Supplementary Table S1: High antiparasitic activities of pentacyclic triterpenes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | Compound | Plant | Activity (IC50 µg/ml) against | Reference |
| *Plasmodium*  | *Leishmania*  | *Trypanosoma* | *Other parasites* |
| Oleanane; Friedelane;Quinone methide | Pristimerin (***1***) | *Salacia* *leptoclada* Tul. (Celastraceae) | *P. falciparum* FC29: 0.052 | *-* | - | - | Ruphin *et al.* 2013 |
| *Salacia kraussii* (Harv.) Harv. (Celastraceae) | *P. falciparum* K1/NF4: 0.19/0.27 | *-* | - | - | Figueiredo *et al.* 1998 |
| *Maytenus senegalensis* (Lam.) Exell. (Celastraceae) | *P. falciparum* Dd2: 0.5 | *L. major:* promastigotes: 6.8 | - | - | Khalid *et al.* 2007 |
| *Maytenus ilicifolia* Mart. Ex Reissek(Celastraceae) | *-* | *L. amazonensis* promastigotes/amastigotes: 0.005‡/0.88‡*L. chagasi* promastigotes/amastigotes: 0.41‡/0.43‡ | *T. cruzi* epimastigotes: 0.30‡ | - | Dos Santos *et al.* 2013 |
| Isoiguesterol (***2***) | *Salacia kraussii* (Harv.) Harv. (Celastraceae) | *P. falciparum* K1/NF4: 0.022/0.054 | *-* | - | - | Figueiredo *et al.* 1998 |
| Celastrol (***3***) | *P. falciparum* K1/NF4: 0.18/0.25 | *-* | - | - | Figueiredo *et al.* 1998 |
| 28-Hydroxyisoiguesterin (***4***) | *P. falciparum* K1/NF4: 0.11/0.14 | *-* | - | - | Figueiredo *et al.* 1998 |
| 17-(Methoxycarbonyl)-28-*nor*-isoiguesterin (***5***) | *P. falciparum* K1/NF4: 0.027/0.037 | *-* | - | - | Figueiredo *et al.* 1998 |
| 28-*nor*-Isoiguesterin-17-carbaldehyde (***6***) | *P. falciparum* K1/NF4: 0.094/0.08 | *-* | - | - | Figueiredo *et al.* 1998 |
| Tingenin B (***7***) | *Elaeodendron schlechteranum* (Loes.) Loes. (Celastraceae) | *P. falciparum* chloroquine sensitive Ghana strain*:* 0.36 | *L. infantum:* 0.51 | *T. brucei brucei, T. cruzi:* <0.25 | - | Maregesi *et al.* 2010 |
| Maytenin (***8***) | *Maytenus ilicifolia* Mart. Ex Reissek(Celastraceae) | *-* | *L. amazonensis* promastigotes/amastigotes: 0.09 ‡/0.47‡*L. chagasi* promastigotes/amastigotes: 0.46‡/0.25‡ | *T. cruzi* epimastigotes: 0.25‡ | - | Dos Santos *et al.* 2013 |
| Tingenone (***9***) | *-* | *-* | *-* | *T. cruzi:* 100 % growth inhibition at 20\* | - | Goijman *et al.* 1985 |
| *Epi-*oleanolic acid (***11***) | *Viola verecunda* A. Gray (Violaceae) | *P. falciparum* D10: 0.018 | - | - | - | Moon *et al.* 2007 |
| *Celaenodendron mexicanum* (Euphorbiaceae) | *-* | *L. donovani* (Promastigotes): 8.59 | *-* | - | Camacho *et al.* 2000 |
| 1-O-[α-L-(Rhamnopyranosyl)]-23-acetoxyimberbic acid 29-methyl ester (***12***) | *Pittosporum mannii* Hook.f (Pittosporaceae) | *P. falciparum* K1: 1.02 | *L. donovani:* 1.8 | *-* | *-* | Nyongbela *et al.* 2013 |
| Oleanolic acid (***13***) | *Nauclea orientalis* (L.) L (Rubiaceae) | *P. falciparum*: D6/ W2: 2.1 /2.33 | - | - | - | He *et al.* 2005 |
| *Salvia hydrangea* DC. ex Bentham (Lamiaceae) | *P. falciparum* 3D7: 8.8±0.4 | - | - | - | Sairafianpour *et al.* 2003 |
| *Satureja parfolia* (Phil.) Epling (Lamiaceae) | *P. falciparum* K1 9.3 | *-* | *T. brucei brucei:* 5.1 | - | van Baren *et al.* 2006 |
| *Salvia cilicica* Boiss (Lamiaceae) | - | *L.* *donovani*: promastigotes/ amastigotes (0.04/0.029)/ *L.* *major*: promastigotes/ amastigotes (0.063/0.055) | - | - | Tan *et al.* 2002 |
| *Pelliciera rhizophorae*Planch. & Triana (Tetrameristaceae) | - | *L.* *donovani* amastigotes: 5.3\* | - | - | López *et al.* 2015 |
| *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: promastigotes 10\*  | - | - | Torres-Santos *et al.* 2004 |
| *Nauclea orientalis* (L.) L (Rubiaceae) | - | - | *T. brucei brucei*: 2.9±0.4 | - | Hoet *et al.* 2007 |
| *Miconia sellowiana* Naud*.*(Melastomataceae) | - | - | *T. cruzi*: 12.8\* (5.85) | - | Cunha *et al.* 2006 |
| *Keetia leucantha* (K. Krause) Bridson (Rubiaceae) | *-* | *-* | *T. brucei brucei* blood stream form*:* 7.3 | - | Bero *et al.* 2013 |
| *Miconia fallax* DC (Melastomataceae)  | - | - | *T. cruzi*: 9.91 | - | Cunha *et al.* 2003 |
| Oleanolic acid acetate (***14***) | *Prismatomeris fragrans*  E.T. Geddes (Rubiaceae) | *P. falciparum* K1: 5.9 | *-* | *-* | - | Kanokmedhakul *et al.* 2005 |
| *-* | *-* | *L. amazonensis:* promastigotes: 2.49 | *-* | - | Gnoatto *et al.* 2008 |
| α-Hederin (***15***) | *Hedera Helix* L. (Araliaceae) | *-* | *L. Mexicanan* promastigotes and amastigotes: 7.65, 0.3  | *-* | *-* | Ridoux *et al.* 2001 |
| β-Hederin (***16***) | *-* | *L. Mexicanan* amastigotes: 0.26  | *-* | *-* | Ridoux *et al.* 2001 |
| Dendropanoxide (***20***) | *Dendropanax morbiferus* H.Lév. (Araliaceae) | *P. falciparum* D10 strain: 5.3\* | - | - | *-* | Chung *et al.* 2009 |
| Friedelin (***21***) | *Harungana madagascariensis* Lam. ex Poir. (Hypericaceae) | *P. falciparum*: W2 7.7\* | - | - | *-* | Lenta *et al.* 2007 |
| Maesabalide I (***23***) | *Maesa balansae* Mez (Myrsinaceae) | *-* | *L. infantum:* amastigotes: 0.018 | *-* | *-* | Germonprez *et al.* 2005 |
| Maesabalide II (***24***) | *-* | *L. infantum:* amastigotes: 0.023 | *-* | *-* | Germonprez *et al.* 2005 |
| Maesabalide III (***25***) | *-* | *L. infantum:* amastigotes: 0.007 | *-* | *-* | Germonprez *et al.* 2005 |
| Maesabalide IV (***26***) | *-* | *L. infantum*: amastigotes: 0.014 | *-* | *-* | Germonprez *et al.* 2005 |
| Maesabalide V (***27***) | *-* | *L. infantum*: amastigotes: 0.046 | *-* | *-* | Germonprez *et al.* 2005 |
| Maesabalide VI (***28***) | *-* | *L. infantum*: amastigotes: 0.041 | *-* | *-* | Germonprez *et al.* 2005 |
| Dihydrocinnamoyl derivative of Maesabalide III (***29***) | *-* | *L. infantum*: amastigotes: 0.009 | *-* | *-* | Germonprez *et al.* 2005 |
| Dihydrocinnamoyl derivative of Maesabalide IV (***30***) | *-* | *L. infantum*: amastigotes: 0.018 | *-* | *-* | Germonprez *et al.* 2005 |
| Hederacolchiside A1 (***32***) | *Hedera colchica* (K.Koch) K.Koch (Araliaceae) | *-* | *L. Mexicanan* promastigotes and amastigotes: 1.34, 0.061 | *-* | *-* | Ridoux *et al.* 2001 |
