quinquefoliae*	*Strobus*	Afghanistan, Pakistan, India, China
102. *Pinus wangii* subsp. *kwangtungensis* (Chun ex Tsiang) Businsky Synonyms: *Pinus parviflora* var. *kwangtungensis Pinus kwangtungensis*	*Strobus*	*Quinquefoliae*	*Strobus*	Vietnam
103. *Pinus yunnanensis* Franch. - **Yunnan pine** Synonyms: *P. sinensis* var. *yunnanensis*	*Pinus*	*Pinus*	*Pinus*	China
104. *Pinus yunnanensis* var. *tenuifolia*	*Pinus*	*Pinus*	*Pinus*	China

Legend: (E)- endemic species; (R) – relic species

Table S2. The main terpene compounds in the needles of *Pinus* taxa in correlation with type of chromatographic column, type of terpenes isolation, origin of trees, and season of needle connection.

Main terpene compounds	Type of chromato-graphic column	Type of terpenes isolation	Origin of trees	Season of needles collection	Reference
Pinus albicaulis					
α-Pinene (30.9%), β-Caryophyllene (19.2%), Germacrene D (9.4%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
δ-3-Carene (30.1%), α-Pinene (10.4%), Limonene (8.4%)	ZB-5MS	Extraction in Likens–Nickerson apparatus	USA/ Wyoming and California	Summer - July	[24]
Pinus aristata					
δ-3-Carene (38.4%), β-Phellandrene (12.7%), Thymol methylether (11.4%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Pinus arizonica					
* α-Pinene (19.4%), Germacrene D (19.0%), (*E*)-Caryophyllene (10.1%), β-Phellandrene (9.0%), β-Pinene (5.0%)	J&W DB-5	Hydrodistillation (Clevenger)	Arizona / Santa Catalina Mts. (3 localities)	-	[149]
Pinus armandii					
* Limonene / β-Phellandrene (51.3%), β-Pinene (26.0%), α-Pinene (13.4%), 3-Carene (5.4%)	WCOT DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
α-Pinene (20.9%), *D*-Limonene (15.8%), β-Pinene (4.9%), *trans*-Pinocarveol (4.8%)	DB-5	Hydrodistillation (Clevenger)	China / Yunnan	Autumn - October	[26]

α-Pinene (41.6%), *D*-Limonene (17.8%), β-Caryophyllene (11.0%), β-Pinene (7.5%)	DB-5	HS-SPME	China / Yunnan	Autumn - October	[26]
β-Caryophyllene (10.9%), γ-Muurolene (7.5%), Terpinolene (5.8%), Longifolene (5.7%)	HP-5MS	Hydrodistillation (Chines pharmacopoeia)	China / Mt. Thaibai	Summer - July	[28]
α-Pinene (48.0%), Germacrene D (19.0%), β-Caryophyllene (14.3%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
α-Pinene (35.5%), β-Caryophyllene (15.5%), δ-Cadinene (6.3%), γ-Cadinene (6.0%), Terpinolene (4.8%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus armandii* subsp. *xuannhaensis					
α-Cedrol (19.2%), Bicycloelemene (5.8%), α-Terpineol (5.5%), δ-3-Carene (5.0%)	HP-5MS	Hydrodistillation (Clevenger)	Vietnam	Summer - July	[30]
Pinus attenuata					
β-Pinene (19.1%), α-Pinene (9.6%), Limonene (5.0%)	DB-5	Hydrodistillation (Clevenger)	Greece / Mt. Parnitha	-	[31]
α-Pinene (38.1%), Germacrene D (29.0%), β-Caryophyllene (7.9%), δ-Cadinene (5.4%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Mt. Parnes	Autumn – October	[23]
(E)Pinus balfouriana ssp. balfouriana					
β-Pinene (36.3%), α-Pinene (20.2%), α-Phellandrene (20.1%), 3-Carene (12.9%)	HP-5MS	SPME	USA / California	Summer – June and July	[29]
Pinus banksiana					
Bornyl acetate (15.7%), Germacrene D (14.7%), α-Pinene (8.2%), β-Pinene (7.8%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Summer -August	[23]
Pinus brutia					
β-Pinene (45.7%), α-Pinene (16.0%), Germacrene D (7.6%), Caryophyllene (4.8%)	DB1, DB5	Hydrodistillation (Clevenger)	Greece / Attiki	-	[25]
β-Pinene (33.6%), α-Pinene (14.8%), β-Caryophyllene (10.4%)	OV 101	Hydrodistillation (Clevenger)	Morocco / Arboretum	Summer - July	[33]
β-Pinene (61.7%), α-Pinene (31.0%)	J&W DB-WAX	Headspace	Italy / Firenze	Spring to Winter - May to February	[34]
β-Pinene (47.5%), α-Pinene (17.0%), β-Caryophyllene (4.6%), α-Terpineol (4.4%)	HP-Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Antalya	May - November	[35]
α-Pinene (29.1%), β-Pinene (10.5%), β-Caryophyllene (5.3%)	-	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter -December	[37]
β-Pinene (31.2%), α-Pinene (20.3%), Germacrene D (12.8%), β-Caryophyllene (11.7%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Mt. Ymittos	Autumn - October	[23]
β-Pinene (31.7%), α-Pinene (20.6%), β-Caryophyllene (14.5%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring - May	[36]
α-Terpineol (66.2%), 3-Carene (4.9%), Carveol (4.6%)	DB-5 HT	Hydrodistillation (Clevenger)	Sirya / Aleppo campus	Spring - March	[38]
Pinus brutia* ssp. *eldarica					

α-Pinene (66.8%), β-Pinene (13.8%), δ-3-Carene (6.9%)	DB-WAX	Headspace	Italy / Firenze	Spring to Winter - May to February	[34]
Germacrene D (18.2%), Caryophyllene (15.4), γ-Terpinene (13.0%), β-Pinene (10.6%)	DB-1	Hydrodistillation (Clevenger)	Iran / Tabriz	Summer - June	[39]
Pinus brutia* var. *stankewiczii					
β-Pinene (31.7%), Germacrene D (23.3%), α-Pinene (17.5%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring - May	[36]
Pinus bungeana					
β-Caryophyllene (27.2%), α-Pinene (17.9%), α-Amorphene (14.8%), δ-Cadinene (7.3%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
α-Pinene (21.1%), Germacrene D (11.2%), β-Caryophyllene (11.0%), γ-Muurolene (10.0%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Caryophyllene (28.4%), Trimethylbicyclo[3.1.1]hept -2-ene (26.0%), γ-Muurolene (6.5%), Humulene (5.8%), Cadina-3,9-diene (5.7%)	DB-5MS	HS-SPME	China / campus of Nanjing	Spring - April	[41]
α-Pinene (51.6%), Camphene (10.5%), β-Caryophyllene (9.4%), β-Pinene (6.3%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
(E) Pinus canariensis					
Germacrene D (50.5%), α-Pinene (14.0%), Myrcene (8.8%)	DB5	Hydrodistillation (Clevenger)	Greece / Attiki	-	[25]
Germacrene D (35.7%), α-Pinene (23.1%), Limonene (10.1%), Myrcene (5.8%)	DB-WAX	Steam distillation (Karlsruher)	Spain / Tenerife island	Winter - February	[42]
Germacrene D (44.0%), α-Pinene (14.6%), β-Caryophyllene (8.7%), Limonene (7.9%), Myrcene (6.4%)	HP-5MS	Hydrodistillation (Clevenger)	Greece /National Garden	Autumn - October	[23]
Germacrene D (55.8%), α-Pinene (15.0%), β-Caryophyllene (5.3%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring - May	[36]
α-Pinene (70.9%), β-Pinene (12.7%), Germacrene D (5.6%)	Rtx-5MS	Hydrodistillation (Clevenger)	Egypt / Botanical Garden at Giza	Spring - March	[43]
Pinus caribaea					
Aromadendrene (17.2%), β-Caryophyllene (14.4%), Limonene (12.1%), α-Terpinen-4-ol (6.4%), α-Pinene (6.3%), α-Terpinolene (5.0%)	-	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter -December	[37]
Limonene (38.6%), α-Pinene (27.6%), Borneol (6.7%)	Innowax FSC	Hydrodistillation (Clevenger)	Uganda / cultivated plants		[44]
Pinus caribaea* var. *bahamensis					
β-Phellandrene (32.0%), Geranylene (24.8%), Caryophyllene (13.9%), β-Pinene (6.1%)	DB-5	Extraction (oil-water separator)	Commonwealth of The *Bahamas*	-	[45]
Pinus caribaea* var. *caribaea					
β-Phellandrene (34.9%), Geranylene (22.4%), Geranyl linalool (10.7%), δ-Cadinene (4.5%)	DB-5	Extraction (oil-water separator)	China	-	[45]

Pinus caribaea* var. *hondurensis					
Limonene (38.6%), α-Pinene (6.3%), Borneol (6.7%), Myrcene (3.5%)	Innowax FSC	Hydrodistillation (modified Clevenger)	Uganda / cultivated plants	-	[44]
β-Phellandrene (36.9%), Geranylene (25.8%), β-Pinene (7.1%), Caryophyllene (4.2%), δ-Cadinene (4.0%)	DB-5	Extraction (oil-water separator)	República de Honduras	-	[45]
Pinus cembra					
* α-Pinene (68.0%), β-Pinene (19.4%), Limonene+β-Phellandrene (9,8%)	WCOT DB-5MS	Headspace	France / three populations in French Alps	Summer - June	[29]
α-Pinene (69.1%), Limonene+β-Phellandrene (4.6%)	DB-5MS	Hydrodistillation (Clevenger)	Romania / Mt. Calimani	Summer - June	[46]
Germacrene D (21.2%), α-Pinene (21.1%), β-Phellandrene (13.5%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
α-Cadinene (3.8%), Germacrene D (1.9%), α-Muurolene (1.8%), γ-Cadinene (1.7%)	Rtx-1	Hydrodistillation (Clevenger)	Poland / Arboretum	Autumn - September	[49]
α-Pinene (53.2%), Limonene/β-Phellandrene (11.4%), Germacrene D (9.4%), β-Pinene (4.6%), δ–Cadinene (4.3%)	HP-5MS	Distillation and extraction with dichloromethane (Likens-Nickerson)	Slovakia / Mt. Vysoké Tatry	Autumn	[47]
* α-Pinene (37.0%), β-Phellandrene (28.8%), Germacrene D (5.9%)	HP-5MS	Steam distillation	Austria / Mt. Alps - three populations	Autumn - September	[48]
Pinus cernua					
Myrcene (47.0%), β-Pinene (28.4%), α-Pinene (12.5%), Limonene (4.6%)	BP-20	Hydrodistillation (Clevenger)	Vietnam / Son La province	Autumn - November	[50]
Pinus contorta* ssp. *contorta					
β-Phellandrene (19.9%), α-Cadinol (8.9%), Pimarinal (8.9%), δ-3-Carene (7.4%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
β-Phellandrene (23.8%), Terpinen-4-ol (11.0%), γ-Terpinene (6.8%), Thymol (6.6%), Chavicol (5.3%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / Oregon, Ona Beach	Summer - July	[51]
Pinus contorta* ssp. *latifolia					
β-Pinene (32.8%), β-Phellandrene (26.0%), δ-Cadinene (8.4%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
* β-Pinene (2.7%), β-Phellandrene (21.4%), δ-3-Carene (7.3%), (2*E*)-Hexenal (6.2%), α-Terpineol (6.2%).	ZB-5MS	Hydrodistillation (Likens-Nickerson)	USA / Idaho	Summer - August	[52]
Pinus contorta* ssp. *murrayana					
β-Phellandrene (47.0%), α-Pinene (4.8%), (*Z*)-β-Ocimene (4.6%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer - June	[23]
Pinus coulteri					
β-caryophyllene (21.3%), *(E)*-Calamanene (15.2%), β-Pinene (11.3%), α-Pinene (10.8%),	-	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter -December	[37]

