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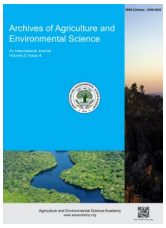

ORIGINAL RESEARCH ARTICLE

# Phytocomposition and pharmacological importance of *Paris polyphylla* (Smith.) and needs of its conservation in Arunachal Pradesh, India

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**ABSTRACT**

*Paris polyphylla* Smith. is a well-known herbal medicine. In Arunachal Pradesh, *P. polyphylla* has drawn much attention among villagers, print media and the wild life government officials. With the advantage of suitable climate, soil, geographical and weather conditions, this healing herb grows luxuriantly in Arunachal Pradesh but the excessive extraction of this species for illegal trading has resulted into the alarming loss of natural populations. The present study was carried out to study the distribution, population status and chemical compositions of *P. polyphylla* in Arunachal Pradesh. To answers the objectives of the studies; Interview, Personal observation, field visit and GCMS were used in the study methods. The results of present study reflect unscientific collection, illegal trading, drastic loss of natural population in Arunachal Pradesh; the ethanolic extract gave forty five phytocompounds with numbers of health wellness compounds. Antidepressant, anti uric acid forming compound, anti-cancer, antihypertensive, compounds useful in Parkinson's disease care and immune system improvement are the major phytocompounds present in *P. polyphylla* stem. Linolein, 2- mono was found to occupy highest area percentage in TIC peak report with 20.21% while Spirost-5-EN-3-OL, (3.beta. 25R) occupy second highest with 15.31 percent area, respectively. The present study shows need of immediate conservational measures, awareness among the villagers, further phytochemical studies and initiation of propagation to increase the population.



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## INTRODUCTION

The herbs have always been considered as an important source of medicaments, either in the form of traditional preparations or formulations or as pure active principles (Timothy, 1996). In more recent past, the use of plants as medicines has involved the isolation of active compounds, beginning with the isolation of morphine from the opium in the early 19$^{th}$ century (Mukheerje, 2001). The traditional knowledge has been the main clue to lead the search of bioactive compound for phytochemists; 80% of globally used drugs are obtained from ethno medicinal plants origin (Fabricant and Farnsworth, 2001). Drug analysis from medicinal plants led to the isolation of important drugs like cocaine, codeine, digitoxin, and quinine (Farnsworth *et al*., 1985). According to World Health Organization (WHO), approximately 80% of world's population in developing countries depends on traditional medicines for primary healthcare (WHO, 2016).

With above backdrops, *Paris polyphylla* Smith. is an important herbal medicine was studied in the context of Arunachal Pradesh. Mamang Dai, a Sahitya Academy Awarded rightly synonym Arunachal Pradesh as a hidden land (Dai, 2002), A land with full of natural resources but unfamiliar and unknown to the other part of the habitants of Indian mainland. Arunachal Pradesh, the "Paradise of the Botanists in India", is a mountainous state, the state is internationally bounded the China in North, the Bhutan in West and the Myanmar in East (Figure 1) and lies in Myers biodiversity hotspot region (Myers, 1988;

Myers *et al*., 2000). More than five hundred medicinal herbs are identified from this Eastern Himalayan state and equal numbers are yet to be identified (Hegre, 2003). This state is a natural habitat of one of the most useful and costly herb called *P. polyphylla* Smith. The rhizome of this herb is used in number of health problems like inti-inflamatory, cancer and bleeding in other parts of world (IUCN, 2004; Lee *et al*., 2005; Sun *et al*., 2007; Man *et al*., 2017; Songsong *et al*., 2017), but very scanty data on the uses of this herb in health wellbeing among tribal people of Arunachal Pradesh is available while illegal collection and selling has reach alarming rate, the concern officials have tried their part by seizing collections, legal ban and arresting numbers of sellers despite these restrictions, still illegal selling of this herb in Arunachal Pradesh is in practice (Dai, 2002; Hegre, 2003). The Arunachal Times- an esteemed local daily stated that the unscientific extraction of *P. Polyphylla* is taking place in broad daylight. Local people do not exactly know the use of this useful rhizome but some tribes use the shoot as vegetables. In Arunachal Pradesh, this useful herb is found in all 19 Districts, locally it is known as Jungali katchu (Dai, 2002; Hegre, 2003).

