

Abbreviations

A – Adenine	cDNA – Complementary deoxyribonucleic acid
A₆₀₀ – Absorbance at 600 nm	CDP-ME – 4-(diphosphocytidyl)-2-C-methyl-D-erythritol
AACT – Acetoacetyl-CoA thiolase	CDP-MEP – 4-(diphosphocytidyl)-2-C-methyl-D-erythritol-2-phosphate
ACN – Acetonitrile	CH₃CO₂K – potassium acetate
ADP – Adenosine diphosphate	CMK – 4-(diphosphocytidyl)-2-C-methyl-D-erythritol kinase
ADW – Autoclaved Distilled Water	CMP – Cytidine monophosphate
AFLP – Amplified Fragment Length polymorphism	CMS – 2-C-methyl-D-erythritol 4-phosphate cytidyltransferase
ANOVA – Analysis of variance	CoASH – Coenzyme A
APC – Anaphase Promoting Complex	CO₂ – Carbon dioxide
APS – Ammonium persulfate	Co – Cobalt
ATP – Adenosine triphosphate	CAS/CS – Cycloartenol synthase
β-AO – β-amyryn oxidase	Ct – Threshold cycle
bAS/β-AS – β – amyryn synthase	CTP – Cytidine triphosphate
bHLH – Basic Helix-Loop-Helix	CYP – Cytochrome P450 enzyme
bla – β-lactamase gene	DCCD – N, N'-dicyclohexylcarbodiimide
BLAST – Basic Local Alignment Search Tool	DD – Differential Display
bp – Base pairs	DNA – Deoxyribonucleic acid
C – Cytosine	DEPC – Diethyl pyrocarbonate
°C – Degree celsius	DH5α – Douglas Hanahan 5α
C₅ – 5 carbon atoms	DMAPP – Dimethylallyl pyrophosphate/diphosphate
C₁₀ – 10 carbon atoms	DMSO – Dimethylsulfoxide
C₁₅ – 15 carbon atoms	DNase – Deoxyribonuclease
C₂₀ – 20 carbon atoms	DOXP – Deoxy-xylulose phosphate
C₂₅ – 25 carbon atoms	ds – Double stranded
C₃₀ – 30 carbon atoms	DS – Dammarenediol synthase
C₄₀ – 40 carbon atoms	
CaCl₂ – Calcium chloride	
CAT – Chloramphenicol Acetyl Transferase	

DTT – Dithiothreitol

DW – Dry weight

DXP – 1-deoxy-D-xylulose 5-phosphate

DXR – 1-deoxy-D-xylulose 5-phosphate reductoisomerase

DXS – 1-deoxy-D-xylulose 5-phosphate synthase

dNTP – Deoxy nucleotide triphosphates

E. coli – *Escherichia coli*

EDTA – Ethylenediaminetetraacetic acid

e.g. – *Exempli gratia* (Latin, meaning “for example”)

eIF – Eukaryotic translation initiation factor

EMBOSS – European Molecular Biology Open Software Suite

ERG – Ergosterol

EST(s) – Expressed Sequence Tag(s)

et al. – *et alia* (Latin; meaning “and others”)

EtBr – Ethidium bromide

F – Forward primer (3' primer)

FAD – Flavin Adenine Dinucleotide

FARM – First Aspartate Rich Motif

FPP – Farnesyl pyrophosphate

FPS – Farnesyl Pyrophosphate Synthase

g – gram (s); acceleration due to gravity when used to denote relative centrifugal force

G – Guanine

GAPDH – Glyceraldehyde-3-phosphate dehydrogenase

GHMP – Galactokinase, Homoserine kinase, Mevalonate kinase, Phosphomevalonate kinase

GO – Gene Ontology

Gols – Galactinol synthase

GPP – Geranyl pyrophosphate

GPS – Geranyl Pyrophosphate Synthase

GT(s) – Glycosyltransferases(s)

h – Hour (s)

H₂O – Water

HDR – (E)-4-hydroxy-3-methylbut-2-en-1-yl diphosphate reductase

HDS – (E)-4-hydroxy-3-methylbut-2-en-1-yl diphosphate synthase

His – Histidine

HMBDP – E-4-hydroxy-3-methylbut-2-en-1-yl diphosphate

HMG-CoA – 3-hydroxy-3-methylglutaryl-CoA

HMGS – HMG-CoA synthase

HMGR – HMG-CoA reductase

HPLC – High Performance Liquid Chromatography

i.d. – Internal diameter

i.e. – *id est* (Latin, meaning “in other words”)

IDI – Isopentenyl pyrophosphate/diphosphate isomerase

IPP – Isopentenyl diphosphate

IPS – Interproscan

IPTG – Isopropylthio-β-D-galactoside

IspD – Isoprenoid synthase-containing protein D

IspE – Isoprenoid synthase-containing protein E

IspF – Isoprenoid synthase-containing protein F

IspG – Isoprenoid synthase-containing protein G

IspH – Isoprenoid synthase-containing protein H

kDa – Kilodalton

KEGG – Kyoto Encyclopedia of Genes and Genomes

KOH – Potassium hydroxide

L – Leaf

lac O – *lac* operator

LB – Luria Bertani

LS – Lupeol synthase

M (in gel electrophoresis picture) – Marker

M (in text) – Molar

MCS – Multiple Cloning Sites

MCS – 2-C-methyl-D-erythritol 2,4 cyclodiphosphate synthase

MEcPP – 2-C-methyl-D-erythritol 2,4 cyclodiphosphate

MEGA – Molecular Evolutionary Genetics Analysis

MEP – Methylerythritol phosphate

Mg – Magnesium

mg – Milligram

MgCl₂ – Magnesium chloride

min – Minute (s)