Germacrene D (6.2%), α-Phellandrene (5.1%)					
Unidentified (161,222) (16.9%), α-Pinene (13.6%), Germacrene D (8.8%), β-Phellandrene (6.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
β-Pinene (11.6%), δ-Cadinene (11.1%), α-Pinene (10.7%), Carvone (6.7%)	5973N MS	Hydrodistillation (Ginsberg)	Russia / Crimea (introduced from North America)	-	[53]
(E) ***Pinus culminicola***					
α-Pinene (33.6%), β-Pinene (20.2%), β-Phellandrene (16.9%), Germacrene D (7.9%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
(E) ***Pinus dalatensis***					
α-Pinene (38.2%), β-Pinene (25.3%), β-Myrcene (11.0%), β-Caryophyllene (10.5%)	HP-5MS	Hydrodistillation (Clevenger)	Vietnam	Summer - July	[30]
(E) ***Pinus densata***					
β-Caryophyllene (24.6%), Germacrene D (11.4%), β-Cadinene (6.4%), α-Humulene (5.0%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus densiflora					
α-Pinene (25.8%), β-Phellandrene + Limonene (10.7%), Myrcene (8.0%), β-Pinene (5.8%), Germacrene D (4.5%)	DB-WAX	Hydrodistillation (Karlsruher)	Croatia	Autumn - October	[54]
β-Thujene (19.3), α-Pinene (14.4%), Myrcene (12.2%), β-Pinene (9.8%), Bornyl acetate (5.7%)	DB-WAX	Steam distillation (manufactured)	Korea / Experimental Station	-	[55]
α-Pinene (21.6%), Limonene (13.1%), Caryophyllene (11.4%)	DB-5MS	Steam distillation	Korea		[56]
Camphene (22.4%), α-Pinene (20.6%), α-Limonene (20.2%), Bornyl acetate (9.8%)	HP-5MS	Steam distillation	Korea	Summer - June	[57]
α-Pinene (18.0%), Sabinene (16.6%), Germacrene D (11.3%), β-Pinene (8.1%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
α-Humulene (18.1%), Caryophyllene (7.7%), β-Pinene (4.9%)	HP-5MS	Hydrodistillation (Herb Oil Maker)	Japan / Suncheon	Summer - June	[58]
trans-Cadina-1(6),4-diene (12.7%), α-Pinene (9.9%), (Z)-β-Ocimene (8.9%), β-Caryophyllene (8.7%)	HP-5MS	Hydrodistillation (Clevenger)	Spain / Botanic Garden	Summer - June	[23]
α-Myrcene (22.3%), Trimethylbicyclo[3.1.1]hept-2-ene (20.5%), Germacrene D (14.9%), α-Phellandrene (14.8%)	DB-5MS	HS-SPME	China / campus of Nanjing	Spring - April	[41]
β-Phellandrene (12.0%), β-Pinene (10.8%), 3-Carene (8.5%), Germacrene D (8.5%)	DB-5MS UI	Hydrodistillation	Korea	February, April, July, October	[16]
Pinus elliottii					

α-Pinene (43.0%), β-Pinene (27.1%), α-Terpineol (9.6%)	J&W DB-WAX	Hydrodistillation (Clevenger)	Mozambique / cultivation site	Summer - July	[166]
Germacrene D (24.5%), β-Pinene (12.9%), α-Pinene (10.6%), β-Caryophyllene (6.6%)	HP-5MS	Hydrodistillation (Clevenger)	Australia / Botanic Garden	Winter – February	[23]
Geranylene (30.5%), β-Pinene (20.1%), δ-Cadinene (7.7%), α-Muurolol (6.1%)	DB-5	Extraction (oil-water separator)	China / germaplasm resource collection	-	[45]
Germacrene D (48.0%), β-Pinene (22.0%), δ-Cadinene (8.0%), β-Caryophyllene (7.0%), α-Pinene (6.0%)	J&W DB-WAX	Hydrodistillation (Clevenger)	Brazil / Minas Gerais	Autumn - September	[59]
[(E)] ***Pinus fenzeliana***					
α-Pinene (20.7%), β-Pinene (11.3%), δ-3-Carene (32.2%), Limonene (8.0%), (E)-β-Caryophyllene (7.1%).	BP-20	Hydrodistillation (Clevenger)	Vietnam/ Hang Kia-Pa Co Nature Reserve, Hoa Binh province	Spring- May	[60]
Pinus flexilis					
α-Pinene (24.5%), Germacrene D (12.2%), β-Pinene (8.6%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
α-Pinene (33.3%), β-Pinene (16.2%), Germacrene D (6.1%), *trans*-Pinocarveol (5.3%)	CP-WAX 52 CB	HS-SPME	Canada / Waterloo Campus	Spring - May	[61]
α-Pinene (37.1%), β-Pinene (21.9%), Bornyl acetate (12.8%), Camphene (8.5%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / Oregon, Ona Beach	Summer - July	[51]
β-pinene (25.2%), α-Pinene (20.1%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / Utah	Summer - July	[24]
Pinus gerardiana					
β-Pinene (39.1%), α-Pinene (26.4%), Myrcene (5.7%), β-Phellandrene (5.3%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Pinus halepensis					
(*E*)-Caryophyllene (19.1%), α-Pinene (13.4%), Cembrene (7.6%), δ-3-Carene (6.9%), Myrcene (6.6%), Phenylethyl-3-methylbutanoate (6.6%), Limonene (5.0%)	DB5	Hydrodistillation (Clevenger)	Greece / Attiki	-	[25]
α-Pinene (23.3%), Myrcene (16.3%), (*E*)-Caryophyllene (14.2%), Terpinolene (10.1%), Bornyl acetate (5.3%)	-	Hydrodistillation (Clevenger)	Morocco / Rabat, Arboretum	Summer - July	[72]
α-Pinene (23.3%), β-Myrcene (16.3%), β-Caryophyllene (14.2%), Terpinolene (10.1%)	OV 101	Hydrodistillation (Clevenger)	Morocco/Arboretum	Summer - July	[33]
Myrcene (27.9%), α-Pinene (18.1%), (*E*)- Caryophyllene (16.4%), Terpinolene (9.9%), Sabinene (9.4%)	HP-5	Hydrodistillation (Clevenger)	Italy / Pisa	Winter - February	[79]
(E)-Caryophyllene (40.3%), α-Humulene (7.9%), Aromadendrene (7.0%)	DB-1	Hydrodistillation (Clevenger)	Algeria / Sidi Feradj	Spring- May	[62]
α-Pinene (56.1%), Myrcene (20.4%), Sabinene (6.8%), δ-3-Carene (5.6%)	DB-WAX	Headspace	Italy / Firenze	Spring to Winter - May to February	[34]

Caryophyllene-oxide (48.2%), Thunbergol (8.3%), Humulene-oxide (6.7%), Phenylethyl-valerate (5.8%)	DB-5	Hydrodistillation (Clevenger)	Algeria / Ghazaouet	Spring - April	[82]
β-Pinene (46.8%), α-Pinene (18.4%), (*E*)- Caryophyllene (9.2%), Germacrene D (8.8%)	HP-Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Adana	May - November	[35]
(Z)-Caryophyllene (33.9%), β-Pinene (10.7%), α-Pinene (9.9%), Myrcene (9.5%), (Z)-Muurola-4(14),5-diene (7.4%), α-Pinene-oxide (5.4%), α-Humulene (5.2%)	HP-5	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter -February	[77]
* Myrcene (23.9%), α-Pinene (13.4%), Terpinolene (11.5%), 2-Phenetyl-isovalerate (10.1%), (*E*)-Caryophyllene (8.8%), Terpinene-4-ol (5.8%), Sabinene (5.5%)	Rtx-1	Hydrodistillation (Clevenger)	Algeria/ Tlemcen (group I)	Winter – January	[80]
* Myrcene (27.2%), α-Pinene (21.8%), (*E*)- Caryophyllene (14.2%), 2-Phenetyl isovalerate (5.8%)	Rtx-1	Hydrodistillation (Clevenger)	Algeria/ Tlemcen (group II)	Winter – January	[80]
β-Caryophyllene (19.0%), Unidentified (81,290), Myrcene (15.1%), Cembrene (6.5%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Mt. Ymittos	Autumn – October	[23]
* (*Z*)-β-Caryophyllene (20.2%), Myrcene (16.1%), α-Pinene (13.7%), *p*-Cymene (11.3%), Caryophyllene oxide (5.9%)	HP-5MS	Hydrodistillation (Clevenger)	Algeria /10 localities	Spring to Autumn	[78]
* (*Z*)-Caryophyllene (21.1%), β-Myrcene (16.8%), α-Pinene (12.5%), α-Terpinolene (9.2%), Bicyclogermacrene (9.2%),	HP-5	Hydrodistillation (Clevenger)	Tunisia / 3 localities	Winter – February	[167]
β-Caryophyllene (28.5%), α-Pinene (20.6%), Unidentified (11.5%), α-Humulene (7.4%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring - May	[36]
Caryophyllene (20.2%), α-Pinene (7.2%), β-Pinene (6.6%)	DB-5	Hydrodistillation (Clevenger)	Libya / 3 localities	Summer – August	[63]
* (*E*)-β-Caryophyllene (32.1%), Myrcene (15.4%), α-Pinene (14.9%), α-Humulene (5.2%)	BP-1	Hydrodistillation (Clevenger)	France / 3 localities	May - July	[64]
(*Z*)-β-Caryophyllene (19.1%), Myrcene (18.8%), α-Pinene (10.0%), p-Cymene (9.8%), Caryophyllene oxide (9.8%)	HP-5MS	Hydrodistillation (Clevenger)	Algeria / Mezreb El Ali	Spring to Autumn	[65]
(*E*)-Caryophyllene (28.0%), Myrcene (23.8%), α-Pinene (12.0%), Caryophyllene oxide (6.8%)	HP-5MS	Hydrodistillation (Clevenger)	Morocco	Summer - June	[66]
(*E*)-Caryophyllene (29.5%), α-Pinene (11.1%), 2-Phenetyl-isovalerate (10.4%), Myrcene (7.9%), Phenetyl-isobutyrate (6.9%), α-Humulene (6.5%)	HP-5MS	Hydrodistillation (Clevenger)	Morocco / Fes	Spring – April	[67]
(E)-Caryophyllene (32.2%), Thunbergol (29.2%), Phenetyl-3-methylbutanoate (6.1%), α-Humulene (5.9%), Myrcene (5.2%)	HP-5MS	Hydrodistillation (Clevenger	Greece / Stratoni	Spring – May	[68]
¥Myrcene (24.2%), α-Pinene (23.1%), Caryophyllene oxide (17.3%), (*E*)-Caryophyllene (6.6%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / Arboretum	-	[69]
¹(*E*)-Caryophyllene (32.8%), Thunbergol (13.3%), β-Phenetyl-isovalerate (11.7%), α-Pinene (6.4%), α-Humulene (5.8%), Myrcene (5.5%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / Arboretum	-	[69]
β-Pinene (41.9%), α-Pinene (22.7%), (*E*)-Caryophyllene (12.0%), α-Terpinolene (10.7%), α-Fenchene (6.1%)	HP-5MS	Steam distillation	Tunisia / Tabarka	Spring – March	[83]