With above backdrops, the present study was carried out to access distribution, availability, collection, trading and related activities of *P. polyphylla* in Arunachal Pradesh. To understand the extent of distribution, extraction and selling, field visit, interview and personal experience was used in the study. Further, the sellers as well as the buyers does not disclose the uses of this costly modified stem which is an unanswered secret; for which, to establish phytoconstituents of this plant GC-MS technique has been choose to study the phytocompounds as GCMS is highly effective and versatile analytical techniques with numerous scientific applications to understand phytocomposition of medicinal plant. It is a very useful for quality control, analytical research, impurity profiling and maintenance for human welfare and development (Chauhan *et al*., 2014), GC-MS enhanced molecular ion, improved confidence for the identification of the sample, with significant increase in the range of thermally labile and low volatility samples amenable for analysis, much faster analysis, improving sensitivity particularly for the compounds that are difficult to analyze and the many other features and options that provide compelling reasons to use the GC-MS in broad range of areas (ISO, 2002; ISO, 2005; Uniyal *et al*., 2016). The materials like foods and beverages contained a number of aromatic compounds and remain found in their natural state and formed whereas processed. GC-MS is completely used for the analysis of different chemical groups such as esters, fatty acids, alcohols, aldehydes, terpenes etc. (Doughari, 2012). It is used for the analysis of different kinds of substances like piperine, spearmint oils, lavender oils, essential oils, fragrance reference standards, perfumes, chiral compounds in essential oils, fragrances, menthol, allergens, olive oil, lemon oil, peppermint oil, yiang oil, straw berry syrup, butter triglycerides, residual pesticides in food and wine etc. (Alon and Amirav, 2006; Robert and Adams, 2007; Paul *et al*., 2015). Therefore, keeping above in view, the present investigation was carried out to study the phytocomposition and pharmacological importance of *Paris polyphylla* (Smith.) and their conservation in Arunachal Pradesh, India.

## MATERIALS AND METHODS

### Filed visit and interviews

The filed visit and interviews were carried out by covering the entire state by the B.Sc. VI$^{th}$ Semester Botany major student 2016-17 session of Jawaharlal Nehru College, Pasighat. Teenager, adult and aged group were taken as respondents. Rhizome used in GC-MS study was collected by Miss Dumpi Mega from Anini forest of Dibang Valley District of Arunachal Pradesh (Figure 1).

**Figure 2:** *Morphological features of P. polyphylla.*

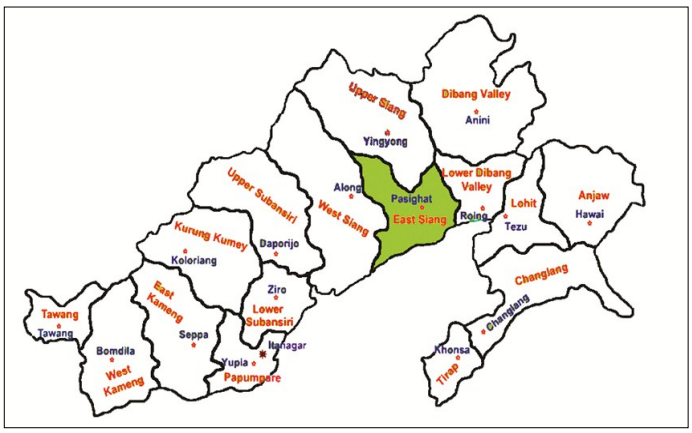


**Figure 1.** *Map of Arunachal Pradesh showing study area.*

**Figure 3.** *Modified stem of P. polyphylla.*

### Plant material and preparation of extract

*Paris polyphylla* Smith. is a herb with rhizome, This herb belongs to Melanthiaceae family, The plant is an annual herb, about 60 cm in height, rhizome with leaf scar is the main part used in herbal medicine (Figures 2, 3). It grows well at an altitudinal range of 9000-3000 m above sea level in humus soil under undisturbed forest. The plant material was collected from Anini of Arunachal Pradesh, The sample was shade dried and pulverized to powder using a mechanical grinder. 500g of plant powder was soaked in ethanol for 72 hours with intermittent shaking then filtered through Whatmann No. 41 filter paper and concentrated by using water bath.