| Glycyrrhetinic acid (***33***) | *-* | - | *L.* *donovani*: promastigotes: 4.6 | - | - | Ukil *et al.* 2005 |
| *-* | - | *L.* *donovani*: promastigotes: 10 | - | - | Ukil *et al.* 2011 |
| *Glycyrrhiza glabra* L. (Leguminosae) | - | - | - | *Brugia malayi* microfilirae*:* 0.56 | Kalani *et al.* 2013 |
| Erythrodiol (***40***) | *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei*: 5.3±0.3 | - | Hoet *et al.* 2007 |
| 3-*O*-[*β*-D-glucopyranosyl-(1-2)-*β*-D-galactopyranosyl]oleanolic acid (***18***) | *Ilex affinis* Gardner (Aquifoliaceae)  | - | - | *T. brucei brucei:* 3.05; *T. cruzi:* 7.63 | - | Taketa *et al.* 2004 |
| Ester derivatives of Glycyrrhetinic acid (***36***; ***37***)  | *-* | - | - | - | *B. malayi* microfilirae*:* 2.21\*; 8.84\* | Kalani *et al.* 2013 |
| Amide derivative of Glycyrrhetinic acid (***34***; ***3****5*) | *-* | - | - | - | *B. malayi* microfilirae/female adult*:* 2.21\*/ 5.95 | Kalani *et al.* 2013 |
|  |  |  |  |  |  |  |
| Hederagenin (***47***) | *Cussonia holstii* Engl. (Araliaceae) | *-* | *-* | *-* | *Trichomonas vaginalis:* 2.8\* | He *et al.* 2003 |
| Bayogenin (***49***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *Meloydogyne javanica*: 100 ± 00 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| TacacosideC (***54***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - | *M. javanica*: 97.16 ± 14.6 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Durantanin III (***55***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - | *M. javanica*: 73.84 ± 2.93 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Heteropappussaponin 5 (***56***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 90.77 ± 3.70 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| TacacosidoB3 (***57***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 93.02 ± 1.35 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| {3-O-β-D-Glucopyranosyl (1→3)-β-D-glucopyranosyl-2β,3β,16α,23-tetrahydroxyolean-12-en-28-oicacid 28-O-α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1-4)-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside} (***58***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 100 ± 00 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Heteropappussaponin 7 (***59***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 92.77 ± 3.57 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| 3-O-β-D-glucopyranosyl (1→3)-β-D-glucopyranosyl-2β,3β,16α,23-tetrahydroxyolean-12-en-28-oic acid 28-O-α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-[β-D-apiosyl-(1→3)]-α-L-rhamnopyranosyl-(1→2)-a-L-arabinopyranoside (***60***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 79.74 ± 2.78 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Ursane | Ursolic acid (***88***) | *Mimusops caffra* E.Mey. ex A.DC (Sapotaceae) | *P. falciparum*: 6.8 | - | *-* | - | Simelane *et al.* 2013 |
| *Satureja parfolia* (Phil.) Epling (Lamiaceae) | *P. falciparum* 3D7:12.7  | *-* |  | - | van Baren *et al.* 2006 |
| *Baccharis dracunculifolia* DC*.* (Compositae) | *P. falciparum* D6*:*1.0  | *L.* *donovani*: promastigote: 3.7 | - | - | da Silva Filho *et al.* 2009 |
| *Pelliciera rhizophorae*Planch. & Triana (Tetrameristaceae) | - | *L.* *donovani* amastigotes: 2.4\* | - | - | López *et al.* 2015 |
| *-* | - | *L.* *amazonensis*: promastigote: 20\* (9.13) | - | - | Gnoatto *et al.* 2008 |
| *Cornus florida* L (Cornaceae) | - | *L. tarentolae*: promastigotes: 9.9±3.2\* | - | - | Graziose *et al.* 2012 |
| *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: amastigotes 11\* (5.02) | - | - | Torres-Santos *et al.* 2004 |
| *Salvia cilicica* Boiss (Lamiaceae) | - | *L.* *donovani*: promastigotes/ amastigotes (0.042/0.006)/ *L.* *major*: promastigotes/ amastigotes (0.023/0.003) | - | - | Tan *et al.* 2002 |
| *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: promastigotes (5±0\*) | - | - | Torres-Santos *et al.* 2004 |
| *Terminalia Arjuna* (Roxb. ex DC.) Wight & Arn. (Combretaceae) | - | *L.* *donovani*: promastigotes: 3.51 | - | - | Moulisha *et al.* 2010 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 1.0±0.2 | - | Hoet *et al.* 2007 |
| *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. brucei brucei:* 4\*/ *T. cruzi:* 4\* | - | Taketa *et al.* 2004 |
| *Miconia sellowiana* Naud*.* (Melastomataceae) | - | - | *T. cruzi*: 17.1\* (7.81) | - | Cunha *et al.* 2006 |
| *Miconia fallax* DC. (Melastomataceae) | - | - | *T. cruzi*: 21.3\* (9.73) | - | Cunha *et al.* 2003 |
| *Keetia leucantha* (K. Krause) Bridson (Rubiaceae) | *-* | *-* | *T. brucei brucei* Blood stream form/procyclic form*:* 2.5/6.5 | - | Bero *et al.* 2013 |
| *Satureja parfolia* (Phil.) Epling (Lamiaceae) | *Plasmosium falcifarum* K1: 4.9  | *-* | *T. brucei brucei:* 1.5 | - | van Baren *et al.* 2006 |
|  | *Lantana camara* L. (Verbenaceae) | *-* |  | *-* | *M. incognita:* 100% larval mortality at 1 mg/ml; 10% at 2 µg/ml | Begum *et al.* 2008 |
| 3β-O-Acetylursolic acid (***89***) | *-* | *P. falciparum* D10: 1.9 | *-* | - | - | Simelane *et al.* 2013 |
| *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. brucei brucei:* 17\*  | - | Taketa *et al.* 2004 |
| 2α-Hydroxy-ursolic acid (***90***) | *Baccharis dracunculifolia* DC. (Compositae) | *P. falciparum*: D6/ W2 (3.2 / 3.0) | - | - | - | da Silva Filho *et al.* 2009 |
| 3α,23-Dihydroxyurs-12-en-28-oic acid (***91***) | *Nauclea orientalis* (L.)L. (Rubiaceae) | *P. falciparum*: D6 (9.7±0.7\*); W2 12.7±0.3\* (6.00) | - | - | - | He *et al.* 2005 |
| Uvaol (***92***) | *Baccharis dracunculifolia* DC. (Compositae) | *P. falciparum* D6/W2*:* 3.3/1.9 | *-* | - | - | da Silva Filho *et al.* 2009 |
| 3-Oxo-ursolic acid (***99***) | *-* | *P. falciparum* D10:7.3 | *-* | - | - | Simelane *et al.* 2013 |