α-Pinene (8.5%), Methyl-dehydro-abietate (7.8%), Myrcene (5.8%), Thunbergol (5.8%), (*E*)-Caryo-phyllene (5.3%)	HP-5MS	Hydrodistillation (Clevenger)	Libya / Sidi Alhamry	Spring – April	[73]
Thunbergol (18.9%), α-Pinene (13.3%), Aromadendrene-oxide (12.1%), Cembrene (8.2%), Limonene (6.8%), (*E*)-Caryophyllene (6.2%)	HP-5MS	Hydrodistillation (Clevenger)	Libya / Alaslab	Spring – April	[73]
α-Pinene (17.0%), (E)-Caryophyllene (12.2%), β-Myrcene (11.3%), Hu-mulene (8.0%), (Z)-Caryophyllene (7.3%), Phenethyl-3-methylbutanoate (6.8%), α-Terpinolene (5.3%)	Rtx-5MS	Hydrodistillation (Clevenger)	Egypt/ Botanical garden	Spring – March	[74]
Caryophyllene (33.0%), α-Pinene (13.7%), β-Pinene (11.0%), α-Hu-mulene (7.9%), Cembrene (6.3%), *trans*-β-Ocimene (5.3%)	Rtx-5 Sil MS	Steam distillation	Morocco / Fez	Spring – April	[75]
(*E*)-Caryophyllene (26.8%), Myrcene (18.4%), Phenethyl-3-methylbuta-noate (8.6%), α-Pinene (8.2%), Thun-bergol (5.6%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter – January	[70]
α-Pinene (46.1%), β-Myrcene (9.5%), (*Z*)-Caryophyllene (6.3%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / forest	-	[76]
β-Caryophyllene (22.2%), Cembrene (13.2%), Camphene (8.0%), α-Ter-pinolene (6.8%), β-Myrcene (5.7%), α-Caryophyllene (5.3%)	HP-5MS	Hydrodistillation	Tunisia	-	[71]
β-Caryophyllene (31.5%), α-Caryo-phyllene (7.8%), Phenethyl oxalate (6.3%), α-Pinene (6.0%), Caryo-phyllene oxide (5.8%)	HP-5MS	Microwave-assisted extraction	Tunisia	-	[71]
Myrcene (24.7%), (*E*)–Caryophyllene (24.7%), α-Pinene (17.0%)	HP-5MS	Hydrodistillation (Clevenger)	Bosnia and Herzegovina	-	[81]
Pinus hartwegii					
β-Pinene (21.4%), Caryophyllene ox-ide (20.0%), α-Pinene (10.8%), β-Cary-ophyllene (7.0%), α-Terpineol (5.2%)	TC-FFAP	Hydrodistillation (special collector)	Japan / Tsukuba	Summer - August	[84]
(R) ***Pinus heldreichii***					
Germacrene D (44%), Limonene (22.8%), (*E*)-Caryophyllene (12.1%)	-	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Spring – Summer, April-Au-gust	[85]
Limonene (34.3%), α-Pinene (13.8%), Germacrene D (12.8%), (E)-Caryo-phyllene (8.4%), Aristolene (6.0%)	DB-5	Hydrodistillation (Clevenger)	Greece / Mt. Katara	-	[31]
* Limonene (42.0%), γ-Muurolene (18.4%), α-Pinene (17.6%), β-Farne-sene (6.1%), β-Pinene (5.8%)	SE-54	Extraction in diethyl-ether/petrolether (1:1)	Bulgaria / Mt. Pirin and Mt. Slavjanka	-	[90]
* [2]Limonene (26.3%), α-Pinene (17.5%), Germacrene D (13.5%), β-Caryophyllene (10.4%)	HP-5MS	Extraction in *n*-pentane	Serbia and Montenegro / four lo-calities	Late Summer to Au-tumn	[3]
[2]Limonene (24.1%), Germacrene D (21.2%), α-Pinene (11.1%), (*E*)-Caryo-phyllene (9.7%), δ-3-Carene (8.5%)	HP-5MS	Extraction in *n*-pentane	Serbia / locality Revuša	Summer – August	[86]
* [2]Germacrene D (33.1%), (*E*)-Caryo-phyllene (14.8%), Limonene (12.8%), α-Pinene (8.6%)	HP-5MS	Extraction in *n*-pentane	Serbia / two artificial populations	Summer	[86]
Limonene (23.7%), Germacrene D (21.3%), δ-3-Carene (18.6%), α-Pinene (11.1%), β-Caryophyllene (8.6%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Mt. Pindos	Autumn – October	[23]

* [2]Germacrene D (28.7%), Limonene (27.1%), α-Pinene (16.2%), β-Caryophyllene (6.9%), β-Pinene (5.2%)	HP-5MS	Extraction in *n*-pentane	Serbia /Mt. Ošljak; Northern Macedonia/ Mt. Galičica	Autmn	[87]
[1]Germacrene D (25.1%), α-Pinene (19.3%), Limonene (14.1%), δ-3-Carene (12.1%), β-Caryophyllene (7.2%) β-Pinene (7.0%)	HP-5MS	Extraction in *n*-pentane	Montenegro / Mt. Orjen	Summer – August	[88]
Limonene (43.9%), Germacrene D (17.2%), α-Pinene (10.6%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mt. Šara	Summer – July to September	[91]
Germacrene D (35.5%), Limonene + β-Phellandrene (30.5%), (E)-Caryophyllene (6.1%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mt. Šara	-	[89]
* Limonene (25.8%), α-Pinene (16.0%), Germacrene D (15.3%), (E)-Caryophyllene (10.2%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia and Montenegro / several localities	Summer / August-September	[92]
Limonene (34.4%), α-Pinene (23.8%), Germacrene D (17.3%), β-Pinene (8.8%)	HP-5MS	Hydrodistillation (Clevenger)	Bulgaria / Mt. Pirin	Autumn – September	[68]
Limonene (25.5%), Germacrene D (12.7%), β-Pinene (10.3%), δ-Cadinene (8.6%), β-Caryophyllene (7.1%), β-Myrcene (7.0%)	VF-5 MS	Hydrodistillation (Clevenger)	'Sharri' National Park	Summer	[93]
Pinus heldreichii* var. *leucodermis					
Limonene (52.8%), Germacrene D (15.8%), α-Pinene (10.2%), *trans*-Caryophyllene (7.7%)	HP-20M	Hydrodistillation (Clevenger)	Bosnia and Herzegovina / Mostar	Summer – August	[94]
α-Pinene (24.2%), β-Pinene (8.4%), Limonene (7.8%), α-Cubebene (7.6%), Terpinolene (5.9%)	SE 30	Hydrodistillation (Clevenger)	Italy / Calabria	Summer – June	[96]
* Limonene (46.5%), Germacrene D (15.4%), α-Pinene (14.3%), (*E*)-Caryophyllene (5.0%)	J&W DB-5	Hydrodistillation (Clevenger)	Bulgaria / Mt. Pirin, two populations	-	[95]
(E) *Pinus henryi*					
β-Caryophyllene (18.3%), α-Pinene (9.7%), α-Selinene (3.5%)	HP-5MS	Hydrodistillation (Clevenger)	China	-	[97]
Pinus jeffreyi					
α-Pinene (20.9%), Thunbergol (9.2%), β-Pinene (6.7%), Limonene (5.0%), β-Phellandrene (4.6%)	J&W DB-5	Steam distillation (circulatory Clevenger)	USA / California, Arboretum	-	[98]
α-Pinene (29.8%), Unidentified (81,290) (18.3%), Germacrene D (11.5%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer – June	[23]
(TR) *Pinus koraiensis*					
* Limonene (72.2%), α-Pinene (15.3%), Myrcene (4.8%)	DB-5MS	Headspace	France /two populations in French Alps	Summer – June	[29]
α-Pinene (22.3%), β-Myrcene (7.3%), γ-Cadinene (6.7%), β-Caryophyllene (6.5%), Limonene (5.0%)	TC-FFAP	Hydrodistillation (special collector)	Japan / Tsukuba	Summer – August	[84]
Germacrene D (18.9%), Bornyl acetate (16.3%), δ-Cadinene (12.1%), β-Caryophyllene (8.5%), α-Pinene (8.2%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
Germacrene D (18.7%), α-Pinene (14.3%), β-Caryophyllene (8.4%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer – June	[23]