### GC-MS analysis

Gas-Chromatography Mass Spectrometry (GC-MS) analysis of the ethanol extracts of *Croton tiglium* carried out in Shimadzu GCMS-QP-2010 plus system. RTx-5 Sil MS column (30 m X 0.25 mm id X 0.25 film thickness) was used for the analysis. The operating conditions of the column were as follows: Oven temperature program from 80°C to 210°C at 4°C/min withhold time of 2 min and from 210°C to 300°C at 15°C/min withhold time of 5 min, and the final temperature was kept for 20 min. The injector temperature was maintained at 270°C, the volume of injected sample was 0.3µl; pressure 85.4kPa, total flow 76.8mL/min, column flow 1.21 mL/min, linear velocity 40.5 cm/sec, purge flow 3.0 mL/min, split ratio: 60.0; ion source temperature 230° C; scan mass range of m/z 40-600 and interface line temperature 280°C. The identification of compounds was performed by comparing their mass spectra with data from NIST 11 (National Institute of Standards and Technology, US) and WILEY 8.

### Identification of phytocompounds

The identification of compounds was performed by comparing their mass spectra with data from NIST 11 (National Institute of Standards and Technology, US) and WILEY 8.

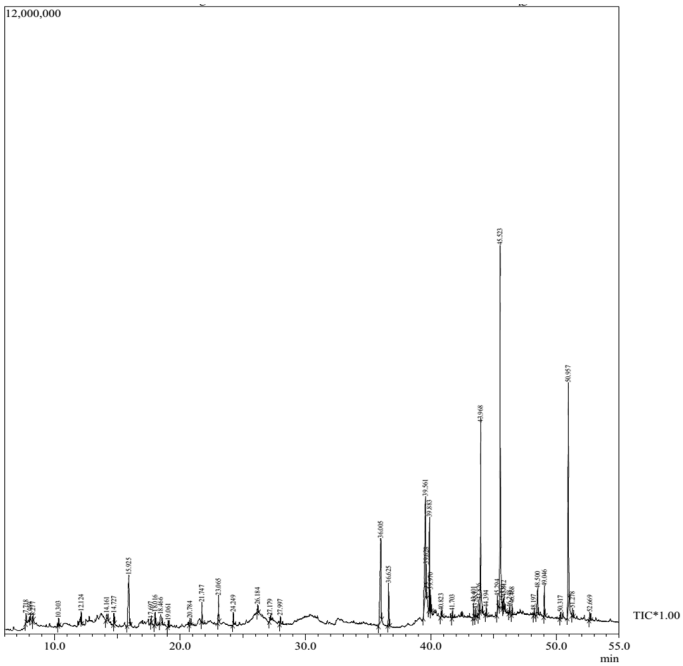


**Figure 4.** *Chromatogram of ethanolic extract of P. polyphylla.*

## RESULTS AND DISCUSSION

The interviews, personnel experience and field visit in the present study revealed that in Arunachal Pradesh, *P. polyphylla* was simply a common herb before twenty years back but due to its high price, demand and trading all the respondents irrespective of age and gender, this herb is a well-known (100%) highly price natural resource. The actual medicinal use was not disclosed or unknown to none of the respondents while knowledge on the legal ban of the selling was very high (95%) to the respondents, which seems to be the impact of legal ban on the collection of *P. polyphylla*. The study also revealed that *P. polyphylla* was one of the most easily accessible herbs before illegal trading but at present this herb is the rarest plant in the state due to over collection. To a renowned herbalist, namely Kirdo Lollen of Tadin Village, Arunachal Pradesh, *P. polyphylla* was simply a wild plant before twenty years ago, but due to its demand, illegal trading and high price value of the rhizome, villagers have started to attract towards the collection of *P. polyphylla*. Presently, illegally and secretly, the dried rhizome is sold at INR 8000/kg