Table 1 Suppl.Recent selected proteomic study of various medicinal plants using mass spectrometry.

| Plant species | Location | Technique | Number of proteins | Reference |
|---|---|---|---|---|
| *Picrorhizakurrooa* | Rohtang pass (4100 m), India | MALDI-TOF-TOF MS/MS | 31 | Kashyap *et al*. 2014 |
| | Sairopa (4,500m), India | MALDI-TOF-TOF MS/MS | 19 | Sud *et al*. 2014 |
| | Rohtang pass (4100 m), India | MALDI-TOF-TOF MS/MS | 47 | Prakash *et al*. 2014 |
| *Aconitum heterophyllum* | Lahul-Spiti (4000 m), India | MALDI-TOF-TOF MS/MS | 47 | Rana *et al.* 2013 |
| *Podophyllumhexandrum* | CSIR-IICB, India | MALDI-TOF-TOF MS/MS | 105 | Bhattacharyya *et al.* 2012 |
| | Koksar, (3350 m), India | MALDI-TOF-TOF MS/MS | 97 | Dogra *et al.* 2015 |
| *Potentillaatrosanguinea* | CSIR-IHBT, India | MALDI-TOF- MS | 39 | Gill *et al.* 2012 |
| *Potentillasaundersiana* | Nyainqentanglha mountains (4350 -5200 m), china | MALDI-TOF-TOF MS/MS | 118 | Ma *et al.* 2015 |
| *Panax ginseng* | Korea | MALDI-TOF-TOF MS/MS | 192 | Ma *et al.* 2016 |
| | NIHHS, South Korea | MALDI-TOF MS | 43 | Lee and Park 2016 |
| | Seoul, South Korea | MALDI-TOF-TOF MS and LTQOrbitrap XL | 81 | Thusoo*et al.* 2014 |
| | Jilin Province (520 m), China | MALDI-TOF-TOF MS/MS | 834 spot | Lum *et al.* 2002 |
| | Korea | MALDI-TOF-TOF MS and ESI Q-TOF MS | 159 | Kim *et al.* 2003 |
| *Lupinusalbus* | Milano, Italy | LC-ESI-MS/MS | 60 | Scarafoni *et al.* 2013 |
| | Portugal | LC-MS/MS | 128 | Alves *et al.* 2011 |
| *Camellia sinensis* | Hunan Tea Research Institute, Changsha | MALDI-TOF-TOF MS/MS | 26 | Li *et al*. 2011 |
| | Tea Research Institute, Chinese | MALDI-TOF-TOF MS/MS | 72 | Zhou *et al.* 2014 |
| | Southern China's Zhejiang | MALDI-TOF MS | 665 | Li *et al.* 2008 |
| *Manihot esculenta* | DanforthCenter | MALDI-TOF-TOF-MS/MS | 146 | Schmitz *et al.* 2016 |
| | China | MALDI-TOF-TOF-MS | 154 | Wang *et al*. 2016 |
| | USA | nanoelectrospray Q-TOF-TOF-MS/MS | 237 | Sheffield *et al.* 2006 |
| | China | MALDI-TOF-TOF MS/MS | 52 | An *et al.* 2014 |
| *Coffeaarabica* | Federal University of Lavras, Brazil | Q ExactiveOrbitrap MS/MS | 1052 | Campos *et al.* 2016 |
| | Portugal | MALDI-TOF-TOF MS | 116 | Guerra- Guimaraes *et al.* 2015 |
| *Eucalyptus globulus* | AltriFlorestal, SA (Portugal) | MALDI-TOF-TOF MS/MS | 217 | Correia *et al.* 2016 |
| | South Eastern Tasmania and Australia | MALDI-TOF-TOF or LC-ESI-QTOF | 24 | Valdes *et al.* 2013 |
| *Hippophaerhamnoides* | Kaza, 3100-3900 m | ExactiveOrbitrapHRMS | 3 | Sharma *et al.* 2016 |
| | Kaza, 3100-3900 m | nano-LC–MS/MS | 61 | Griffith and Yaish 2004 |
| *Taxuschinensis* | China | MALDI-TOF/TOF | 277 | Zheng *et al.* 2016 |
| *Lonicera japonica* | Shandong, China | Nanospray LTQOrbitrap MS | 1320 | Zhu *et al.* 2015 |
| *Allium sativum* | VolcaniCenter, Bet Dagan, Israel | LC-MS/MS | 36 | Shemesh-Mayer*et al.* 2015 |
| | Cosio, Aguascalientes,Mexico | LC-ESI-MS/MS | 50 | Dufoo-Hurtado*et al*. 2015 |