β-Caryophyllene (11.7%), δ-Cadinene (11.2%), α-Pinene (9.4%), Limonene (8.8%), γ-Muurolene (6.0%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Germacrene D (10.1% in avg.), α-Pinene (7.5%), 3-Carene (6.9%), γ-Muurolene (6.2%), γ-Terpinene (4.6%),	DB-5MS UI	Hydrodistillation	Korea	February, April, July, October	[9]
(E) ***Pinus krempfii***					
α-Pinene (37.9%), Limonene (9.8%), (*E*)-β-Caryophyllene (8.8%), α-Terpineol (7.4%), Myrcene (6.5%)	BP-1	Hydrodistillation (Clevenger)	Vietnam	Summer – July	[99]
Pinus lambertiana					
β-Pinene (38.4%), α-Pinene (14.9%), (*E*)-β-Caryophyllene (9.8%), Germacrene D (7.9%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / California	Summer - July	[24]
Pinus latteri					
Caryophyllene (57.8%), Humulene (10.4%), Geranylene (6.7%), 3-Carene (6.0%)	DB-5	Extraction (oil-water separator)	Vietnam	-	[45]
Caryophyllene (40.6%), Geranylene (22.0%), α-Pinene (8.9%), 3-Carene (7.3%)	DB-5	Extraction (oil-water separator)	China		[45]
Pinus massoniana					
α-Pinene (26.9%), Germacrene D (20.7%), β-Pinene (16.3%), β-Caryophyllene (11.6%)	HP-5MS	Hydrodistillation (Clevenger)	Greece	Winter – February	[23]
β-Caryophyllene (18.5%), α-Pinene (8.2%), Germacrene D (9.8%)	HP-5MS	Hydrodistillation (Clevenger)	China	-	[97]
α-Thujene (32.7%), β-Pinene (11.2%), β-Caryophyllene (14.1%), δ-Cadinene (6.4%), Limonene (5.0%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
α-Pinene (38.3%), Caryophyllene (10.9%), Limonene (5.6%), Terpinene (5.4%)	DB-5	Extraction (oil-water separator)	China	-	[45]
Pinus massoniana* var. *massoniana					
α-Pinene (29.2%), Caryophyllene (12.3%), β-Pinene (10.6%), γ-Elemene (6.4%)	DB-5	Extraction (oil-water separator)	China / germaplasm resource collection	-	[45]
Pinus merkusii					
β-Caryophyllene (43.1%), Caryophyllene oxide (11.9%), α-Humulene (9.0%), α-Pinene (8.9%), Limonene (7.1%)	TC-FFAP	Hydrodistillation (special collector)	Indonesia	Summer – August	[84]
Pinus monophylla					
β-Pinene (27.2%), α-Pinene (18.7%), δ-Cadinene (7.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring – April	[23]
Pinus monticola					
β-Elemene (15.0%), α-Pinene (14.9%), β-Pinene (14.2%), Germacrene D (6.8%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter – January	[23]
β-Pinene (22.8%), α-Pinene (21.0%), Limonene (14.0%), Terpinolene (5.1%)	DB-5	Hydrodistillation	Argentina / Valle Chico	Autumn	[100]
β-Pinene (21.6%), α-Pinene (12.6%), δ-3-Carene (10.9%), Limonene (6.0%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / Mt. St. Helens,Washington, and Priest Lake, Idaho	Summer - July	[29]
Pinus mugo					

α-Pinene (33.3%), γ-Cadinene (9.0%), α-Fenchene (6.4%), Caryophyllene oxide (6.1%)	DB-5	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	-	[101]
Bornyl acetate (11.5%), Unidentified diterpene (8.7%), α-Terpineol (7.3%), (*E*)- Caryophyllene (5.9%)	HP-5MS	Hydrodistillation (Clevenger)	Italy / National Park	Spring - May	[106]
α-Pinene (13.7%), Germacrene D (12.1%), δ-3-Carene (9.9%), Myrcene (6.9%), Germacrene D-4-ol (6.1%), (E)-Caryophyllene (5.3%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
δ-3-Carene (36.5%), *p*-Cymene (18.0%), α-Pinene (9.0%), Limonene (5.1%)	CP-Wax 52 CB	HS-SPME	Canada / Toronto	Spring - May	[61]
α-Pinene (20.0%), δ-3-Carene (18.1%), Bornyl acetate (9.9%), (*E*)-Caryophyllene (6.1%), Germacrene D (5.7%), Terpinolene (5.3%)	-	HS-SPME	Poland / Garden	Autumn – October	[102]
* α-Pinene (18.9%), δ-3-Carene (17.9%), (E)-Caryophyllene (7.5%), Germacrene D (7.0%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Summer - Autumn (July – September)	[103]
* α-Pinene (19.9-24.5%), δ-3-Carene (15.5-27.9%), Bornyl acetate (4.6-8.1%), (*E*)-Caryophyllene (4,5-5,1%), Germacrene D (4.0-8.4%),	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Prokletije	Summer - Autumn (July – September)	[103]
* δ-3-Carene (20.7%), β-Phellandrene (16.4%), α-Pinene (15.0%)	HP-5MS	Hydrodistillation (Clevenger)	Slovenia / four populations	Summer -August	[107]
α-Pinene (21.3%), δ-3-Carene (19.3%), (*E*)-Caryophyllene (6.7%), Germacrene D (6.1%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mt. Šara	Summer – July to September	[91]
δ-3-Carene (21.3%), α-Pinene (18.0%), Limonene + β-Phellandrene (7.6%), Germacrene D (5.6%), Terpinolene (5.5%), Bornyl acetate (5.1%), (*E*)-Caryophyllene (5.0%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mt. Šara	Summer -August	[104]
δ-3-Carene (24.6%), β-Phellandrene (16.7%), α-Pinene (11.0%), (E)- Caryophyllene (5.3%)	J&W DB-5	Steam distillation (circulatory Clevenger)	Bulgaria	Summer - June	[108]
δ-3-Carene (15.2%), α-Pinene (10.9%), α-Terpinolene (10.0%), β-Myrcene (6.5%), β-Phellandrene (6.2%), β-Caryophyllene (5.7%)	VF-5 MS	Hydrodistillation (Clevenger)	'Sharri' National Park	Summer	[93]
α-Pinene (18.6%), δ-3-Carene (11.3%), Bornyl acetate (8.3%)	Rtx-1	Hydrodistillation (Clevenger)	Poland / Arboretum	Autumn - September	[105]
* α-Pinene (37.5%), δ-3-Carene (23.8%), Limonene+β-Phellandrene (9.2%), β-Pinene (6.0%), Camphene (5.1%)	HP-5MS	Static Headspace	Slovenia, Montenegro, Serbia, Bulgaria, Romania	Summer- June – September	[104]
β-Pinene (43.3%), α-Pinene (16.6%), β-Phellandrene (16.0%), Limonene (9.5%)	SPME	Steam distillation	Italy / commercial essential oil	-	[109]
β-Pinene (42.3%), α- Pinene (31.6%), γ-Terpinene (13.3%), Limonene (7.8%)	VF-1	Steam distillation	Italy / commercial essential oil	-	[109]
Limonene (78.5%), Myrcene (5.1%)	SPME	Steam distillation	Italy / commercial essential oil	-	[110]
Limonene (33.1%), α-Pinene (28.0%), Myrcene (27.8%)	VF-1	Steam distillation	Italy / commercial essential oil	-	[110]
δ-3-Carene (23.4%), (E)–Caryophyllene (5.9%), Germacrene D (5.5%)	HP-5MS	Hydrodistillation (Clevenger)	Bosnia and Herzegovina	-	[81]

Pinus mugo* ssp. *mugo					
δ-3-Carene (24.6%), β-Phellandrene (16.7%), α-Pinene (11.0%)	J&W DB-5	Steam distillation (circulatory Clevenger)	Bulgaria	Summer - June	[108]
δ-3-Carene (21.3%), α-Pinene (11.0%), Limonene+β-Phellandrene (7.6%), Germacrene D (5.6%), Terpinolene (5.5%), Bornyl acetate (5.1%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Šar Mts.	Summer- August	[111]
Pinus mugo* var. *prostrata					
Bornyl acetate (14.1%), α-Pinene (12.9%), Camphene (6.5%), δ-3-Carene (6.4%), Germacrene D-4-ol (6.0%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Pinus mugo* var. *pumilio					
α-Pinene (14.1%), δ-3-Carene (12.0%), Germacrene D (8.0%), Bornyl acetate (7.6%), (E)-Caryophyllene (6.8%), Camphene (6.3%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Pinus mugo* ssp. *uncinata					
* α-Pinene (25.2%), Myrcene (24.9%), Limonene (19.9%), β-Pinene (14.3%)	WCOT CPSil-8CB,	Headspace	France /two populations in French Alps	Summer - June	[29]
Bornyl acetate (30.2%), α-Pinene (12.2%), (E)-β-Caryophyllene (6.8%), Limonene (4.9%)	Rxi-1MS	Hydrodistillation (Deryng)	Poland / Dendrological Garden	-	[112]
Pinus muricata					
Germacrene D (41.5%), α-Pinene (17.3%), (*E*)-β-Ocimene (5.4%), δ-3-Carene (5.3%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter - January	[23]
Pinus nigra					
α-Pinene (52.2%), Germacrene D (14.3%), (*E*)-Caryophyllene (5.7%)	DB5	Hydrodistillation (Clevenger)	Greece / Attiki	-	[25]
* Monoterpenes: α-Pinene (73.4%), β-Pinene (10.0%), Myrcene (4.7%) * Sesquiterpenes: Germacrene D (60.3%), β-Caryophyllene (22.9%)	DB-5	Extraction in *n*-pentane	Europe / 41 populations from nine regions	-	[113]
[1] β-Pinene (46.5%), α-Pinene (39.9%), Terpineol (7.6%), Bornyl acetate (3.0%)	Carbowax 20M	Steam distillation	Slovakia, Nitra		[122]
[2] α-Pinene (41.8%), β-Pinene (37.8%), Terpineol (7.4%), Bornyl acetate (5.4%)	Carbowax 20M	Steam distillation	Slovakia, Nitra		[122]
* α-Pinene (42.7%), Germacrene D (17.7%), β-Pinene (11.6%), β-Caryophyllene (5.6%)	DB-WAX	Hydrodistillation (Karlsruher)	Croatia	Autumn – October	[54]
α-Pinene (28.4%), Germacrene D (21.2%), (*E*)-Caryophyllene (16.2%), β-Pinene (6.2%)	HP-5	Hydrodistillation (Clevenger)	Italy / Massa, Pian della Fioba	Winter - February	[79]
* α-Pinene (48.2-74.8%), Myrcene (3.9-17.2%), β-Pinene (4.1-27.2%), β-Phellandrene (1.5-6.4%)	CBX	Extraction in *n*-pentane	France / Corsica, France and Spain / East Pyrenees	-	[114]
* α-Pinene (56.3%), β-Pinene (9.4%), α-Copaene (7.8%)	SE-54	Extraction in solution 1:1 diethyl-ether and petrolether	Bulgaria / Plantation of six populations	-	[115]
* α-Pinene (35.4%), β-Pinene (13.0%), Germacrene D (12.4%), (*E*)-Caryophyllene (8.0%)	Thermon 600T	Hydrodistillation (Clevenger)	Turkey / 8 populations	Spring, Summer, Autumn, Winter	[116]