in Arunachal Pradesh. This healing herb has enormous prospects in Arunachal Pradesh because natural populations have been recorded in Aka hills, Daphla hills, Abor hills as well as from Mishmi hills, these hills covers almost entire state, the soil is basically acidity in nature due to heavy rainfall and are rich in humus with high percentage of nitrogen, the soil has rich layer of organic matter as a result of decaying plant stem and leaves. The state also receives high rainfall almost throughout the year and practically without any dry months (Hajra *et al*., 1996).There is enormous scope of in-situ and ex-situ propagation of *P. polyphylla* in Arunachal Pradesh.

The ethanolic extract GC-MS chromatogram of *P. polyphylla* shows 45 peaks indicating the presence of at least forty five phytochemical constituents (Figure 4). On comparison of the mass spectra of the constituents with the NIST 11 library and Willey 8 library, the forty five phytocompounds were characterized and identified as given in Table 1. Few compounds that could be beneficial to health and corresponding reported biological activities are given in Figures 5-7. Selected thirty two compounds that have reported to be biologically active are given in Table 2.

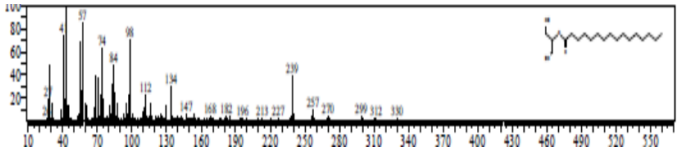

**Figure 5.** *Fragmentation pattern of Palmitin, 2-mono.*

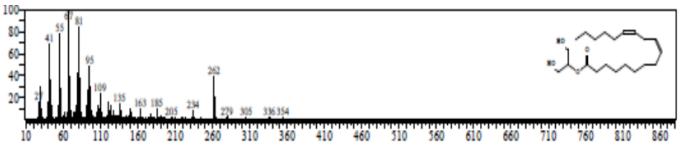

**Figure 6.** *Fragmentation pattern of Linolein, 2- mono.*

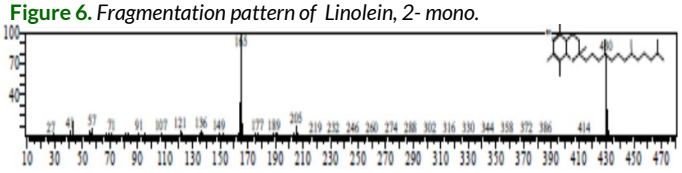

**Figure 7.** *Fragmentation pattern of Vitamin E.*

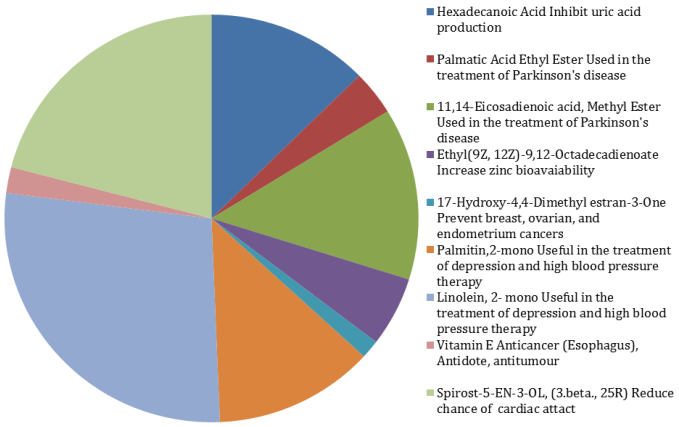


**Figure 8.** *Some major compounds present in P. polyphylla and their related health wellness function.*

The phytocompositions of the ethanol extract of *P. polyphylla* stem shows that this herb contain numbers of useful compounds which could be used in the treatment of numbers of health problems like hypertension, parkinson's disease, tumour formation, as an antidote, coronary protection, fertility problems, availability of zinc, increase immune system etc. Among the 45 five total compounds, Linolein, 2- mono was found to cover highest area percentage in TIC peak report with 20.21%, Palmitin, 2-mono was found to occupy 9.15 percent in area % of TIC peak table, these compound has been reported to be useful in the treatment of depression (Bernard and Caroll, 1971), cholesterol control* and anti-hypertensive (Belter *et al.*, 2011). Some of the major compounds present in *P. polyphylla* and their