| Pomolic acid (***100***) | *Markhamia tomentosa* (Benth.) K.Schum. ex Engl. (Bignoniaceae) | *P. falciparum* K1/ W2: (3.47/ >5) | *L.* *donovani*: amastigotes: 0.31 | *T. brucei brcei, rhodesiense:* >5 | - | Tantangmo *et al.* 2010 |
| 3-Acetylpomolic acid (***101***) | *Markhamia tomentosa* (Benth.) K.Schum. ex Engl. (Bignoniaceae) | *P. falciparum*: K1/ W2 (2.10/ >5) | *L.* *donovani*: amastigotes: 3.40 | *T. brucei brcei, rhodesiense:* >5 | - | Tantangmo *et al.* 2010 |
| N-{3-[4-(3-Aminopropyl)piperazinyl]propyl}-3-O-acetylursolamide (***105***) | *-* | - | *L.* *infantum*: promastigote: 3.7 | - | - | Gnoatto *et al.* 2008 |
| Ursolic acid potassium salt (***93***) | *Miconia sellowiana* Naud*.*(Melastomataceae) | - | - | *T. cruzi*: 4.26  | - | Cunha *et al.* 2006 |
| Brevicuspisaponin 2 (***103***) | *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. brucei brucei:* 16\* (8.00) | - | Taketa *et al.* 2004 |
|  | Camarinin (***43***) | *Lantana camara* L. (Verbenaceae) | *-* | *-* | *-* | *M. incognita:* 90% larval mortality at 2 µg/ml | Begum *et al.* 2008 |
|  | Lantanolic acid (***44***) | *Lantana camara* L. (Verbenaceae) | *-* |  | *-* | *M. incognita:* 100% larval mortality at 1 mg/ml; 10% at 2µg/ml | Begum *et al.* 2008 |
|  | Camaric acid (***45***) | *Lantana camara* L. (Verbenaceae) | *-* | *-* | - | *M. incognita:* 60% larval mortality at 1.25 mg/ml | Qamar *et al.* 2005 |
|  | Lantalinilic acid (***46***) |  | *-* | *-* | - | *M. incognita:* 75% larval mortality at 1.25 mg/ml | Qamar *et al.* 2005 |
|  | Camarin (***77***) | *Lantana camara* L. (Verbenaceae) | *-* |  | *-* | *M. incognita:* 100% larval mortality at 1 mg/ml | Begum *et al.* 2008 |
|  | (***100***) | *Lantana camara* L. (Verbenaceae) | *-* |  | *-* | *M. incognita:* 100% larval mortality at 1 mg/ml | Begum *et al.* 2008 |
|  | Lantacin (***114***) | *Lantana camara* L. (Verbenaceae) | *-* | *-* | - | *M. incognita:* 100% larval mortality at 1 mg/ml after 48 hr | Begum *et al.* 2008 |
|  | Lantoic acid (***111***) | *Lantana camara* L. (Verbenaceae) | *-* | *-* | - | *M. incognita:* 100% larval mortality at 1 mg/ml after 24 hr | Begum *et al.* 2008 |
|  | Camarinic acid (***110***) | *Lantana camara* L. (Verbenaceae) | *-* | *-* | - | *M. incognita:* 100% larval mortality at 10 µg/ml | Begum *et al.* 2000 |
|  | Cordinoic acid (***112***) | *Cordia latifolia* Roxb. (Boraginaceae)  | *-* | *-* | - | *M. incognita*: 100 % mortality at 5 µg/ml after 24hr | Begum *et al.* 2011 |
| Taraxastane | Taraxasterol acetate (***115***) | *Pluchea lanceolata* DC. (Asteraceae) | *P. falciparum:* 4.7±0.1 | - | - | - | Mohanty *et al.* 2013 |
| Taraxerol (***116***) | *Cupania**cinerea* Poepp. (Sapindaceae) | *P. falciparum* K1: 8.5\* | - | - | - | Gachet *et al.* 2011 |
|  | Taraxerone (***117***) | *Dregea volubilis* (L.f.) Benth. ex. Hook.f. (Apocynaceae) | *-* | *L. donovani promastigotes*: 3.18  | - | - | Moulisha *et al.* 2009 |
| Lupane | Betulinic acid 3-diacetyl caffeate (***121***) | *-* | *P. falciparum* D6/W2: 0.45/ 0.42  | - | - |  | Ma *et al.* 2008 |
| Betulinic acid 3-caffeate (***122***) | *Diospyros quaesita* THW. (Ebanaceae) | *P. falciparum* D6/W2: 0.86/0.61  | - | - | - | Ma *et al.* 2008 |
| Messagenic acid A (***123***) | *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: 1.5 | - | - | - | Suksamrarn *et al.* 2003  |
| Messagenic acid B (***124***) |  | *P. falciparum*: 3.8 | - | - | - | Suksamrarn *et al.* 2003 |
| Methyl betulinate (***125***) | *-* | *P. falciparum:* 3.3±0.9 | - | - | - | Ziegler *et al.* 2004 |
| Betulone (***126***) | *Cupania**cinerea* Poepp. (Sapindaceae) | *P. falciparum*: 1.32  | - | *T. brucei rhodesiens*:18.9\* | - | Gachet *et al.* 2011 |
| Lupenone (***127***) |  | *P. falciparum*: 2 | - | - | - | Gachet *et al.* 2011 |
| Lupeol (***128***) | *Cassia siamea* Lam. (Leguminosae) | *P. falciparum*: 5 | - | - | - | Ajaiyeoba *et al.* 2008 |
| Betulinic acid (***129***) | *Harungana madagascariensis* Lam. ex Poir. (Hypericaceae) | *P. falciparum*: W2 2.33 | - | - | *-* | Lenta *et al.* 2007 |
| *Ziziphus vulgaris* Lam*.* (Rhamnaceae); *Zataria**multiflora* Boiss. (Lamiaceae) | *P. falciparum* 3D7*:* 6.3±1.3 | - | - | - | Ziegler *et al.* 2004 |
| *-* | *P. falciparum* D6/W2: 3.7/3.79 | - | - | - | Ma *et al.* 2008 |
| *Ziziphus joazeiro* Mart. (Rhamnaceae) | *P. falciparum* W2: 4.52 | - | - | - | de Sá *et al.* 2009 |
| Betulinic acid acetate (***130***) | *Ziziphus joazeiro* Mart. (Rhamnaceae) | *P. falciparum* W2: 2.99 | - | - | - | de Sá *et al.* 2009 |
| *-* | *P. falciparum* F32: 5.89 | - | - | - | Domínguez-Carmona *et al.* 2010 |
| *Cornus florida* L. (Cornaceae) | - | *L. tarentolae*: promastigotes: 0.45 | - | - | Graziose *et al.* 2012 |
| Betulinic aldehyde (***131***) | *Ziziphus vulgaris* Lam*.* (Rhamnaceae) | *P. falciparum:* 6.2±1.5 | - | - | - | Ziegler *et al.* 2004 |
| Betulinic acid amide (***132***) | *-* | *P. falciparum:* 6.4±0.60 | - | - | - | Ziegler *et al.* 2004 |
| Betulonic acid (***133***) | *-* | *P. falciparum* W2: 4.57 | - | - | - | de Sá *et al.* 2009 |
| 3β-O-*cis*-Coumaroyl betulinic acid (***138***) | *Cornus florida* L. (Cornaceae) | *P. falciparum*: 6.03  | *L. tarentolae*: promastigotes: 5.14 | - | - | Graziose *et al.* 2012 |
| 3β-O-Trans-coumaroyl betulinic acid (***139***) | *Cornus florida* L. (Cornaceae) | *P. falciparum*: 9.22 | *L. tarentolae*: promastigotes: 1.36 | - | - | Graziose *et al.* 2012 |
| Methyl derivative of heterocyclic botulin (***187***) | - | *-* | *L. donovani* amastigotes: GI50 8.9\* |  |  | Alakurtti *et al.* 2010b |
| Dihydro-betulinic acid (***140***) | *Bacopa monniera* Hayata & Matsum. (Plantaginaceae) | - | *L.* *amazonensis*: promastigotes/ amastigotes: 2.6/4.1\* | - | - | Chowdhury *et al.* 2003 |
| Betulin (***134***) | *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 4.0±1.5 | - | Hoet *et al.* 2007 |