α-Pinene (44.2%), β-Pinene (21.3%), Germacrene D (16.7%), (*E*)-Caryophyllene (4.9%)	HP-Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Kizilcahamam	May – November	[35]
Acetic acid (31.1%), Bicyclo[2.2.1]heptan-2-one (21.5%), Borneol (8.6%), Limonene (8.1%), β-Myrcene (5.0%)	CP-Wax 52 CB	HS-SPME	Canada / Waterloo Campus	Spring - May	[61]
α-Pinene (24.9%), Germacrene D (20.3%), (*E*)-Caryophyllene (19.0%), β-Pinene (11.0%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring – May	[36]
Germacrene D (31.9%), α-Pinene (28.9%), (*E*)-Caryophyllene (17.1%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Korint	Spring – May	[36]
α-Pinene (26.4%), Germacrene D (22.6%), (*E*)-Caryophyllene (15.5%), β-Pinene (12.8%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Samos Island	Spring – May	[36]
α-Pinene (35.4%), Germacrene D (28.1%), β-Pinene (10.0%), (E)-Caryophyllene (7.4%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mileševka Canyon	Summer - August	[92]
α-Pinene (28.8%), Germacrene D (11.9%), Limonene (8.5%), β-Caryophyllene (8.2%), β-Pinene (6.9%), β-Myrcene (6.9%)	VF-5 MS	Hydrodistillation (Clevenger)	'Sharri' National Park	Summer	[93]
α-Pinene (54.4%), Germacrene D (16.3%), (*E*)– Caryophyllene (8.5%)	HP-5MS	Hydrodistillation (Clevenger)	Bosnia and Herzegovina	-	[81]
Pinus nigra* ssp. *banatica					
α-Pinene (50.8%), Germacrene D (23.7%), (E)-Caryophyllene (7.3%), Limonene (5.0%)	HP-5MS	Extraction in *n*-pentane	Serbia (one locality)	Summer – August	[117]
* α-Pinene (79.5%), β-Pinene (8.0%), Germacrene D (5.1%)	HP-5MS	Static headspace (HS)	Roumania and Serbia (four populations)	Summer – July	[118]
Pinus nigra* var. *calabrica					
α-Pinene (24.6%), β-Pinene (10.9%), γ-Cadinene (9.9%), β-Phellandrene (6.3%), Manoyl oxide (6.2%)	SE 30	Hydrodistillation (Clevenger)	Italy / Calabria	-	[96]
Pinus nigra* ssp. *caramanica					
β-Pinene (20.7%), Germacrene D (20.0%), α-Pinene (18.0%), β-Caryophyllene (7.8%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring-April	[23]
Pinus nigra* ssp. *dalmatica					
α-Pinene (24.3%), β-Pinene (16.0%), Germacrene D (14.6%), (*E*)-Caryophyllene (9.6%)	HP-101, HP-20M	Hydrodistillation (Clevenger)	Croatia / Island Brač	Spring - May	[119]
* α-Pinene (85.1%), β-Pinene (5.9%)	HP-5MS	Static headspace (HS)	Croatia /Island Brač	Summer – August	[118]
Pinus nigra* ssp. *gocensis					
* α-Pinene (41.8%), Germacrene D (32.2%), (E)-Caryophyllene (8.2%), β-Pinene (6.8%)	HP-5MS	Extraction in *n*-pentane	Serbia (two populations)	Summer – August	[117]
Pinus nigra* ssp. *laricio					
* α-Pinene (41.0%), Germacrene D (8.6%), Myrcene (7.7%), (*E*)-Caryophyllene (5.3%), Limonene (5.1%)	BP-1	Hydrodistillation (Clevenger)	France / Corsica (group I)	Autumn – September to November	[120]
* Manoyl oxide (22.6%), α-Pinene (22.0%), Germacrene D (17.8%), (*E*)-Caryophyllene (6.3%)	BP-1	Hydrodistillation (Clevenger)	France / Corsica (group II)	Autumn – September to November	[120]

α-Pinene (18.0%), δ-3-Carene (16.1%), (*E*)-Caryophyllene (13.9%), Germacrene D (12.7%), Limonene (9.7%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[24]
Manoyl oxide (38.0%), Germacrene D (16.7%), δ-Cadinene (9.0%), (*E*)-Caryophyllene (8.9%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia	Autumn – October	[123]
* Caryophyllene oxide (37.7%), (*E*)-Caryophyllene (17.0%), Camphene (9.0%), α-Amorphene (5.6%), Germacrene D (4.7%)	DB-5MS	Hydrodistillation (Clevenger)	Tunisia / Garden	Spring - April	[124]
Pinus nigra* ssp. *mauritanica					
(*E*)-Caryophyllene (26.2%), Germacrene D (17.2%), α-Pinene (9.4%), Kaur-16-ene (7.1%), δ-Cadinene (6.9%)	DB-5MS	Hydrodistillation (Clevenger)	Algeria / National park	Summer – June	[125]
Hexadecanoic acid (37.6%), α-Pinene (29.9%), Myrcene (6.7%), (*E*)- Caryophyllene (6.6%)	DB-5MS	SPME	Algeria / National park	Summer – June	[125]
Pinus nigra* ssp. *nigra					
* α-Pinene (66.5%), Limonene (5.7%), β-Pinene (5.3%)	CP WAX 51	Hydrodistillation (Clevenger)	Bosnia and Herzegovina / five locations	Winter – December	[121]
α-Pinene (25.3%), Limonene (22.6%), Sabinene (12.8%), α-Terpineol (8.3%)	SE 30	Hydrodistillation (Clevenger)	Italy / Calabria	-	[96]
* α-Pinene (44.0%), Germacrene D (29.0%), (*E*)-Caryophyllene (8.0%), β-Pinene (6.7%)	HP-5MS	Extraction in *n*-pentane	Serbia (Three localities)	Summer – August	[117]
α-Pinene (19.5%), Germacrene D (32.1%), (*E*)-Caryophyllene (16.1%), β-Pinene (12.1%)	HP-5MS	Hydrodistillation (Clevenger)	Spain / Botanic Garden	Summer – June	[23]
α-Pinene (35.4%), Germacrene D (28.1%), β-Pinene (10.0%), (*E*)-Caryophyllene (7.4%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia /Mileševka Canyon	Spring - May	[111]
Caryophyllene oxide (44.9%), Germacrene D (13.6%), β-Phenethyl butyrate (11.6%), α-Pinene (9.7%;), (*E*)-Caryophyllene (7.9%)	DB-5MS	Hydrodistillation (Clevenger)	Tunisia / Garden	Spring - April	[124]
* α-Pinene (72.7%), β-Pinene (11.5%), Germacrene D (6.1%)	HP-5MS	Static headspace (HS)	Croatia, Bosnia and Herzegovina, Serbia / seven localities	Summer – July to August	[118]
Pinus nigra* ssp. *pallasiana					
* α-Pinene (42.3%), Germacrene D (30.6%), (*E*)-Caryophyllene (7.4%), β-Pinene (5.2%)	HP-5MS	Extraction in *n*-pentane	Serbia (one locality)	Summer – August	[117]
β-Pinene (20.7%), Germacrene D (20.0%), α-Pinene (18.0%), (*E*)-Caryophyllene (7.8%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Germacrene D (25.4%), α-Pinene (24.6%), (*E*)-Caryophyllene (13.2%), β-Pinene (8.8%)	HP-5MS	Hydrodistillation (Clevenger)	North Macedonia / Mt. Kožuf	Summer – July	[89]
* Caryophyllene oxide (58.5%), (*E*)-Caryophyllene (15.6%), 3-Decyne (5.8%), α-Humulene (5.0%)	DB-5MS	Hydrodistillation (Clevenger)	Tunisia / Garden	Spring - April	[124]
* α-Pinene (72.6%), β-Pinene (13.2%), Germacrene D (6.6%)	HP-5MS	Static headspace (HS)	Bulgaria, Serbia, North Macedonia, Greece / several locations	Summer – July to Autumn	[118]
Pinus nigra* ssp. *salzmannii					