**Table 1.** Compounds isolated from ethanolic extract of *P. polyphylla* rhizome.

| Peak | R. time | Area | Area% | Compound name |
|---|---|---|---|---|
| 1 | 7.718 | 439077 | 0.46 | 2(3H)-Furanone, Dihydro |
| 2 | 8.059 | 140627 | 0.15 | 2H-Pyran-2-One, Tetrahydro-6-Methyl |
| 3 | 8.277 | 259273 | 0.27 | 6-Oxa-bicyclo[3.1.0]Hexan-3-one |
| 4 | 10.303 | 327296 | 0.34 | 2,4-Dhydroxy-2, 5-Dimetyl-3(2H)-furan-3-one |
| 5 | 12.124 | 412684 | 0.43 | 2-Oxabicyclo[2.2.2] Octane, 1,3,3-Trimethyl |
| 6 | 14.161 | 741305 | 0.78 | Pentanal |
| 7 | 14.727 | 596624 | 0.63 | 4H-Pyran-4-One, 3-Hydroxy-2-Methyl |
| 8 | 15.925 | 5956919 | 6.26 | 1,5-Anhydro-6-Deoxyhexo-2,3-Diulose |
| 9 | 17.697 | 197172 | 0.21 | Guanosine |
| 10 | 18.016 | 867813 | 0.91 | 1,4: 3,6- Dianhydro-.alpha.-d-glucopyranose |
| 11 | 18.466 | 1218265 | 1.28 | 5-Hydroxymethylfurfural |
| 12 | 19.061 | 299801 | 0.32 | 1,6- Octadien-3-ol, 3,7-Dimethyl-,2-Aminobenzoate |
| 13 | 20.784 | 570166 | 0.60 | 2-Methoxy-4-Vinylphenol |
| 14 | 21.747 | 1007186 | 1.06 | Phenol,2,6-Dimethoxy |
| 15 | 23.065 | 1266505 | 1.33 | Decanoic Acid Ethyl Ester |
| 16 | 24.249 | 584675 | 0.61 | 1,2,3-Trimethoxybenzene |
| 17 | 26.184 | 423779 | 0.45 | Benzene, 1,2,3-Trimethoxy-5-Methyl |
| 18 | 27.179 | 269723 | 0.28 | Butyl hydroxyl anisole |
| 19 | 27.997 | 429714 | 0.45 | Hexadecanoic acid Ethyl Ester |
| 20 | 36.005 | 8799075 | 9.25 | Hexadecanoic Acid |
| 21 | 36.625 | 2468389 | 2.59 | Palmatic Acid Ethyl Ester |
| 22 | 39.561 | 9482110 | 9.97 | 11,14-Eicosadienoic acid, Methyl Ester |
| 23 | 39.268 | 999623 | 1.05 | 9.12- Octadecanoic Acid(Z,Z) |
| 24 | 39.883 | 3846682 | 4.04 | Ethyl(9Z, 12Z)-9,12-Octadecadienoate |
| 25 | 39.970 | 977892 | 1.03 | Linolenin, 1- mono |
| 26 | 40.823 | 411491 | 0.43 | Linoleic |
| 27 | 41.703 | 242369 | 0.25 | 15-Hydroxypentadecanoic acid |
| 28 | 43.401 | 479654 | 0.50 | 3-cyclopentylpropionic acid, 2-dimethylaminoethyl ester |
| 29 | 43.553 | 270565 | 0.28 | 1,E-6, Z-11-Hexadecatriene |
| 30 | 43.826 | 1021830 | 1.07 | 17-Hydroxy-4,4-Dimethyl estran-3-One |
| 31 | 43.968 | 8699797 | 9.15 | Palmitin,2-mono |
| 32 | 44.394 | 371660 | 0.39 | 1-palmitoyl-1,3-propanediol, trimethylsilyl |
| 33 | 45.294 | 882338 | 0.93 | Ethyl (9Z, 12Z)-9,12-Octadecadienoate |
| 34 | 45.523 | 19221957 | 20.21 | Linolein, 2- mono |
| 35 | 45.739 | 254773 | 0.27 | Octadecanoic , 2,3-dihydroxypropyl ester |
| 36 | 45.812 | 581992 | 0.61 | Monolinoleoyl glycerol tromethyl silyl ether |
| 37 | 46.248 | 221634 | 0.23 | E-11(12 Cyclopropyl) dodecen-1-ol acetate |
| 38 | 46.468 | 355195 | 0.37 | Squalene |
| 39 | 48.197 | 162417 | 0.17 | Spirost-5-EN-3-OL |
| 40 | 48.500 | 1969139 | 2.07 | Diosgenin Acetate |
| 41 | 49.046 | 1430348 | 1.50 | Vitamin E |
| 42 | 50.319 | 336179 | 0.35 | Methyl squalene |
| 43 | 50.957 | 14566534 | 15.31 | Spirost-5-EN-3-OL, (3.beta., 25R) |
| 44 | 51.278 | 472790 | 0.50 | .gamma,-Sitosterol |
| 45 | 52.669 | 593992 | 0.62 | 7.beta.-hydroxydiosgenin |
| | | 95129029 | 100.00 | |