| *Papaver somniferum* | University of Calgary, Canada | LC-MS/MS | 1004 | Desgagne-Penix *et al.* 2010 |
| | Martinsried, Germany | MALDI-TOF-TOF-MS/MS | 75 | Decker *et al.* 2000 |
| *Clematis terniflora* | Beijing, China | MALDI-TOF-MS/MS | 53 | Gao *et al.* 2016 |
| | Beijing, China | nanosprayLTQOrbitrap MS | 733 | Yang *et al.* 2016 |
| *Euphorbia kansui* | Shaanxi Province, China | MALDI-TOF-TOF-MS | 125 | Zhao *et al.* 2014 |
| *Portulaca oleracea* | Institute of Tibet Plateau Research, China | MALDI-TOF-TOF-MS/MS | 51 | Yang *et al.* 2012 |
| *Tangut Nitraria* | Tokyo University of Technology, Japan | triple quadrupole TOF-MS | 71 | Cheng *et al.* 2015 |
| *Viola tricolor* | Terrace, Gainesville, Florida | MALDI-TOF-TOF-MS/MS | 164 | Hellinger *et al.* 2015 |
| *Equisetum hyemale* | Brazil, USA | GeLC-MS | 3771 | Balbuena *et al.* 2012 |

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|---|---|---|---|---|
| | US | GeLC-MS | 2200 | Salvato*et al.* 2015 |
| *Cyclamen persicum* | Hannover, Germany | microTOF -QIIESI-MS/MS | 248 | Mwangi *et al.* 2013 |
| *Betulaplatyphylla* | Maoershan, North China | MALDI-TOF-TOF-MS/MS | 15 | Feng*et al.* 2015 |
| | Ibaraki, Japan | LTQ XL Orbitrap MS | 718 | Suzuki *et al.* 2014 |
| *Amaranthushypochondriacus* | Mexican High Plateau | LC-ESI MS/MS | 21 | Huerta-Ocampo *et al.* 2009 |
| *Artemisia annua* | Switzerland, UK | nanoUHPLCMS/MS | - | Bryant *et al.* 2016 |
| | Switzerland,UK | LC-MS/MS | 1216 | Bryant *et al.* 2015 |
| *Fagopyrumesculentum* | Korea | MALDI-TOF MS | 165 | Shin *et al.* 2010 |
| *Nicotianatabacum* | Czech Republic | LC-tandem mass spectrometry | 801 | Hafidh *et al.* 2016 |
| | Belgium | MALDI TOF-TOF MS | 532 | Duby *et al*. 2010 |
| | Belgium | MALDI TOF/TOF-MS/MS | 461 | Sallets *et al.* 2014 |
| *Crocus sativus* | Tehran, Iran | MALDI TOF-TOF | 36 | Sharifi *et al.* 2012 |
| *Alternariaalternata* | China | MALDI TOF-TOF MS/ | 43 | Zhang *et al.* 2015a |
| | IICB Kolkata, India | MALDI TOF-TOF MS/MS | 45 | Sinha *et al.* 2011 |
| *Araucaria angustifolia* | Brazil | GeLC-MS/MS | 2398 | Dos-Santos *et al.* 2016 |
| *Cupressussempervirens* | LSABM, Paris, France. | LC-MS/MS | 108 | Shahali *et al.* 2012 |
| *Saussurealaniceps* | Tibet (4500 m), China | MALDI-TOF MS | 41 | Huang *et al.* 2016 |
| *Dianthus caryophyllus* | South Korea | MALDI-TOF MS | 40 | Muneer *et al.* 2016 |
| *Rehmanniaglutinosa* | China | MALDI-TOF-TOF-MS | 103 | Wu *et al.* 2011 |
| *Nigella sativa* | Riyadh, Kingdom of Saudi Arabia | LC - tandem mass spectrometry | 277 | Alanazi *et al.* 2016 |
| *Cymbidium ensifolium* | Hangzhou, China | MALDI -TOF-TOF MS | 21 | Li *et al.* 2014 |
| *Platycladusorientalis* | Shaanxi Province, China | MALDI-TOF-TOF MS/MS | 77 | Zhang *et al.* 2015b |
| *Catharanthusroseus* | Gorlaeus Laboratories, Netherlands | MALDI-MS/MS | 58 | Jacobs *et al.* 2005 |
| *Curcuma comosa* | Bangkok, Thailand | LC-Q-TOF-MS/MS | 42 | Boonmee *et al.* 2011 |

Table 2 Suppl. Major stress responsive and defence proteins in medicinal plants.