Germacrene D (18.5%), (E)-Caryophyllene (17.8%), Limonene (12.5%), α-Pinene (12.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
* Caryophyllene oxide (52.3%), β-Caryophyllene (12.0%), Camphene (6.6%), Limonene oxide (5.2%)	DB-5MS	Hydrodistillation (Clevenger)	Tunisia / Garden	Spring - April	[124]
(E) Pinus occidentalis					
β-Pinene (45.0%), Germacrene D (22.3%), α-Pinene (15.1%), Myrcene (9.2%)	J&W DB-5	Steam distillation	Dominican Republic	Summer - August	[126]
Pinus palustris					
α-Terpineol (27.3%), δ-Cadinene (8.3%), δ-Cadinol (5.1%)	TC-FFAP	Hydrodistillation (special collector)	Japan / Tsukuba	Summer – August	[84]
Pinus parviflora					
* Limonene / β-Phellandrene (51.4%), Myrcene (14.2%), β-Pinene (12.1%), α-Pinene (8.5%)	DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
α-Pinene (20.2%), Bornyl acetate (18.3%), β-Caryophyllene (8.7%), Camphene (8.1%)	TC-FFAP	Hydrodistillation	Japan / Tsukuba	Summer – August	[84]
Bornyl acetate (17.8%), α-Pinene (16.3%), β-Pinene (16.2%), Limonene (14.2%), Germacrene D (7.6%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
β-Phellandrene (31.9%), α-Pinene (21.1%), β-Pinene (12.5%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter – January	[23]
α-Pinene (25.6%), Caryophyllene (13.2%), Germacrene D (6.7%), Limonene (6.2%), Camphene (5.7%)	CP-Wax 52 CB	HS-SPME	Canada / Ontario	Spring - May	[61]
Pinus patula					
Caryophyllene oxide (14.8%), β-Phellandrene (12.1%), α-Pinene (9.8%), β-Caryophyllene (7.4%)	TC-FFAP	Hydrodistillation (special collector)	U.S.A. / Botanical Garden	Summer - August	[84]
α-Pinene (35.2%), β-Phellandrene (19.5%), Abietatriene (9.3%), (Z)-Caryophyllene (8.9%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / experimental field	Spring - March	[127]
Germacrene D (21.3%), α-Pinene (18.5%), β-Phellandrene (14.7%), β-Caryophyllene (11.8%)	HP-5MS	Hydrodistillation (Clevenger)	USA / Botanical Garden	Autumn – September	[23]
(R, E) ***Pinus peuce***					
α-Pinene (18.6%), γ–Muurolene (17.9%), δ-3-Carene (13.8%), Sabinene (13.2%), Limonene (7.1%)	OV-101	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Spring to Autumn	[128]
* Limonene/ β-Phellandrene (58.1%), α-Pinene (22.5%), β-pinene (9.6%)	DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
α-Pinene (23.1%), β-Pinene (22.0%), Citronellol (13.4%), Bornyl acetate (9.8%), β-Phellandrene (6.8%), Camphene (5.5%)	HP-5MS	Steam distillation Vapodest (Buchi)	Greece / Mt. Rodopi	Autumn-November	[129]
α-Pinene (21.8%), Germacrene D (18.8%), β-Pinene (9.4%)	Carbowax® 20 M, DB-5	Hydrodistillation (Clevenger)	Greece / Mt. Parnitha	-	[31]
* α-Pinene (36.5%), Germacrene D (11.4%), Camphene (8.5%), Bornyl acetate (6.8%), β-Pinene (6.8%), β-Caryophyllene (5.2%)	HP-5MS	Extraction in *n*-pentane	Montenegro (Zeletin and Sjekirica) and Serbia (Mokra Gora)	Last Summer - Autumn	[130]
* α-Pinene (16.3%), Germacrene D (14.0%), Bornyl acetate (10.0%), β-Pinene (7.1%), (*E*)-Caryophyllene (6.0%), Camphene (3.9%)	HP-5MS	Hydrodistillation (Clevenger)	North Macedonia / Mt. Pelister	Summer - July	[131]

* α-Pinene (18.2%), Germacrene D (13.2%), β-Pinene (8.5%), Bornyl acetate (6.3%)	HP-5MS	Hydrodistillation (Clevenger)	North Macedonia / four localities	Summer - July	[132]
α-Pinene (30.1%), Germacrene D (17.0%), β-Pinene (10.8%)	HP-5MS	Hydrodistillation (Clevenger)	Finland / Botanic Garden	Summer – August	[23]
* α-Pinene (45.4%; 45.6%), Germacrene D (11.1%; 11.1%), β-Pinene (8.6%; 12.1%), Camphene (10.7%; 10.1%), Bornyl acetate (5.7; 4.5%)	HP-5MS	Extraction in *n*-pentane	North Macedonia (Mt. Pelister) and Serbia (Mt. Ošljak)	Last Summer - Autumn	[133]
* α-Pinene (31.6%), β-Pinene (13.8%), β-Phellandrene (9.8%), Germacrene D (9.2%), α-Terpineol (8.1%), Camphene (7.7%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Summer-Autumn (July-September)	[134]
* α-Pinene (29.0%), Germacrene D (16.6%), β-Phellandrene (11.4%), β-Pinene (10.9%), Bornyl acetate (7.4%), Camphene (5.8%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Prokletije	Summer-Autumn (July-September)	[134]
α-Pinene (36.8%), β-Pinene (13.0%), Germacrene D (10.0%), α-Terpineol (9.3%), Camphene (8.0%), β-Phellandrene (6.1%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Summer – July to September	[91]
α-Pinene (49.3%), β-Pinene (13.0%), Camphene (8.1%), Bornyl acetate (7.7%), Germacrene D (6.5%), Limonene+β-Phellandrene (5.5%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Šara	Summer- August	[111]
α-Pinene (34.2%), β-Pinene (17.8%), Camphene (9.3%), Germacrene D (8.0%), Limonene (7.1%)	VF-5 MS	Hydrodistillation (Clevenger)	'Sharri' National Park	Summer	[93]
Pinus pinaster					
(*E*)-Caryophyllene (22.2%), α-Pinene (21.4%), γ-Muurolene (6.8%)	OV 101, CBW 20M	Hydrodistillation (Clevenger)	Morocco / Rabat, Arboretum	Summer - July	[33]
* α-Pinene (20.9%), Germacrene D (19.2%), (E)-Caryophyllene (14.8%)	Carbowax® 20 M, DB-5	Hydrodistillation (Clevenger)	Greece/ Island of Corfu	-	[31]
α-Pinene (28.9%), β-Pinene (21.7%), (*E*)-Caryophyllene (13.2%)	HP-WAX, HP-5	Hydrodistillation (Clevenger)	Italy / La Spezia, Montemarcello	Winter – February	[79]
(*E*)-Caryophyllene (26.6%), allo-Aromadendrene (12.5%)	DB-1	Hydrodistillation (Clevenger)	Algeria / Sidi Feradj	Spring – May	[136]
* Abieta-7,13-diene (16.3%), α-Pinene (14,5%), Germacrene D (13.5%), (*E*)-Caryophyllene (10.4%), Palustradiene (6.8%)	BP-1, BP-20, Rtx-1	Hydrodistillation (Clevenger)	France / Corzica (five localities)	Spring / March to June	[139]
β-Pinene (40.5%), α-Pinene (34.6%), Myrcene (13.5%), β-Phellandrene + Limonene (5.0%)	PTE-5	Extraction with Diethyl ether–Petroleumether (1:1)	Spain / Segovia	-	[140]
(*E*)-Caryophyllene (30.9%), β-Selinene (13.5%), δ-Cadinene (7.8%), α-Humulene (6.9%), α-Copaene (5.1%)	DB5-MS	Hydrodistillation (Clevenger)	Algeria / Garden	Spring – March	[137]
Isoabienol (19.1%), Sclarene (18.0%), Abietadiene (10.6%), Germacrene D (11.2%), α-Pinene (5.2%)	HP-5MS	Hydrodistillation (Clevenger)	Spain / Botanic garden	Summer - June	[23]
(*E*)-Caryophyllene (22.5%), Abietadiene (14.8%), α-Pinene (12.1%), β-Pinene (5.0%)	HP-5MS	Hydrodistillation (Clevenger)	Turkey / Bartin	-	[138]
Limonene (51.9%), Cembrene (12.2%), (*E*)-Caryophyllene (8.2%), α-Pinene (7.0%)	HP-5MS	Steam distillation	Tunisia /Tabarka	Spring - March	[69]

α-Pinene (17.2%), Palustradiene (15.7%), (*E*)-Caryophyllene (15.4%), Abieta-7,13-triene (15.0%), Levopimaradiene (8.0%), Abietatriene (5.3%)	HP-5	Hydrodistillation (Clevenger)	Tunisia /Arboretum	Winter – January	[70]
α-Pinene (25.1%), (*E*)-Caryophyllene (21.3%), Germacrene D (5.9%), Abietadiene (5.9%), Abietatriene (5.4%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia /Arboretum	Winter – January	[135]
Pinus pinaster* var. *maghrebiana					
(*E*)-Caryophyllene (10.7%), α-Amorphene (10.7%), β-Cadinene (9.7%)	DB-5	Hydrodistillation (Clevenger)	Tunisia /Arboretum	Spring – May	[141]
Pinus pinaster* var. *renoui					
(*E*)-Caryophyllene (14.7%), Abietane (8.6%), δ-Cadinene (8.4%), Sclarene (8.3%), Trypethelone (7.3%)	DB-5	Hydrodistillation (Clevenger)	Tunisia /Arboretum	Spring – May	[141]
Pinus pinea					
Limonene (39.1%), β-Phellandrene (13.8%), α-Pinene (5.1%)	DB1, DB5	Hydrodistillation (Clevenger)	Greece / Attiki	-	[25]
α-Pinene (37.0%), Farnesyl acetate (9.0%)	OV 101, CBW 20M	Hydrodistillation (Clevenger)	Morocco / Arboretum	Summer - July	[33]
Limonene (58.9%), β-Phellandrene (6.7%), α-Pinene (6.2%)	HP-WAX, HP-5	Hydrodistillation (Clevenger)	Italy / Pisa	Winter - February	[79]
Limonene (20.4%), Camphor (5.8%), Terpinolene (5.6%), Thymol (5.6%), Verbenone (5.4%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Bečetur	Autumn - November	[142]
Limonene (46.4%), Thymol (9.1%), Camphor (5.6%), Verbenone (5.5%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Dar Čičou	Autumn – November	[142]
Limonene (34.3%), α-Pinene (8.8%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Džebel Essma	Autumn - November	[142]
Limonene (28.6%), α-Pinene (26.8%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Džebel Hadada	Autumn – November	[142]
Limonene (51.7%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Oued El Bir	Autumn – Novmber	[142]
Limonene (34.1%), Thymol (12.9%), Terpinolene (7.8%)	HP-5MS	Extraction (Likens-Nickerson)	Tunisia / Zouara	Autumn – November	[142]
Limonene (31.7%), Abienol (12.3%), Sylvestrene (7.9%), α-Pinene (5.8%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / National Park	Autumn – October	[23]
β-Pinene (42.4%), α-Pinene (15.1%), Germacrene D (10.4%), α-Terpineol (6.3%), (E)-Caryophyllene (5.5%)	HP-Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Antalia	May - November	[35]
Limonene (54.1%), α-Pinene (7.7%), (*E*)-Caryophyllene (5.7%)	HP-5 , HP Innowax	Hydrodistillation (Clevenger)	Tunisia / Arijana	Winter – February	[143]
Limonene (55.0%), β-Phellandrene (7.4%), β-Caryophyllene (4.0%)	Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Ortanca-Muğla	Spring - May	[144]
Guaiol (12.7%), Limonene (11.4%), β-Caryophyllene (7.6%), Germacrene D (5.5%), α-Eudesmol (5.2%)	DB-5MS	Hydrodistillation (Clevenger)	Jordan / Amman	Summer – July and August	[146]
Limonene (75.4%), α-Pinene (8.3%), (*E*)-Caryophyllene (5.8%)	HP-5MS	Steam distillation	Tunisia /Tabarka	Spring - March	[83]