‡IC50 value in nM.

\*IC50 valuein µM.

Supplementary Table S2: Moderate antiparasitic activities of pentacyclic triterpenes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Compound | Plant | Activity (IC50 µg/ml) against |  |
| Class | *Plasmodium* | *Leishmania* | *Trypanosoma* | *Other parasites* | Reference |
| Oleanane; Friedelanes | (***11***) | *Celaenodendron mexicanum* Standl. (Euphorbiaceae) | *P. falciparum*: 12.92 | *-* | *-* | - | Camacho *et al.* 2000 |
| (***13***) | *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: amastigotes (27±1\*) | - | - | Torres-Santos *et al.* 2004 |
| - | - | *L.* *amazonensis*: promastigote: >25\**L.* *infantum*: promastigote: >25\* | - | - | Gnoatto *et al.* 2008 |
|  |  |  |  |  |  |
| (***21***) | *Celaenodendron mexicanum* Standl. (Euphorbiaceae) | - | - | *T. brucei. brucei*: >30\* | - | Camacho *et al.* 2000 |
| Maslinic acid (***61***) | *Olea europaea* L. (Oleaceae) | *P. falciparum*: Dd2/3D7 (15.13/12.29) | - | - | - | Moneriz *et al.* 2011a |
| (***16***) | *Hedera Helix* L. (Araliaceae) | *-* | *L. Mexicanan* promastigotes: 18\* (13.77)  | *-* | *-* | Ridoux *et al.* 2001 |
| Populnoic acid (***62***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | *-* | *L. donovani*: promastigote: 18.0 | *-* | *-* | Andrade *et al.* 2008 |
| Winchic acid (***71***) | *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
|  | Arjunglucoside (***73***) | *Combretum molle* (R. Br. ex G. Don.)Engl & Diels (Combretaceae) | - | *L.* *donovani*: amastigotes >10 | *-* | - | Asres *et al.* 2001 |
|  | Amide derivative of Glycyrrhetinic acid (***34***; ***3****5*) | *-* | - | - | - | *B. malayi* female adult*:* 12.04 | Kalani *et al.* 2013 |
| Ursane | (***88***) | *Pelliciera rhizophorae*Planch. & Triana (Tetrameristaceae) | *P. falciparum* W2: 21.9\* | *-* | - | - | López *et al.* 2015 |
| - | - | - | *T. cruzi*: 25.5\* | - | da Silva Ferreira *et al.* 2010 |
| *Rosmarinus officinalis* L. (Lamiaceae) | - | - | *T. cruzi*: MC100 (40)  | - | Abe *et al.* 2002 |
| 3α-Hydroxyurs-12-en-28-oic acid methyl ester (***94***) | *Nauclea orientalis* (L.)L. (Rubiaceae) | *P. falciparum*: D6/ W2 (>21.2\*/ >21.2\*) | - | - | - | He *et al.* 2005 |
| 3α,19α,23-Trihydroxyurs-12-en-28-oic acid methyl ester (***104***) | *Nauclea orientalis* (L.)L. (Rubiaceae) | *P. falciparum*: D6/ W2 (>19.8\*/ >19.8\*) | - | - | - | He *et al.* 2005 |
| *N,N-*di substituted derivatives of N-{3-[4-(3-Aminopropyl)piperazinyl]propyl}-3-O-acetylursolamide (***106*; *107*; *108***) | - | - | *L.* *amazonensis and L.* *infantum* amastigotes: 6 – 17  | - | - | Gnoatto *et al.* 2008 |
| 2α-Hydroxy-ursolic acid (***90***) | *Baccharis dracunculifolia* DC. (Compositae) | *-* | *L.* *donovani*: promastigote: 19.0 | - | - | da Silva Filho *et al.* 2009 |
| (***105***) | *-* | - | *L.* *infantum*: promastigote: >25\* | - | - | Gnoatto *et al.* 2008 |
| (***89***) | *-* | - | *L.* *infantum*: promastigote: >25\* | - | - | Gnoatto *et al.* 2008 |
| *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. cruzi:* >32\* | - | Taketa *et al.* 2004 |
| N-{3-[4-(3-Aminopropyl)piperazinyl]propyl}ursolamide (***109***) | *-* | - | *L.* *infantum and L.* *infantum*: promastigote: >25\* | - | - | Gnoatto *et al.* 2008 |
| (***92***) | *Baccharis dracunculifolia* DC. (Compositae) | *-* | *L.* *donovani*: promastigote: 15.0 | *-* | - | da Silva Filho *et al.* 2009 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 12.3±1.6  | - | Hoet *et al.* 2007 |
| *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. cruzi* and *T. brucei brucei:* >32\* | - | Taketa *et al.* 2004 |
| *α*-Amyrin (***95***) | *Pelliciera rhizophorae*Planch. & Triana (Tetrameristaceae) | - | - | *T. cruzi*: 19\* | - | López *et al.* 2015 |
| Brevicuspi saponin I and II (***102*; *103***) | *Ilex affinis* Gardner (Aquifoliaceae) | - | - | *T. brucei brucei; T. cruzi:* >32\* | - | Taketa *et al.* 2004 |
| Taraxastane | Arborenin (***119***) | *Careya arborea* Roxb. (Lecythidaceae) | *-* | *L. donovani:* promastigotes: 75% growth inhibition at 15 µg/ml | *-* | - | Mandal *et al.* 2006 |
| Lupane | (***128***) | - | *P. falciparum* F32: > 20\* | *-* | *-* | *-* | Domínguez-Carmona *et al.* 2010 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| - | *P. falciparum*: 11.8 ± 0.2  | - | - | - | Ziegler *et al.* 2006 |
| *Rinorea ilicifolia* Kuntze (*Violacea*) | *P. falciparum* 3D7: 11.8 | - | - | - | Ziegler *et al.* 2002 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 19.3 ± 1.6 | - | Hoet *et al.* 2007 |
| (***129***) | *Uapaca nitida* Müll.Arg. (Phyllanthaceae) | *P. falciparum*: 19.6 | - | - | - | Steele *et al.* 1999 |
| *Uapaca nitida* Müll-Arg. (Phyllanthaceae) | *P. falciparum* (K1): (19.6) | *-* | *-* | - | Steele *et al.* 1999 |
| *-* | *P. falciparum* F32: > 20\* | *-* | *-* | *-* | Domínguez-Carmona *et al.* 2010 |
| *Pentalinon* *andrieuxii* Muell. Arg. (Apocynaceae) | *P. falciparum* F32: 22.5\* | *-* | *-* | - | Domínguez-Carmona *et al.* 2010 |
| *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
| *Pelliciera rhizophorae*Planch. & Triana (Tetrameristaceae) | *P. falciparum* W2: 18\* | - | - | - | López *et al.* 2015 |
| *Keetia leucantha* (K. Krause) Bridson (Rubiaceae) | *-* | *-* | *T. brucei brucei* blood stream form*:* 11.2 | - | Bero *et al.* 2013 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 14.9±2.9 | - | Hoet *et al.* 2007 |
| (***134***) | *-* | *P. falciparum:* < 12 | - | - | - | Ziegler *et al.* 2004 |
| (***133***) | - | *-* | *L. donovani* amastigotes*:* GI50 = 14.6 | - | - | Alakurtti *et al.* 2010a |
| - | *P. falciparum* F32: > 20\* | *-* | *-* | - | Domínguez-Carmona *et al.* 2010 |
| 28-(1H-imidazole-1-yl)-3,28-dioxo-lup-1,20(29)-dien-2-yl-1H-imidazole-1-carboxylate (**147**) | *-* | *-* | *L. infantum*: promastigotes: 25.8\* (12.9) | - | - | Sousa *et al.* 2014 |
| Hopane | 17β,21β-epoxyhopan-3-one (***191***) | *Cupania**cinerea* Poepp. (Sapindaceae) | *P. falciparum*: >10\* | - | *-* | - | Gachet *et al.* 2011 |