| Stress conditions | Protein name | Reference |
|---|---|---|
| Dehydration/drought stress | ascorbate peroxidase, 2-cys-peroxiredoxin, CF1 alpha subunit of ATP synthase, dehydrogenase family protein, disease resistance protein, glutamine synthetase, glutathione, glycogen/starch synthase, granule-bound starch synthase lb precursor (GBSS), high molecular mass HSP, HSP 90, isopentenyl pyrophosphate isomerase IDI2, LEA D-29, lipoxygenase, peroxiredoxin, protein oxidoreductase, peptidyl prolyl *cis*-trans isomerase, phosphatidylinositol 4-phosphate 5-kinase 1, putative defensin-like protein 239, thaumatin-like cytokinin-binding protein, thioredoxin superfamily, transferase lambda 2, zinc-binding | Zhou *et al*. 2014, Correia*et al*. 2016, Kashyap *et al.* 2014, Valdes *et al.* 2013 |
| Salinity stress | ABA-responsive proteins, gamma carbonic anhydrase-like 2, LEA proteins, malate dehydrogenase (NADP+), osmotin-like protein, ornithine decarboxylase, putative magnesium-chelatase subunit chII, pyruvate phosphate dikinase 14-3-3 protein, PRPs, Sti1(HSPs) | Cheng *et al*. 2015, Aghaei and Komatsu 2013 |
| Low temperature stress | adenosyltransferase, chaperonin CPN60-2 mitochondrial, chaperonin 60 subunit beta 1 chloroplastic, chaperone protein ClpC1, chaperonin CPN60-like protein, chloroplastic, chitinases, chloroplast HSP 70-2, chitinase-like protein, class I chitinase-like protein, Class I endochitinase, Class II endochitinase, chaperone18.1 kDa class I HSP-like, cyclophilin of 18 kDa3, cyclosporin A-binding protein, dehydrineb-1,3-endoglucanase, dessication related protein, disease resistance RPP8-like protein 3, protein 1, DHAR2-like, dnaJ protein-like protein, endoplasmin, fibrillin-2, GDSL-motif lipase/hydrolase family protein, glutathione S-transferase, glutathione S-transferase T1-like CBS domain-containing protein, HSP, hop-interacting protein THI032, HS 70 kDa protein, HSP 70 kDa-7, HSP 70-7, late embryogenesis-like protein, lipoxygenase, macrophage migration inhibitory factor homologisoformX338, mitochondrial HSP 70-1, mitochondrial heat shock cognate 70 kDa, non-cell-autonomous HSCP 70, osmotin-like protein, peptidyl-prolyl *cis-trans* isomerase, peptidyl-prolyl *cis-trans* isomerase CYP38, peptidyl-prolyl *cis-trans* isomerase FKBP12, probable plastid-lipid-associated protein 2 chloroplastic, PREDICTED: GDSL esterase/lipase At2g04570-like, phenylalanine ammonia lyase, polygalacturonase inhibitor protein, protein disulfide-isomerase like 2-3, probable protein Pop3, rotamasecyclophilin-1, S-adenosylmethionine synthase/Methionine, similar to pathogenesis-related protein STH-2, sHSP, sHSP16.6CI, sHSP17.4BCII, TCP -1/cpn60 chaperonin family protein, thaumatin-like proteins, VQ motif-containing protein, WRKY protein | Sharma *et al*. 2016, Gupta and Deswal 2012, Griffith and Yaish 2004, Dufoo-Hurtado *et al*. 2015, Bhardwaj *et al*. 2013 |
| UV stress | casein lytic proteinase B3, chaperone protein clpB, chaperone protein htpG family protein, chloroplast HSP70-1, disease resistance protein, endoplasmin homolog, HSCP 70 kDa, HSP 70, HSCP 70-1, HSP 70-6HSP 83, HSP101, HSP 90 (endoplasmic reticulum), HSP 90, HSP 81-1, HSP 70-3, HSP 70 with TPR, HSP, HSP 70 (chloroplast), HSP 90-4, HSP 90-5, HSP 90-6, luminal binding protein, 18.2 kDa class I HSP, luminal binding protein Bip2, luminal binding protein, luminal-binding protein 2, stromal HSP, stromal 70 kDa HS related protein, stromal 70 kDa heat shock-related protein chloroplastic, | Zheng *et al*. 2016, Yang *et al.* 2016 |