α-Pinene (13.8%), Thunbergol (6.2%), α-Terpineol (5.7%), Thymol (5.5%)	HP-5MS	Hydrodistillation (Clevenger)	Libiya / Werdama	Spring – April	[73]
α-Pinene (21.0%), Limonene (8.5%), Germacrene D (7.8%), (*E*)-Caryophyllene (5.4%)	HP-5MS	Hydrodistillation (Clevenger)	Libiya / Al-Mansura	Spring – April	[73]
β-Pinene (24.0%), Terpinolene (11.4%), α-Pinene (8.5%), δ-3-Carene (7.0%), Germacrene D (6.2%)	Rtx-5MS	Hydrodistillation (Clevenger)	Egypt / Botanic garden	Spring - March	[74]
* Limonene (64.0%)	DB-1, DB-5	Hydrodistillation (Clevenger)	Turkey /5 localities	-	[145]
Limonene (20.4%), Caryophyllene oxide (5.5%)	HP-5MS	Hydrodistillation (Clevenger)	Tunisia / Arboretum	Winter – January	[70]
Pinus ponderosa					
β-Pinene (37.9%), δ-3-Carene (19.3%), α-Pinene (9.1%), α-Terpineol (6.2%)	J & W DB-5	Steam distillation (Clevenger modified)	U.S.A. - Washington	Summer - July	[147]
β-Pinene (45.7%), α-Pinene (10.2%), δ-3-Carene (8.4%), Methyl chavicol (8.0%)	DB-5	Hydrodistillation (Clevenger)	Poland / Medicinal Plants Garden	Autumn-September	[148]
β-Pinene (38.2%), α-Pinene (13.0%), Methyl chavicol (10.5%), β-Myrcene (10.4%), δ-3-Carene (8.2%), α–Terpineol (7.5%)	TC-FFAP	Hydrodistillation (special collector)	U.S.A. / Botanic Garden	Summer – August	[84]
β-Pinene (45.0%), α-Pinene (22.5%), δ-3-Carene (12.0%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer - June	[23]
Pinus ponderosa* var. *brachyptera					
α-Pinene (15.2%), Germacrene D (13.6%), β-Pinene (11.2%), (E)-Caryophyllene (9.7%), δ-3-Carene (9.2%)	J & W DB-5	Hydrodistillation (Clevenger)	U.S.A. /Arizona (Coconino National Forest)	-	[33]
Pinus ponderosa* var. *ponderosa					
* β-Pinene (37.4%), Methyl chavicol (25.8%), α-Pinene (6.3%), δ-3-Carene (5.1%)	ZB-5ms, ZB-5	Hydrodistillation (Clevenger)	U.S.A. / Oregon	Spring - May	[51]
Pinus pumila					
* Limonene/ β-Phellandrene (74.6%), α-Pinene (12.3%), β-Pinene (7.8%)	WCOT CPSil-8CB, WCOT DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
α-Pinene (18.3%), δ-3-Carene (10.4%), γ-Cadinene (8.7%), β-Copaene (7.5%), Camphene (5.2%)	TC-FFAP	Hydrodistillation (special collector)	Japan / Tsukuba	Summer - August	[84]
δ-3-Carene (20.8%), α-Pinene (17.0%), Terpinolene (6.0%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer - June	[23]
(+)-3-Carene (22.7%), δ-Cadinene (12.2%), Terpinolene (12.1%), β-Bisabolene (9.1%)	HP-5MS	SFM-E	China/ Great Khingan Mountains	Autumn -September	[150]
(+)-3-Carene (20.5%), δ-Cadinene (15.5%), Terpinolene (7.0%), β-Bisabolene (7.3 %)	HP-5MS	SFM-P	China/ Great Khingan Mountains	Autumn -September	[150]
Pinus pungens					
β-Pinene (18.3%), γ-Muurolene (18.1%), α-Bisabolol (14.7%), Cadinene (9.2%), β-Bisabolene (8.1%), Caryophyllene (5.5%)	QC methyl silicone				[151]
Pinus radiata					

β-Pinene (26.4%), α-Pinene (16.7%), Limonene (5.0%)	DB-5	Hydrodistillation (Clevenger)	Greece / Mt. Parnitha	-	[31]
β-Pinene (35.2%), α-Pinene (21.9%), β-Phellandrene (12.6%)	MEGA SE 52	Steam distillation	Ecuador		[152]
β-Pinene (38.7%), α-Pinene (18.9%), germacrene D (6.4%), β-phellandrene (5.0%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Mt. Parnes	Autumn - October	[23]
β-Pinene (29.5%), α-Pinene (21.2%), Limonene (12.4%);	5973N MS	Hydrodistillation (Ginsberg)	Russia / Crimea	-	[53]
Pinus resinosa					
β-Pinene (42.4%), α-Pinene (23.3%), Myrcene (14.5%), Germacrene D (4.9%)	DB-5	Hydrodistillation (Clevenger)	Poland / Medicinal Plants Garden	Autumn-September	[148]
Caryophyllene (27.6%), α-Pinene (13.0%), δ-3-Carene (12.9%), Naphthalene (9.3%)	CP-Wax 52 CB	HS-SPME	Canada / Waterloo Campus	Spring - May	[61]
Pinus rigida					
β-Pinene (15.2%), α-Pinene (11.1%), Ethyl laurate (9.6%), Caryophyllene oxide (7.7%), α-Terpineol (7.3%)	TC-FFAP	Hydrodistillation (special collector)	Japan / Garden	Summer – August	[84]
Bornyl acetate (17.8%), α-Pinene (16.3%), β-Pinene (16.2%), Limonene (14.2%), Germacrene D (7.6%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
2H-Benzocyclohepten-2-one (24.5%), α-Humulene (14.1%), β-Caryophyllene (10.2%), β-Pinene (7.4%)	HP-5MS	Hydrodistillation (Herb oil Maker Japan)	Korea / Suncheon	Summer - June	[58]
β-Pinene (16.7%), Germacrene D (15.5%), β-Phellandrene (13.6%)	HP-5MS	Hydrodistillation (Clevenger)	Germany / Botanic Garden	Summer - June	[23]
Pinus roxburghii					
(*E*)-Caryophyllene (31.7%), Terpinen-4-ol (30.1%), α-Humulene (7.3%), α-Terpineol (5.0%)	HP-5MS	Hydrodistillation (Clevenger)	Nepal / city in Morang district	Spring - May	[154]
β-Caryophyllene (20.5%), δ-3-Carene (15.9%), Terpinolene (10.5%)	HP-5MS	Hydrodistillation (Clevenger)	Australia / Botanic Garden	Winter - February	[23]
α-Pinene (39.0%), 3-carene (33.4%), β-pinene (4.6%)	ZB-5MS	Hydrodistillation (Clevenger)	Egypt/ Arboretum	Summer - August	[153]
α-Phellandrene (39.6%), α-Pinene (15.4%), α-Terpinolene (11.8%), Caryophyllene (6.4%)	CP-SIL 8CB	Hydrodistillation (modified Clevenger)	India / University campus	Spring - April	[155]
(E) ***Pinus sabiniana***					
* α-Pinene (39.1%), Limonene (10.5%), β-Phellandrene (10.4%)	J&W DB-5	Steam distillation (circulatory Clevenger)	USA / California, Arboretum	-	[98]
α-Pinene (61.6%), Unidentified (81,286) (12.1%), (*E*)-β-Ocimene (5.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Phenylethyl butyrate (20.6%), Limonene (15.2%), α-Pinene (13.7%)	5973N MS	Hydrodistillation (Ginsberg)	Russia / Crimea	-	[52]
α-Pinene (47.3%), Limonene (19.3%), (*Z*)-β-Ocimene (9.6%), β-Pinene (5.1%)	ZB-5MS	Hydrodistillation (Likens-Nickerson)	U.S.A. / Paradise, California	Summer - July	[24]
Pinus sibirica					

α-Pinene (40.2%), β-Pinene (19.6%), δ-3-Carene (16.1%), D-Limonene (9.9%)	HP-5MS	Hydrodistillation	Commercial essential oil	–	[156]
(E) ***Pinus strobiformis***					
Germacrene D (25.5%), β-Pinene (12.5%), Unidentified1(161,222) (8.2%), α-Pinene (8.0%)	HP-5MS	Hydrodistillation (Clevenger)	Finland / Botanic Garden	Summer – August	[23]
Pinus strobus					
* 3-Carene (40.8%), α-Pinene (17.5%), Myrcene (17.1%), β-Pinene (14.4%)	WCOT CPSil-8CB, WCOT DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
α-Pinene (17.7%), Germacrene D (12.2%), β-Pinene (7.9%), δ-Cadinene (7.5%)	DB-5	Hydrodistillation (Clevenger)	Poland / Medicinal Plants Garden	Autumn-September	[148]
α-Pinene (14.7%), Germacrene D (11.1%), β-Pinene (5.8%), β-Phellandrene (5.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
α-Pinene (34.1%), β-Pinene (19.5%), Germacrene D (12.9%), Sabinene (6.0%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
* α-Pinene (33.0%), β-Myrcene (27.7%), β-Pinene (8.0%)	CP-Wax 52 CB	HS-SPME	Canada / Ontario	Spring - May	[61]
β-Pinene (33.6%), α-Pinene (31.4%), β-Caryophyllene (8.2%)	HP-5MS	Hydrodistillation (Clevenger)	Greece / Botanic Garden	Spring - May	[36]
β-Pinene (29.1%), α-Pinene (17.9%), Myrcene (12.6%)	DB-5, Supelcowax 10	Hydrodistillation	Argentina / Valle Chico	Autumn	[100]
α-Pinene (23.5%), β-Caryophyllene (9.0%), Camphene (7.4%), Terpinolene (6.8%), Limonene (5.5%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus sylvestris					
α-Pinene (32.9%), endo-1-Bourbounal (9.9%), δ-3-Carene (8.9%)	CP-Sil 5 CB, DB-Wax	Hydrodistillation (Karlsruher)	Croatia	Autumn – October	[54]
* α-Pinene (23.1%), δ-3-Carene (15.6%), δ-Cadinene (7.7%)	BP-5	Hydrodistillation (Karlsruher)	Lithuania (15 localities)	Summer - July	[157]
Manoyl oxide (30.2%), Caryophyllene oxide (12.7%), Unidentified compound (9.8%), Nonacosane (6.8%)	DB-5	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	-	[101]
α-Pinene (37.3%), δ-3-Carene (10.7%), Germacrene D (7.0%), Camphene (6.3%)	HP-5MS	Extraction by *n*-hexane (1-year old needles)	Finland / Korpilahti	Autumn – October	[158]
* α-Pinene (53.4%), β-Pinene (9.4%), Camphene (6.9%), (*E*)-Caryophyllene (5.5%), δ-Cadinene (5.3%), Germacrene D (5.2%)	SE-54	Extraction by 1:1 solution of diethyl and petrol ether	Bulgaria /12 provenance tests	Winter	[159]
* α-Pinene (40.1%), β-Pinene (8.8%), Camphene (8.5%)	Thermon 600 T	Hydrodistillation (Clevenger)	Turkey / four localities	Different seasons	[160]
α-Pinene (39.1%), Germacrene D (16.1%), β-Pinene (15.6%), (E)-Caryophyllene (8.6%)	HP-Innowax FSC	Hydrodistillation (Clevenger)	Turkey / Yedigoller	May – November	[35]
α-Pinene (34.4%), Unidentified compound (8.7%), δ-Cadinene (7.1%), β-Pinene (6.8%), Bicyclogermacrene (6.0%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]