**Table 2.** Selected biologically active compounds present in *P. polyphylla*.

| Peak | Area% | Compound name | Activity |
|---|---|---|---|
| 1 | 0.46 | 2(3H)-Furanone, Dihydro | Anti- HIV integrase, Antidote, Hemagglutin, Hematonic, Hemoglobin inducer, Hepatoprotective , Hepatonic, HIV-RT inhibitor, Hormone balancing, increase T-helper* |
| 2 | 0.15 | 2H-Pyran-2-One, Tetrahydro-6 -Methyl | Anti- HIV integrase, Antidote, HepatonicHormone balancing, increase T-helper* |
| 4 | 0.34 | 2,4-Dhydroxy-2, 5-Dimetyl-3 (2H)-furan-3-one | Anti- HIV integrase, Antidote, HepatonicHormone balancing, increase T-helper* |
| 7 | 0.63 | 4H-Pyran-4-One, 3-Hydroxy-2-Methyl | Anti- HIV integrase, Antidote, HepatonicHormone balancing, increase T-helper* |
| 8 | 6.26 | 1,5-Anhydro-6-Deoxyhexo-2,3-Diulose | Anhydrotic* |
| 10 | 0.91 | 1,4: 3,6- Dianhydro-.alpha.-d-glucopyranose | *5-Alpha-Reductase-Inhibitor*, *HIF-1alpha-Inhibitor*, *Increase Alpha-Mannosidase Activity*, *Ikappa B-alpha-Phosphorylation-Inhibitor** |
| 12 | 0.32 | 1,6- Octadien-3-ol, 3,7-Dimethyl-,2-Aminobenzoate | *Oligosaccharide Provider** |
| 15 | 1.33 | Decanoic Acid Ethyl Ester | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), inhibit uric acid production, Arachidonic acid-inhibitor to stop tumour cell* |
| 17 | 0.45 | Benzene, 1,2,3-Trimethoxy-5-Methyl | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease )* |
| 18 | 0.28 | Butyl hydroxyl anisole | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), Methyl-Guanidine-Inhibitor (avoid renal failure)* |
| 19 | 0.45 | Hexadecanoic acid Ethyl Ester | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), Methyl-Guanidine-Inhibitor (avoid renal failure), inhibit uric acid production.* |
| 20 | 9.25 | Hexadecanoic Acid | Inhibit uric acid production, , Arachidonic acid-inhibitor to stop tumour cell* |
| 21 | 2.59 | Palmatic Acid Ethyl Ester | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), Methyl-Guanidine-Inhibitor (avoid renal failure), inhibit uric acid production.* |
| 22 | 9.97 | 11,14-Eicosadienoic acid, Methyl Ester | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), Methyl-Guanidine-Inhibitor (avoid renal failure), inhibit uric acid production.* |
| 23 | 1.05 | 9.12- Octadecanoic Acid (Z,Z) | Catechol-O-Methyl transferase inhibitor (used in the treatment of Parkinson's disease ), Methyl-Guanidine-Inhibitor (avoid renal failure), inhibit uric acid production, increase zinc bioavaiability* |
| 24 | 4.04 | Ethyl(9Z, 12Z) -9,12-Octadecadienoate | increase zinc bioavaiability* |
| 25 | 1.03 | Linolenin, 1- mono | Monoamine precursor, squalene monooxygenase–Inhibitor* also find application in treatment of hypercholesterolemia . |
| 27 | 0.25 | 15-Hydroxypentadecanoic acid | Inhibit uric acid production, increase aromatic amino acid decaroxylase activity* also helpful in Parkinson's disease treatment |
| 28 | 0.50 | 3-cyclopentylpropionic acid, 2-dimethylaminoethyl ester | inhibit uric acid production, increase aromatic amino acid decaroxylase activity* |
| 29 | 0.28 | 1,E-6, Z-11-Hexadecatriene | Anti-cancer (Esophagus), Increase zinc bioavaiabiity, Antidote (Emetine), Decrease C-teleopeptide excretion (to reduce risk of Peget bone disease), fertility enhancing, endocrine protective, Endothelium derived relaxing factor promoter( in parasympathetic coronary vasodilation)* |
| 30 | 1.07 | 17-Hydroxy-4,4-Dimethyl estran-3-One | 17-beta-hydroxysteroid dehydrogenase-inhibitor (prevent breast, ovarian, and endometrium cancers) and androgeno-sensitive pathologies (prostate cancer, benign prostatic hyperplasia, acne, hirsutism, etc (Poirier, 2003; (Aryl- hydrocarbon dehydrogenase-inhibitor (to stop carcinogen (Kinoshita and Gelboin, 1972). |
| 31 | 9.15 | Palmitin, 2-mono | Monoamine precursor (monoamine precursor is useful in the treatment of depression) (Bernard and Caroll, 1971), squalene monooxygenase – Inhibitor* (squalene epoxidase is on the biosynthetic pathway leading to cholesterol, inhibitors of this enzyme may also find application in treatment of hypercholesterolemia (Belter *et al*., 2011). |