| Ozone stress | germin-like protein, harpin binding protein putative Xal-like protein, temperature stress-induced lipocalin | Sarkar *et al*. 2010, Bohler *et al.* 2007 |
| Dark stress | cold shock domain-containing protein 4, defensin-like proteins, vernalization insensitive 3 | Prakash*et al*. 2014 |
| UV + Dark | chloroplast envelope membrane 70 kDa heat shock related protein disease resistance protein, endoplasmin homolog, HSP 81-1, heat shock 70 kDa protein 6, heat shock 70 kDa protein, heat shock 70 kDa protein 18, heat shock 70 kDa protein 3HSP 82, HSP 90-4, HSP 90-5, HSP 90-6, luminal-binding protein, luminal-binding protein 5, luminal-binding protein 4, luminal-binding protein 3, mediator of RNA polymerase II transcription subunit 37f, mediator of RNA polymerase II transcription subunit 37e, stromal 70 kDa HSP | Yang *et al.* 2016 |
| Elevated temperature and humidity | ABA-8′-hydroxylase, chloroplast HSP 70-2, filamentation temperature-sensitive H2B, GTP-binding protein, HSP70, HSP90, HSP101, molecular chaperones DnaK and DnaJ, pathogen induced protein 2-4, Δ1-pyrroline- 5-carboxylate synthetase | Yang *et al.* 2012 |

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|---|---|---|
| Hyperhydricity stress | abscisic stress-ripening protein 2, putative disease resistance protein, RGA3 | Muneer *et al*. 2016 |
| Along altitude gradient | basic 30 kDa endochitinase chitinase 6, desiccation-related protein PCC13-62, dehydrinCOR410, dehydration-responsive element-binding protein 1C, 17.7 kDa class I heat shock protein, HSP, filamentation temperature-sensitive H2B, 33 kDa manganese stabilizing chloroplast, 14-3-3-like protein, Vf14-3-3c protein, NAC domain containing protein, HSP20, low-temperature-induced 65 kDa protein, heat shock 70 kDa protein 18, acidic endochitinaseWIN6.2B, | Li *et al*. 2014, Ma *et al*. 2015 |
| Storage condition | antibiotic resistance protein, HSP 70 kDa protein 2, urease accessory protein UreD, pollen-specific protein | Li *et al*. 2008 |
| Biotic stress | beta-1,3-glucanase, beta-1,3-glucanase basic, chitinase 1, chitinase family protein, germin-like protein partial, germin-like protein 10, HSP70, high-molecular-weight HSP70, major allergen mal d1, osmotin, PREDICTED: cysteine-rich repeat secretory protein 55-like, PREDICTED: pathogenesis-related protein 5-like, putative NtPRp27-like protein, PREDICTED: chitinase 2-like, pathogenesis-related1 protein, S-adenosylmethionine synthetase, thaumatin-like protein | Zhang *et al.* 2015, Guerra-Guimaraes *et al*. 2015 |

Table 3 Suppl.Proteins involved in synthesis of secondary metabolites.

| SM Class | Intermediate precursors | SM related proteins | Reference |
|---|---|---|---|
| Alkaloids | jasmonic acid, morphine, strictosidine, tryptamine | codeinone reductase, 12-oxophytodienoate reductase, strictosidine synthase, vtryptophan synthase | Aghaei and Komatsu 2013, Jacobs *et al.* 2005 |
| | paclitaxe | baccatin III amino phenylpropanoyl-13-O-transferase, chain A, crystal structure of shikimate kinase, 1-deoxy-D-xylulose-5-phosphate reductoisomerase, 10-deacetylbaccatin III-10-O-acetyltransferase, geranylgeranyl diphosphate synthase, 4-hydroxy-3-methylbut-2-enyl diphosphate reductase, 3'-N-debenzoyltaxol N-benzoyltransferase, taxane 10-b-hydroxylase, taxadiene synthase, taxadiene 5-a hydroxylase, taxadien-5-a-ol-O-acetyltransferase, taxane 13-a-hydroxylase | Zheng *et al*. 2016, Sharma *et al.* 2016 |
| Etoposides | podophyllotoxin | CYP719A23,dirigent protein, dehydrogenase, pinoresinollariciresinol reductase, secoisolariciresinol | Lau and Sattely, 2015 |