MJ – Methyl jasmonate

mM – Millimolar

Mn – Manganese

MnCl₂ – Manganese chloride

MOPS – 3-(N-Morpholino) propane sulfonic acid

mRNA – messenger RNA

msl – Meter above sea level

MVA – Mevalonic acid/mevalonate

MVD – Mevalonate diphosphate decarboxylase

MVK – Mevalonate kinase

MVP – Mevalonate 5 – phosphate

MVPP – Mevalonate 5 – diphosphate

NA – Not available

NAD – Nicotinamide Adenine Dinucleotide

NADP – Nicotinamide Adenine Dinucleotide Phosphate

NADPH – Nicotinamide Adenine Dinucleotide Phosphate Hydrogen

ND – Not detected

NaOAc – Sodium acetate

NaOH – Sodium hydroxide

NCBI – National Center for Biotechnology Information

NF – Nested forward (nested/3' primer for nested PCR)

NH₄OAc – Ammonium acetate

nm – Nanometer

nM – Nanomolar

NR – Nested reverse (nested/5' primer for nested PCR)

NUP – Nested Universal Primer

OBB – Oligotex Binding Buffer

OD – Optical density

OEB – Oligotex Elution Buffer

ORF – Open reading frame

OW – Oligotex Wash (buffer)

PaeI – *Pseudomonas aeruginosa* I

PAGE – Polyacrylamide gel electrophoresis

PAS(s) – Polyadenylation signal(s)

PCR – Polymerase chain reaction

PF – Primary forward (forward/3' primer for primary PCR)

Pg – *Panax ginseng*

pH – Negative logarithm of hydrogen ion concentration

P_i – Inorganic phosphate

pI – Isoelectric point

PMVK – Phosphomevalonate kinase

PPDS – Protopanaxadiol synthase

PPTS – Protopanaxatriol synthase

Pq – *Panax quinquefolius*

PR – Primary reverse (reverse/5' primer for primary PCR)

Ps – *Panax sokpayensis*

PsCMK – *Panax sokpayensis* 4-(diphosphocytidyl)-2-C-methyl-D-erythritol kinase

PsCS – *Panax sokpayensis* cycloartenol synthase

PsDS – *Panax sokpayensis* dammarenediol synthase

PsFPS – *Panax sokpayensis* farnesyl pyrophosphate synthase

PsPMVK – *Panax sokpayensis* phosphomevalonate kinase

PsSE – *Panax sokpayensis* squalene epoxidase

PsSS – *Panax sokpayensis* squalene synthase

PSPP – Presqualene pyrophosphate/diphosphate

PstI – *Providencia stuartii* I

PVDF – Polyvinylidenedifluoride

qRT-PCR – Quantitative realtime PCR (realtime PCR)

R – Rhizome; reverse primer (3' primer)

RACE – Rapid Amplification of cDNA Ends

RbCl – Rubidium chloride

RBS – Ribosome binding site

RCF – Relative Centrifugal Force

RDA – Representational Difference Analysis

RFO(s) – Raffinose oligosaccharide(s)

RPM – Revolutions Per Minute

RNA – Ribonucleic acid

RNAi – RNA interference

RNAseq – Ribonucleic acid sequencing

RQ – Relative quantitation

RQ_{MIN} – Relative quantitation minimum

RQ_{MAX} – Relative quantitation maximum

rrnB – Ribosomal RNA B

RsaI – *Rhodopseudomonas sphaeroides* I

RT – Room temperature

SD – Standard deviation

SDS – Sodium dodecyl sulfate

SAGE – Serial Analysis of Gene Expression

SARM – Second Aspartate Rich Motif

SE – Squalene epoxidase

SM(s) – Secondary metabolite(s)

SOC – Super optimal broth with catabolite repression

SOPMA – Self Optimized Prediction Method with Alignment

Sph I – *Streptomyces phaeochromogenes I*

Spp. – More than one species

SQCY – Squalene cyclase

SQHop – Squalene hopene

SRA – Sequence Read Archive

SS – Squalene synthase

SSH – Suppression Subtractive Hybridization

T – Thymine

TAE – Tris acetate EDTA

Taq – *Thermus aquaticus*

TCM – Traditional Chinese medicine

TE – Tris EDTA

TEMED – N, N, N', N' tetramethylethylene diamine

TFB – Transformation buffer

Tm – Melting temperature

TMHMM – Transmembrane prediction using Hidden Markov Model

TMV – Tobacco mosaic virus

Tris – Tris-(hydroxymethyl) aminomethane

TSAR – Triterpene saponin activating regulator

U – Unit

UDP – Uridine diphosphate

UGT(s) – Uridine diphosphate glycosyltransferases

UPGMA – Unweighted pair group method with arithmetic mean

UPM – Universal primer mix

USA – United States of America

UTR – Untranslated region

UV – Ultra violet

V – Volt

Viz. – *videlicet* (latin, meaning “namely”, in English)

v/v – Volume/volume

w/v – Weight/volume

X-gal – 5-Bromo-4-chloro-3-indolyl-β-D-galactoside

Zn – Zinc

ZnCl₂ – Zinc chloride

μg – Microgram

μl – Microliter

μM – Micromolar

IPPi/IDI – Isopentenyl pyrophosphate/diphosphate isomerase