**Table 2.** *Contd.*

| | | | |
|---|---|---|---|
| 33 | 0.93 | Ethyl (9Z, 12Z)-9,12-Octadecadienoate | *Increase zinc bioavailibility** |
| 34 | 20.21 | Linolein, 2- mono | Monoamine precursor (monoamine precursor is useful in the treatment of depression) (Bernard and Caroll, 1971), Squalene monooxygenase –Inhibitor* (squalene epoxidase is on the biosynthetic pathway leading to cholesterol, inhibitors of this enzyme may also find application in treatment of hypertension, (Belter *et al.*, 2011). |
| 37 | 0.23 | E-11(12 Cyclopropyl) dodecen-1-ol acetate | Anti-cancer (Esophagus), Increase zinc bioavaiabiity* (It is needed for the body's defensive (immune) system to properly work, Antidote (Emetine), Decrease C-teleopeptide excretion (to reduce risk of Peget bone disease), fertility enhancing, endocrine protective, Endothelium derived relaxing factor promoter (in parasympathetic coronary vasodilation), Expectorant, Endocrine tonic, Endocrine protective* |
| 38 | 0.37 | Squalene | Squalene monooxygenase –Inhibitor* (squalene epoxidase is on the biosynthetic pathway leading to cholesterol, inhibitors of this enzyme may also find application in treatment of hypercholesterolemia (Belter *et al.*, 2011). |
| 39 | 0.17 | Spirost-5-EN-3-OL | Endocrine protective, Endothelium –derived relaxing factor promoter, endocrine tonic, energizer* |
| 41 | 1.50 | Vitamin E | anticancer (Esophagus), Antidote, antitumour, Decrease C-teleopeptide excretion (to reduce risk of Peget bone disease), ecbolic* |
| 42 | 0.35 | Methyl squalene | Squalene monooxygenase –Inhibitor* |
| 43 | 15.31 | Spirost-5-EN-3-OL, (3.beta., 25R) | Beta adrenergic receptor blocker* (Reduce chance of cardiac attack), endothelium derived relaxing factor promoter*, Eendoanesthetic, endocrinoprotective, energizer, fertility enhancer, memory enhancer, trypsin enhancer, HIV-RT -inhibitor*, Quninine-reductase- inducer (Muriel *et al.*, 2006), radioprotective, Regulate calcium metabolism, ruminatonic, Suppress HMG-CoA reductase activity (used to lower serum cholesterol as a means of reducing the risk for cardiovascular disease)*. |
| 44 | 0.50 | .gamma,-Sitosterol | PPAR gamma agonist* reduce obesity and type-II diabetes* |