\* IC50 value in µM.

Supplementary Table S3: Low/no antiparasitic activities of pentacyclic triterpenes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | Activity (IC50 µg/ml) against |  |
| Class | Compounds | Plant | *Plasmodium* | *Leishmania* | *Trypanosoma* | *Other parasites* | References |
| Oleanane;Friedelan; Quinone methide | 20α-Hydroxy-tingenone (***10***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | - | - | *T. (Schizotrypanum) cruzi*: 64.9 % growth inhibition at 10\* after 192 hrs | - | Duarte *et al.* 2002 |
| (***13***)  | *Satureja parfolia* (Phil.) Epling (Lamiaceae) | *P. falciparum* 3D7: 34.5  | *-* | - | - | van Baren *et al.* 2006 |
| *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
| *-* | *P. falciparum*: 88.8/70.6 | - | - | - | Steele *et al.* 1999 |
| *Miconia langsdorffii* Cogn. (Melastomataceae) | *-* | *L.* *amazonensis*: promastigote: 439.5\* | *-* | - | Peixoto *et al.* 2011 |
| *-* | - | - | *T. cruzi*: 45.2\* (22.6) | - | da Silva Ferreira *et al.* 2010 |
| *Arrabidaea triplinervia* (Mart. Ex DC.) Baill (Bignoniaceae) | - | - | *T. cruzi:* ED100 (1.6 mg/ml) | -  | Leite *et al.* 2006 |
| *Keetia leucantha* (K. Krause) Bridson (Rubiaceae) | *-* | *-* | *T. brucei brucei* blood stream form*:* 86.4 | - | Bero *et al.* 2013 |
| *Cedrela fissilis* Vell (Meliaceae) | - | - | *T. cruzi*: 80\* | - | Leite *et al.* 2008 |
| *Rosmarinus officinalis* L. (Lamiaceae) | - | - | *T. cruzi*: MC100 (250) | - | Abe *et al.* 2002 |
| *Calendula officinalis* L. (Compositae) | - | - | - | *Heligmosomoides polygyrus*: 350 | Szakiel *et al.* 2008 |
| *Lantana camara* L. (Verbenaceae) | *-* | *-* | - | *M. incognita:* 55.33 % larval mortality at 1.25 mg/ml | Qamar *et al.* 2005 |
| *Miconia langsdorffii* Cogn. (Melastomataceae) | - | - | *-* | *Schistosoma mansoni*: inactive | Cunha *et al.* 2012 |
|  | *Lantana camara* L. (Verbenaceae) | - | - | *-* | *B. malayi* adult worms*:* LC100 62.50 | Misra *et al.* 2007  |
| (***21***) | *Allanblackia monticola* Mildbr. ex Engl. (Clusiacea) | *P. falciparum*: FcM29/ F32 (32/ >200) | - | - | - | Azebaze *et al.* 2007  |
| *Celaenodendron mexicanum* Standl. (Euphorbiaceae) | *P. falciparum*: >767.5\* | *L. donovani*: promastigotes/ amastigotes >1173.7\* | *-* | - | Camacho *et al.* 2000 |
| *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: promastigotes >200 | - | - | Torres-Santos *et al.* 2004 |
| 3β,29-Dihydroxyglutin-5-ene (***86***) | *Elaeodendron schlechteranum* (Loes.) Loes. (Celastraceae) | *P. falciparum* chloroquine sensitive Ghana strain*:* inactive | *L. infantum:* inactive | *T. brucei, T. cruzi:* inactive | - | Maregesi *et al.* 2010 |
| Cangoronine methyl ester (***87***) | *P. falciparum* chloroquine sensitive Ghana strain*:* inactive | *L. infantum:* inactive | *T. brucei, T. cruzi:* inactive | - | Maregesi *et al.* 2010 |
| (***62***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | *P. falciparum* D6 clone: inactive at 10 µg/ml | *-* | *-* | *-* | Andrade *et al.* 2008 |
| Methyl populnoate (***63***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | *P. falciparum* D6 clone: inactive  | *L. donovani*: promastigote: inactive  | *-* | *-* | Andrade *et al.* 2008 |
| β-Amyrin (***19***) | *Dendropanax morbiferus* H.Lév. (Araliaceae) | *P. falciparum*: 89.9 ± 10.6\* | - | *-* | - | Chung *et al.* 2009 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei. brucei*: 54.2±0.7 | - | Hoet *et al.* 2007 |
| Maytensifolin B (***22***) | *Celaenodendron mexicanum* Standl. (Euphorbiaceae) | *P. falciparum*: 765.5±4.5\* | *L. donovani*: promastigotes/ amastigotes >1136.4/ >90\* | *T. brucei brucei*: >30\* | - | Camacho *et al.* 2000 |
| 3β-O-acetyl-11α,12α-epoxyolean-28,13-olide (***72***) | *Prismatomeris fragrans* E.T. Geddes (Rubiaceae) | *P. falciparum* K1: inactive  | *-* | *-* | - | Kanokmedhakul *et al.* 2005 |
| (***73***) | *Combretum molle* (R. Br. ex G. Don.) Engl & Diels (Combretaceae) | *P. falciparum*: >30 | *-* | *T. cruzi*: >30/ *T. brucei rhodesiense:* >30  | - | Asres *et al.* 2001 |
| Sericoside (***74***) | *Combretum molle* (R. Br. ex G. Don.) Engl & Diels (Combretaceae) | *P. falciparum*: >30 | *L.* *donovani*: amastigotes >30 | *T. cruzi*: >30/ *T. brucei brucei rhodesiense:* >30  | - | Asres *et al.* 2001 |
| *Epi*-Friedelanol (***84***) | *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: promastigotes 91±2 | - | - | Torres-Santos *et al.* 2004 |
| Desacylescin III (***68***) | *Careya arborea* Roxb. (Lecythidaceae) | *-* | *L. donovani:* promastigotes inactive | *-* | - | Mandal *et al.* 2006 |
| Barringtogenol C (***69***) | - | *-* | *L. donovani:* promastigotes inactive  | *-* | - | Mandal *et al.* 2006 |
| Barringtogenol D (***70***) | - | *-* | *L. donovani:* promastigotes inactive  | *-* | - | Mandal *et al.* 2006 |
| Non-esterified derivative of maesabalides (***31***) | *-* | *-* | *L. infantum*: amastigotes: inactive | - | *-* | Germonprez *et al.* 2005 |
| Aglycone derivatives of maesabalides (***78*-*83***) | *-* | *-* | *L. infantum*: amastigotes: inactive | - | *-* | Germonprez *et al.* 2005 |
| Populnilic acid (***64***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | - | - | *T. (Schizotrypanum) cruzi*: inactive | - | Duarte *et al.* 2002 |
| Populninic acid (***65***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | - | - | *T. (Schizotrypanum) cruzi*: inactive | - | Duarte *et al.* 2002 |
| Urjunolic acid (***42***) | *Miconia sellowiana* Naud*.* (Melastomataceae) | - | - | *T. cruzi*: 76.3\* | - | Cunha *et al.* 2006 |