* α-Pinene (12.2%), δ-Cadinene + *trans*-Calamenene (10.7%), 3-Carene (7.3%), α-Cadinol (6.3%), T-Cadinol + T-Muurolol (6.0%)	HP-5MS	Steam distillation	Russia / Kuzbass Surface Coal Mine Dumps	Summer – July	[168]
α-Pinene (41.9%), (E)-Caryophyllene (6.0%), δ-Cadinene (6.0%)	HP-5MS	Hydrodistillation (Clevenger)	Serbia / Mt. Tara	Summer – June	[111]
α-Pinene (25.6%), Limonene (18.5%), Bornyl acetate (17.9%), β-Pinene (15.9%), Camphene (6.4%)	HP-5MS	Hydrodistillation	Spain / commercial essential oil	-	[161]
α-Pinene (31.9%), β-Pinene (9.8%), δ-Cadinene (8.6%), Germacrene D (5.6%), β-Myrcene (5.4%), β-Caryophyllene (5.0%)	VF-5 MS	Hydrodistillation (Clevenger)	'Sharri' National Park	Summer	[93]
Trimethylbicyclo[3.1.1]hept-2-ene (53.8%), Limonene (10.9%), Myrcene (6.2%), α-Pinene (5.3%)	DB-5MS	HS-SPME	China / campus of Nanjing	Spring - April	[41]
α-Pinene (39.4%), Limonene (14.3%), β-Pinene (11.0%), α-Terpineol (8.8%), (*E*)-Caryophyllene (8.4%), δ-3-Carene (7.0%)	-	-	Hungary / commercial essential oil	-	[162]
* α-Pinene (39.8%), β–Pinene (6.0%), (*E*)–Caryophyllene (4.8%)	HP-5MS	Hydrodistillation (Clevenger)	Bosnia and Herzegovina	-	[81]
Pinus sylvestris* ssp. *scotica					
Isoabienol (25.9%), δ-3-Carene (10.7%), Germacrene D-4-ol (10.0%), α-Pinene (9.5%), β-Pinene (5.7%), Germacrene D (5.1%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Winter – January	[23]
Pinus sylvestris* var. *mongolica					
α-Pinene (29.9%), Limonene + β-Phellandrene (16.2%), Camphene (5.0%)	DB-Wax, Supelcowax 10	Hydrodistillation (Clevenger)	Mongolia/ Mt. Bayanzurkh	Autumn – September	[163]
δ-Cadinene (17.6%), α-Pinene (9.4%), γ-Cadinene (9.0%), α-Cadinol (6.8%), epi-α-Muurolol (5.6%), δ-3-Carene (5.5%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus tabuliformis					
β-Caryophyllene (13.0%), α-Pinene (8.6%), Caryophyllene oxide (7.4%), Intermedeol (5.5%), β-Cadinene (5.0%)	HP-5MS	Hydrodistillation (Chines pharmacopoeia)	China / Mt. Thaibai	Summer - July	[28]
α-Pinene (9.7%), β-Pinene (6.2%), Bornyl acetate (4.7%), Myrcene (4.1%)	HP-5MS	Hydrodistillation (Clevenger)	Spain / Botanic Garden	Summer - June	[23]
β-caryophyllene (22.4%), α-Pinene (11.1%), Germacrene D (7.4%)	HP-5MS	Hydrodistillation (Clevenger)	China	-	[97]
Trimethylbicyclo[3.1.1]hept-2-ene (36.2%), Myrcene (17.5%), Caryophyllene (14.0%)	DB-5MS	HS-SPME	China / campus of Nanjing	Spring - April	[41]
α-Pinene (25.1%), β-Caryophyllene (24.4%), β-Pinene (8.3%), Bornyl acetate (7.7%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus tabuliformis* var. *mukdensis					
β-Caryophyllene (24.1%), α-Pinene (16.5%), Germacrene D (9.9%)	HP-5MS	Hydrodistillation (Clevenger)	China	-	[97]
α-Pinene (53.0%), β-Pinene (22.3%), δ-Cadinene (4.9%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
Pinus tabuliformis* f. *shekanensis					

β-Caryophyllene (20.8%), γ-Cadinene (9.7%), Germacrene D (9.0%), α-Pinene (7.0%)	HP-5MS	Hydrodistillation (Clevenger)	China	-	[97]
Pinus tabuliformis* var. *umbraculifera					
β-Caryophyllene (26.3%), α-Pinene (20.5%), Bornyl acetate (12.7%), α-Guaiene (8.2%)	needles	Hydrodistillation (Clevenger)	China	-	[97]
Pinus taeda					
α-Pinene (43.4%), β-Pinene (18.8%), Caryophyllene (8.6%), Limonene (6.7%)	DB-5	Extraction (oil-water separator)	China	-	[45]
(E) ***Pinus taiwanensis***					
α-Pinene (33.3%), Germacrene D (27.6%), β-Pinene (7.8%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
(E) ***Pinus teocote***					
β-Pinene (16.7%), Germacrene D (15.5%), Bicyclogermacrene (14.1%), β-Phellandrene (13.6%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
Pinus thunbergii					
β-Pinene (34.1%), α-Pinene (19.6%), β-Phellandrene+Limonene (10.6%), Germacrene D (8.3%)	CP-Sil 5 CB, DB-Wax	Hydrodistillation (Karlsruher)	Croatia	Autumn – October	[54]
δ-3-Carene (16.8%), α-Terpinolene (19.3%), β-Phellandrene (13.4%), α-Pinene (10.9%), γ-Terpinene (6.3%), 4-Terpineol (5.4%), Sabinene (5.2%)	HP-5MS	Steam distillation	Korea	Summer - June	[57]
β-Pinene (33.5%), α-Pinene (11.9%), Sabinene (10.2%), Germacrene D (9.3%)	DB-5	Steam distillation	South Korea / parks in Jeonju	Spring	[40]
2H-Benzocyclohepten-2-one (34.3%), α-Humulene (19.6%), β-Caryophyllene (5.3%)	HP-5MS	Hydrodistillation (Herb oil Maker Japan)	Korea / Boseong	Summer - June	[58]
Germacrene D (18.7%), β-Phellandrene (14.5%), β-Pinene (13.2%), β-Caryophyllene (9.4%)	HP-5MS	Hydrodistillation (Clevenger)	USA / Botanic Garden	Autumn – September	[23]
Germacrene D (30.2%), α-Phellandrene (14.3%), Myrcene (13.0%), Trimethylbicyclo[3.1.1]hept-2-ene (11.7%), Bornyl acetate (9.5%), Caryophyllene (8.5%)	DB-5MS	HS-SPME	China / Campus of Nanjing	Spring - April	[41]
(E) ***Pinus torreyana***					
4-epi-Isocembrol (55.7%), Cembrene (12.7%), Limonene (8.6%), Thunbergol (7.7%)	HP-5MS	Hydrodistillation (Clevenger)	USA / Botanic Garden	Summer - June	[23]
Pinus torreyana* ssp. *insularis					
Thunbergol (67.1%), iso-Cembrene (6.8%), Cembrene (6.4%)	J&W DB-5	Steam distillation (circulatory Clevenger)	USA / California	-	[164]
Pinus torreyana* ssp. *torreyana					
Thunbergol (30.6%), iso-Cembrene (25.5%), Cembrene (20.0%), Limonene (6.9%)	J&W DB-5	Steam distillation (circulatory Clevenger)	USA / California	-	[164]
Pinus uliginosa					

α-Pinene (8.1%), Bornyl acetate (7.9%), δ-3-Carene (6.9%), (*E*)-β-Caryophyllene (6.4%)	-	Hydrodistillation (Deryng)	Poland / Dendrological Garden	-	[112]
Pinus wallichiana					
* Limonene / β-phellandrene (38.1%), β-Pinene (28.1%), α-Pinene (15.2%), Myrcene (12.2%)	WCOT CPSil-8CB, WCOT DB-5MS	Headspace	France /two populations in French Alps	Summer - June	[29]
β-Pinene (46.8%), α-Pinene (25.2%), Myrcene (9.5%)	DB-1 MS	Hydrodistillation (Clevenger)	India / Kashmir	Summer – July, August	[165]
β-Pinene (18.1%), α-Pinene (13.8%), Germacrene D (10.3%), β-Caryophyllene (7.2%)	HP-5MS	Hydrodistillation (Clevenger)	United Kingdom / Botanic Garden	Spring - April	[23]
β-Pinene (34.0%), Limonene (17.8%), α-Pinene (14.8%)	DB-5, Supelcowax 10	Hydrodistillation	Argentina / Esquel	Autumn	[100]
Pinus wangii* subsp. *kwangtungensis					
β-Pinene (26.3%), α-Pinene (18.0%), Limonene (16.1%) β-Myrcene (10.4%)	HP-5MS	Hydrodistillation (Clevenger)	Vietnam	Summer - July	[30]
Pinus yunnanensis					
* β-Caryophyllene (18.8%), α-Pinene (15.8%), δ-Cadinene (10.4%)	OM-5MS	Steam distillation	China / Tahe, Heilongjiang	-	[27]
β-Pinene (20.9%), Caryophyllene (14.8%), α-Pinene (14.1%), β-Phellandrene (11.3%), Geranylene (8.8%)	DB-5	Extraction (oil-water separator)	China	-	[45]
Pinus yunnanensis* var. *tenuifolia					
α-Pinene (17.5%), Caryophyllene (16.1%), Geranylene (16.0%), δ-Cadinene (7.5%), γ-Elemene (6.1%)	DB-5	Extraction (oil-water separator)	China	-	[45]

$^{(E)}$-endemic species; $^{(R)}$-relic species; * - average values on populations level; ^{Y} – young needles; ^{1} – one-year-old needles; ^{2}- two-year-old needles;