| 45 | 0.62 | 7.beta.-hydroxydiosgenin | 17-beta-hydroxysteroid dehydrogenase-inhibitor (inhibitors of 17beta-HSDs are useful tools to elucidate the role of these enzymes in particular biological systems or for a therapeutic purpose, especially to block the formation of active hydroxysteroids that stimulate estrogeno-sensitive pathologies (breast, ovarian, and endometrium cancers) and androgeno-sensitive pathologies (prostate cancer, benign prostatic hyperplasia, acne, hirsutism, etc.; (Poirier, 2003), Anti-amyloid-beta (immunotherapy in Alzheimer's disease, Wilcock and Colton, 2008), anti TGF beta (for cancer therapy by targeting TGF beta, Saunier and Akhust, 2006), Beta adrenergic receptor blocker*(Reduce cardiac attack). |

related health wellness function are given in figure number 8. Uniyal *et al.* (2016) also identified the phytoconstuents of some herbal plants like amyris (*Amyris balsamifera*), juniper (*Juniperus communis*), black pepper (*Piper nigrum*), lavender (*Lavendula angustifolia*), catnip (*Nepeta cataria*), chamomile (*Anthemis nobilis*), cinnamon (*Cinnamamomus zeylanicum*), dill (*Anethum graveolens*), citronella (*Cymbopogon winterianus*), galbanum (*Ferula galbaniflua*), camphor (*Cinnamomum camphora*), basil (*Ocimum basilicum*), jasmine (*Jasminum grandiflorum*), peppermint (*Mentha piperita*), rosemary (*Rosmarinus officinalis*), tagetes (*Tagetes minuta*), thyme (*Thymus serpyllum*) and frankincense (*Boswellia carteri*) by using GC-MS and reported their medicinal importance against different diseases.

## Conclusion

Arunachal Pradesh is a natural habitat of *P. polyphylla* but natural population of this useful herb is under high threat hence conservation and restriction on extraction of natural population is highly needed. This herb contains many healths wellbeing phytocompounds. Anti- HIV integrase, Antidote, Hemagglutin, Hematonic, Hemoglobin inducer, Hepatoprotective, Hepatonic, HIV-RT inhibitor, Hormone balancing, increase T-helper, Anhydrotic, HIF-1alpha-Inhibitor, Catechol-O-Methyl transferase inhibitor, uric acid production inhibitor, anti tumour, antihypertensive, compounds useful in the treatment of Parkinson's disease , Anti-cancer, fertility enhancing, endocrine protective, Endothelium derived relaxing factor promoter and compounds useful in treatment of depression problem are some of the major useful compounds in this useful modified stem. The state has problems of unscientific extraction but still has prospects of cultivation and propagation. Scientific intervention on propagation and exploitation for wellbeing of nature and mankind is the need of the hour.

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