| Epikatonic acid (***76***) | *Austroplenckia populnea* (Reissek) Lundell (Celastraceae) | - | - | *T. (Schizotrypanum) cruzi*: 64.9 % growth inhibition at 10\* after 192 hrs | - | Duarte *et al.* 2002 |
| Friedelanol (***85***) | *Baccharis dracunculifolia* D. C. (Compositae) | - | *-* | *T. cruzi*: 1402.3\* | - | da Silva Filho *et al.* 2004 |
| Oleanonic acid (***66***) | *Cedrela fissilis* Vell (Meliaceae) | - | - | *T. cruzi*: 294.9\* | - | Leite *et al.* 2008 |
|  | *Miconia fallax* DC. (Melastomataceae) | - | - | *T. cruzi*: 294.9\* | - | Cunha *et al.* 2003 |
|  | *Lantana camara* L. (Verbenaceae) | - | - | *-* | *B. malayi* adult worms*:* LC100 31.25 | Misra *et al.* 2007  |
| 3,11-Dioxoolean-12-en-28- onic acid (***67***) | *Cedrela fissilis* Vell (Meliaceae) | - | - | *T. cruzi*: 173.9 | - | Leite *et al.* 2008 |
| (***11***) | *Celaenodendron mexicanum* Standl. (Euphorbiaceae) | - | - | *T. brucei. brucei*: >30\* | - | Camacho *et al.* 2000 |
| Gypsogenic acid (***41***) | *Miconia stenostachya* DC. (Melastomataceae) | - | - | *T. cruzi:* 56.6\*  | - | Cunha *et al.* 2003 |
| 3-O-Acetyl aleuritolic acid (***75***)  | *Croton cajucara* Benth. (Euphorbiaceae) | *-* | *-* | *T. cruzi*: ≥78.1 |  | Campos *et al.* 2010 |
| *Discoglypremna caloneura* (Pax) Prain (Euphorbiaceae) | - | - | - | *Onchocerca gutturosa*:28.6 % | Nyasse *et al.* 2006 |
| Sumaresinolic acid (***17***) | *Miconia fallax* DC. (Melastomataceae) | - | - | *T. cruzi*: 402.3\* |  | Cunha *et al.* 2003 |
| Acyl derivatives of glycyrrhetinic acid (***38***; ***39***) | *-* | - | - | - | *B. malayi* microfilirae/adult worms*:* > 100\* | Kalani *et al.* 2013 |
| (***61***) | *Olea europaea* L. (Oleaceae) | - | - | *-* | *Toxoplasma gondii*: LD50 53.8\* | De Pablos *et al.* 2010 |
| 3-O-β-D-glucopyranosyl (1→3)-β-D-glucopyranosyl-2β,3β,16α,23-tetrahydroxyolean-12-en-28-oic acid 28-O-α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-[β-D-xylopyranosyl-(1→3)]-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside (***50***) | *Microsechium helleri* (Peyr.) Cogn. (Cucurbitaceae) | - | - | - |  *M. javanica*: 6.52 ± 0.31 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| 3-O-β-D-glucopyranosyl-2β,3β,16α,23-tetrahydroxyolean-12-en-28-oic acid 28-O-α-L-rhamnopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-[β-D-xylopyranosyl-(1→3)]-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside (***51***) | *Microsechium helleri* (Peyr.) Cogn. (Cucurbitaceae) | - | - | - |  *M. javanica*: 6.34 ± 0.46 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Amoles F (***52***) | *Microsechium helleri* (Peyr.) Cogn. (Cucurbitaceae) | - | - | - |  *M. javanica*: 4.78 ± 0.62 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Amoles G (***53***) | *Microsechium helleri* (Peyr.) Cogn. (Cucurbitaceae) | - | - | - |  *M. javanica*: 7.83 ± 0.82 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Polygalacic acid (***48***) | *Sicyos bulbosus* Lira & Dávila (Cucurbitaceae) | - | - | - |  *M. javanica*: 33.19 ± 6.53 % immobility at 0.5 µg/ml | Hernández-Carlos *et al.* 2011 |
| Ursane | (***88***) | *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
| *-* | *P. falciparum* (K1/T9-96)*:* (36.5/28) | *-* | *-* | - | Steele *et al.* 1999 |
| *Cornus florida* L. (Cornaceae) | *P. falciparum*: > 200\* | *-* | - | - | Graziose *et al.* 2012 |
| *Cornus florida* L. (Cornaceae) | *P. falciparum*: >200\* | *-* | - | - | Graziose *et al.* 2012 |
| *Miconia langsdorffii* Cogn. (Melastomataceae) | *-* | *L.* *amazonensis*: promastigote: 360.3\* | *-* | - | Peixoto *et al.* 2011 |
| *Arrabidaea triplinervia* (Mart. Ex DC.) Baill (Bignoniaceae) | - | - | *T. cruzi*: ED100 (0.4 mg/ml) | - | Leite *et al.* 2006 |
| *Miconia langsdorffii* Cogn. (Melastomataceae) | *-* | *-* | *-* | *S. mansoni* inactive | Cunha *et al.* 2012 |
| (***95***) | *Dendropanax morbifera* H.Lév. (Araliaceae) | *P. falciparum*: 50.3 ± 11.3\* | - | *-* |  | Chung *et al.* 2009 |
| *Strychnos spinosa* Lam. (Loganiaceae) | - | - | *T. brucei brucei:* 48.9±3.1 | - | Hoet *et al.* 2007 |
| (***89***) | *-* | *-* | *L.* *amazonensis*: promastigote: 406.0\* | *-* | - | Peixoto *et al.* 2011 |
| Ursolic acid 3-O-fatty esters (***97***;***98***) | *-* | *-* | *L.* *amazonensis*: promastigote: 240.4\*; 340.4\* | *-* | - | Peixoto *et al.* 2011 |
| Ursolic acid methyl ester (***96***) | *-* | *-* | *L.* *amazonensis*: promastigote: 174.9\* | *-* | - | Peixoto *et al.* 2011 |
| (***93***) | *-* | *-* | *L.* *amazonensis*: promastigote: 458.7\* | *-* | - | Peixoto *et al.* 2011 |
| Tormentic acid (***113***) | *Pourouma guianensis* Aubl. (Urticaceae) | - | *L.* *amazonensis*: promastigotes/ amastigotes 95/ >100 | - | - | Torres-Santos *et al.* 2004 |
| Taraxastane | (***116***) | *Mimusops obtusifolia* Lam. (Sapotaceae) | *P. falciparum*: >100 | - | *-* | - | Simelane *et al.* 2013 |
| (***117***) | *Cupania**cinerea* Poepp. (Sapindaceae) | *-* | - | *T. brucei rhodesiense:* >90\* | - | Gachet *et al.* 2011 |
| Sawamilletin (***118***) | *Mimusops obtusifolia* Lam. (Sapotaceae) | *P. falciparum*: >100 | - | *-* | - | Simelane *et al.* 2013 |
| 2α,3β-Dihydroxy-taraxastan-28,20β-olide (***120***) | - | *-* | *L. donovani:* promastigotes:inactive | *-* | - | Mandal *et al.* 2006 |
| Lupane | (***127***) | *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
| (***128***) | *Gardenia saxatilis* Geddes (Rubiaceae) | *P. falciparum*: ≥20 | - | - | - | Suksamrarn *et al.* 2003 |
| (***129***) | *Uapaca nitida* Müll.Arg. (Phyllanthaceae) | *P. falciparum*: 25.9 | - | - | - | Steele *et al.* 1999 |