| Flavonoids | anthocyanin, apigenin, apigenin 7-O- arabinose (1−6) glucoside, apigenin 7-O- glucoside, apigenin 7-O-rutinoside, diosmetin, eriodictyol, kaempferol 3-O-glucoside, kaempferol 3-O hamnosyl-7-Oglucoside, luteolin, naringenin, quercetin, quercetin 3-O-glucoside, rutin, | chalcone synthase, flavonoid 3′-O-methyltransferase, isoflavone reductase, isoflavone reductase-like protein 5 | Zhu *et al*. 2015 |
| Indoles | indole nuclei | anthranilate synthase, indole-3-glycerol phosphate synthase, phosphoribosylanthranilate transferase, tryptophan synthase | Gao *et al.* 2016 |
| Iridoid glycosides | picrosides biosynthesis | acetyl-CoA acetyltransferase, 1-deoxy-D-xylulose-5-phosphate synthase, 1-deoxy-D-xylulose-5-phosphate reductoisomerase, 4-diphosphocytidyl-2-C-methyl-D-erythritol kinase, geranyl diphosphate synthase, 4-hydroxy-3-methylbut-2-enyl diphosphate reductase, 3-hydroxy-3-methylglutaryl coenzyme A reductase, isopentenyl pyrophosphate isomerase | Singh *et al.* 2013 |
| Phenolics | chlorogenic acid | chorismate synthase, 5-enolpyruvylshikimate-3-phosphate synthase, shikimate dehydrogenase, shikimate kinase | Gao *et al.* 2016 |
| | catechin, ferulic acid | | Sharma *et al.* 2016 |
| Phenylpropanoids | lignin | caffeic acid, 3-O-methyltransferase | Sanjeeta *et al.* 2014 |
| Phenylpropanoids | caffeic acid, chlorogenic acid, ferulic acid, isochlorogenic acid, p-coumaroylquinic acid, umbelliferone | caffeic acid O-methyltransferase, cinnamyl alcohol dehydrogenase, 4-coumarate:CoA ligase, gentiobiase, PLP-dependent aminotransferase, phenylalanine ammonia-lyase, somatic embryogenesis cinnamyl alcohol dehydrogenase 1 | Zhu *et al*. 2015 Wu *et al.* 2011 |
| Sesquiterpene lactones | artemisinin | 2-alkenal reductase, amorpha-4,11-diene synthase, artemisinic aldehyde delta-11(13) reductase , HMG-CoA reductase, putative hemebinding cytochrome P450, peroxidase 1 | Bryant *et al.* 2015 |
| Terpenoids | ginsenosides | aldolase, cycloartenolsynthasev, enolase, farnesyl diphosphate synthase, glyceraldehyde 3-phosphate dehydrogenase, squalene epoxidases, squalene synthase | Ma *et al.* 2016 Aghaei and Komatsu 2013 |

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|---|---|---|---|
| | loganin<br>secologanate<br>oleanolic acid | acetyl-CoA acetyltransferase, acetyl-CoA C-acetyltransferase, cytidylyl transferase, cytosolic 2carotenoid cleavage dioxygenase 1, 1-deoxy-D-xylulose 5-phosphate reducto isomerase, hydroxy methyl butenyl 4-diphosphate synthase1-deoxy-D-xylulose 5-phosphate, 4-diphosphocytidyl-2-C-methyl-erythritol kinase, hydroxy methyl glutaryl-CoA synthase, 4-hydroxy-3-methylbut-2-en-1-yl diphosphate synthase, hydroxy methyl butenyl diphosphate reductase, hydroxy methyl butenyl 4-diphosphate synthase, linalool synthase, 2-C-methyl-D-erythritol 4-phosphate, 2-C-methyl-D-erythritol 2,4-cyclodiphosphate, phytoene desaturase, putative isopentenyl diphosphate isomerase, reducto isomerase, | Zhu *et al*. 2015 |
| | diterpenes | cis-abieniol synthase, cembratrien-ol synthase, 1-deoxyxylulose-5-phosphate synthase, 1-deoxy-D-xylulose-5-phosphate reductoisomerase, diphosphate synthase, dimethylallyl pyrophosphate, 4-diphosphocytidyl-2-C-methyl-D-erythritol kinase, 2-enyl diphosphate reductase, geranyl geranyl pyrophosphate synthase, glyceraldehyde phosphate, 2-C-methyl-D-erythritol 4-phosphate cytidylyltransferase, 2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase, 4-hydroxy-3-methylbut-2-enyl diphosphate synthase, 4-hydroxy-3-methylbut-isopentenyl pyrophosphate, 8-hydroxycopalyl, IPP/DMAPP isomerase; | Sallets *et al.* 2014 |