| *Cornus florida* L. (Cornaceae) | *P. falciparum*: > 200\* | *L. tarentolae*: promastigotes: >40\* | - | - | Graziose *et al.* 2012 |
| - | *-* | *L. infantum*/*donovani*: promastigotes: 64 %/ 36.3 % | - | - | Wert *et al.* 2011 |
| - | *-* | *L. donovani* amastigotes*:* 39.8 % inhibition at 50\* | *-* | *-* | Alakurtti *et al.* 2010a |
| *Betula platyphylla* var. *japonica* | *-* | *L. major*: promastigotes: 40 µg/ml | *-* | *-* | Takahashi *et al.* 2004 |
| - | *-* | *L. amazonensis:* amastigotes > 200\* | *T. cruzi:* 50\* |  | Domínguez-Carmona *et al.* 2010 |
| *Rosmarinus officinalis* L. (Lamiaceae) | - | - | *T. cruzi*: MC100 1000 | - | Abe *et al.* 2002 |
| *Keetia leucantha* (K. Krause) Bridson (Rubiaceae) | *-* | *-* | *T. brucei brucei* blood stream form*:* 40.9 | - | Bero *et al.* 2013 |
| (***130***) | *Cornus florida* L. (Cornaceae) | *P. falciparum*: >200\* | *-* | - | - | Graziose *et al.* 2012 |
| - | *-* | *L. amazonensis*: amastigotes: 44.9\* (22.5) | *-* | *-* | Domínguez-Carmona *et al.* 2010 |
| - | *-* | *-* | *T. cruzi:* 154\* | *-* | Domínguez-Carmona *et al.* 2010 |
| 3-*O*-(3'-Hydroxyeicosanoyl) lupeol (***144***) | *Holarrhena floribunda* (G.Don) T.Durand & Schinz (Apocynaceae) | *P. falciparum* 3D7/FCR3 strain: 208/198 | - | - | - | Fotie *et al.* 2006 |
| 3-*O*-[(2'-(Tetracosyloxy)acetyl] lupeol (***145***) | *Holarrhena floribunda* (G.Don) T.Durand & Schinz (Apocynaceae) | *P. falciparum* 3D7/FCR3 strain: 111/69 | - | - | - | Fotie *et al.* 2006 |
| 3-*O*-[(1''-Hydroxyoctadecyloxy)-2'-hydroxypropanoyl] lupeol (***146***) | *Holarrhena floribunda* (G.Don) T.Durand & Schinz (Apocynaceae) | *P. falciparum* 3D7/FCR3 strain: >391/>391 | - | - | - | Fotie *et al.* 2006 |
| (***127***) | *Cupania cinerea* Poepp. (Sapindaceae) | - | - | *T. brucei rhodesiens*:>90\* | - | Gachet *et al.* 2011 |
| (***128***) | *Holarrhena floribunda* (G.Don) T.Durand & Schinz (Apocynaceae) | *P. falciparum* 3D7/FCR3 strain: 45/41 | - | - | - | Fotie *et al.* 2006 |
| *Vernonia brasiliana* (L.) Druce (Compositae) | *P. falciparum:* 45% growth inhibition at 25 µg/ml | - | - | - | Alves *et al.* 1997 |
| Lup-20(29)-2ene-3-one (***137***) | - | *P. falciparum*: MIC > 50 | - | - | - | Kumar *et al.* 2008 |
| Dihydro lupenone (***141***) | - | *P. falciparum*: MIC > 50 | - | - | - | Kumar *et al.* 2008 |
| Lup-20(29)-2ene-3-oxime (***136***) | - | *P. falciparum*: MIC = 50 | - | - | - | Kumar *et al.* 2008 |
| Dihydro lupenone oxime (***142***) | - | *P. falciparum*: MIC > 50 | - | - | - | Kumar *et al.* 2008 |
| Betulinic acid methyl ester acetate (***135***) | *-* | *P. falciparum* W2: 45.79±36.26\* | - | - | - | de Sá *et al.* 2009 |
| (***125***) | - | *-* | *L. amazonensis*: amastigotes: 69.9\* | *T. cruzi:* 93.3\* |  | Domínguez-Carmona *et al.* 2010 |
| *-* | *P. falciparum* W2: 51.58±10.85\* | - | - | - | de Sá *et al.* 2009 |
| (***133***) | - | *-* | *L. amazonensis*: amastigotes: 51.2\* | *T. cruzi:* 161.4\* | - | Domínguez-Carmona *et al.* 2010 |
| - | *-* | *L. infantum*/donovani: promastigotes: 69.4 %/ 78.4 % | - | - | Wert *et al.* 2011 |
| (***134***) | - | *-* | *L. amazonensis*: amastigotes > 200\* | *T. cruzi:* 173\* | *-* | Domínguez-Carmona *et al.* 2010 |
| - | *-* | *L. infantum*/*donovani:* promastigotes: 57.2 %/ 60.2 % | - | - | Wert *et al.* 2011 |
| - | *-* | *L. donovani* amastigotes*:* 35 % inhibition at 50\* | *-* | *-* | Alakurtti *et al.* 2010a |
| *Schefflera vinosa* (Cham. & Schltdl.) Frodin (Araliaceae) | - | - | - | *S. mansoni* 50 % death after incubation with 200 *μ*M for 2 hr | Cunha *et al.* 2012 |
| (***131***) | *Doliocarpus dentatus* (Aubl.) Standl. (Dilleniaceae) | - | *L. amazonensis:* amastigotes 12%/42% | - | - | Sauvain *et al.* 1996 |
| 3β-Hydroxy-(20R)-lupan-29-oxo-28-yl-1H-imidazole-1-Carboxylate (***148***) | *-* | *-* | *L. infantum*: promastigotes: 50.8\* | - | - | Sousa *et al.* 2014 |
| Betulin derivatives (***149*; *150***; ***152***-***155***; ***157***; ***15*9**-***163***) | - | *-* | *L. infantum*/*donovani*: amastigotes: 0 %-69.1 % inhibition at 50\* | - | - | Alakurtti *Et al.* 2010a; Wert *et al.* 2011 |
| Dihydrobetulonic acid (***143***) | - | *-* | *L. donovani* amastigotes*:* GI50: 56 | *-* | *-* | Alakurtti *et al.* 2010a |
| 28-O-bromoacetylbetulin (***151*** | - | *-* | *L. donovani* amastigotes*:* GI50: 34.9 | *-* | *-* | Alakurtti *et al.* 2010a |
| L-aspartyl amide derivative of betulonic acid (***156***) | - | *-* | *L. donovani* amastigotes*:* GI50 : 21.2 | *-* | *-* | Alakurtti *et al.* 2010a |
| Oxime derivative of botulin (***158***) | - | *-* | *L. donovani* amastigotes*:* GI50: 22.8 | *-* | *-* | Alakurtti *et al.* 2010a |
| Betulin 3-caffeate (***190***) | - | *-* | *L. major*: promastigotes: >100 µg/ml | *-* | *-* | Takahashi *et al.* 2004 |
| Heterocyclic betulin derivative (***165***-***183***; ***186***; ***188***;***189***) | - | *-* | *L. donovani* amastigotes: 0-63.8 % inhibition at 50\* |  |  | Alakurtti *et al.* 2010b; Wert *et al.* 2011 |
| Ethyl derivative of heterocyclic botulin (***184***) | - | *-* | *L. donovani* amastigotes: GI50 30\* |  |  | Alakurtti *et al.* 2010b |
| Dipropionate derivative of heterocyclic botulin (***164***) | - | *-* | *L. donovani* amastigotes: GI50 25\* |  |  | Alakurtti *et al.* 2010b |
| Diacetyl derivative of heterocyclic botulin (***185***) | - | *-* | *L. donovani* amastigotes: GI50 26\* |  |  | Alakurtti *et al.* 2010b |
| Hopane | (***191***) | *Cupania**cinerea* Poepp. (Sapindaceae) | *-* | - | *T. brucei rhodesiens*:>90\* | - | Gachet *et al.* 2011 |

\* IC50 value in µM.

Figure S1. Structures of the 191 pentacyclic triterpenes and their derivatives found to possess varying degrees of activities against tropical parasitic diseases.



  

  



 

   

 

  

 

 

 

  

   



  

   

  

 

 

  

 

 

 

 

  



   

 

**References**

Ajaiyeoba, E. O., Ashidi, J. S., Okpako, L. C., Houghton, P. J. and Wright, C. W. (2008). Antiplasmodial compounds from *Cassia siamea* stem bark extract. *Phytotherapy Research* 22, 254–255.

Alakurtti, S., Bergström, P., Sacerdoti-Sierra, N., Jaffe, C. L. and Yli-Kauhaluoma, J. (2010*a*). Anti-leishmanial activity of betulin derivatives. *Journal of Antibiotics* 63, 123–126.

Alakurtti, S., Heiska, T., Kiriazis, A., Sacerdoti-Sierra, N., Jaffe, C. L. and Yli-Kauhaluoma, J. (2010*b*). Synthesis and anti-leishmanial activity of heterocyclic betulin derivatives. *Bioorganic and Medicinal Chemistry* 18, 1573–1582.

Andrade, S. F., da Silva Filho, A. A., de\_O\_Resende, D., Silva, M. L., Cunha, W. R., Nanayakkara, N. P. D. and Bastos, J. K. (2008). Antileishmanial, antimalarial and antimicrobial activities of the extract and isolated compounds from *Austroplenckia populnea* (Celastraceae). *Zeitschrift für Naturforschung C (A Journal of Biosciences)* 63, 497–502.

Azebaze, A. G. B., Dongmo, A. B., Meyer, M., Ouahouo, B. M. W., Valentin, A., Laure Nguemfo, E., Nkengfack, A. E. and Vierling, W. (2007). Antimalarial and vasorelaxant constituents of the leaves of *Allanblackia monticola* (Guttiferae). *Annals of Tropical Medicine and Parasitology* 101, 23–30.

Asres, K., Bucar, F., Knauder, E., Yardley, V., Kendrick, H. and Croft, S. L. (2001). *In vitro* antiprotozoal activity of extract and compounds from the stem bark of *Combretum molle*. *Phytotherapy Research* 15, 613–617.

Campos, M. C., Salomão, K., Castro-Pinto, D. B., Leon, L. L., Barbosa, H. S., Maciel, M. A. M. and de Castro, S. L. (2010). *Croton cajucara* crude extract and isolated terpenes: activity on *Trypanosoma cruzi*. *Parasitology Research* 107, 1193–1204.

Chung, I. M., Kim, M. Y., Park, S. D., Park, W. H. and Moon, H. I. (2009). *In vitro* evaluation of the antiplasmodial activity of *Dendropanax morbifera* against chloroquine‐sensitive strains of *Plasmodium falciparum*. *Phytotherapy Research* 23, 1634–1637.

Domínguez-Carmona, D. B., Escalante-Erosa, F., García-Sosa, K., Ruiz-Pinell, G., Gutierrez-Yapu, D., Chan-Bacab, M. J., Gim-enez-Turba, A. and Peña-Rodríguez, L. M. (2010). Antiprotozoal activity of betulinic acid derivatives. *Phytomedicine* 17, 379–382.

Dos Santos, V. A., Leite, K. M., da Costa Siqueira, M., Regasini, L. O., Martinez, I., Nogueira, C. T., Galuppo, M. K., Stolf, B. S., Pereira, A. M. S., Cicarelli, R. M. B., Furlan, M. and Graminha, M. A. (2013). Antiprotozoal activity of quinonemethide triterpenes from *Maytenus ilicifolia* (Celastraceae). *Molecules* 18, 1053–1062.

Duarte, L. P., Vieira Filho, S. A., Silva, G. D. D. F., Sousa, J. R. D. and Pinto, A. D. S. (2002). Anti-trypanosomal activity of pentacyclic triterpenes isolated from *Austroplenckia populnea* (Celastraceae). *Revista do Instituto de Medicina Tropical de São Paulo* 44, 109–112.

Fotie, J., Bohle, D. S., Leimanis, M. L., Georges, E., Rukunga, G. and Nkengfack, A. E. (2006). Lupeol long-chain fatty acid esters with antimalarial activity from *Holarrhena floribunda*. *Journal of Natural Products* 69, 62–67.

Goijman, S. G., Turrens, J. F., Marini-Bettolo, G. B. and Stoppani, A. O. M. (1985). Effect of tingenone, a quinonoid triterpene, on growth and macromolecule biosynthesis in *Trypanosoma cruzi*. *Experientia* 41, 646–648.

Kanokmedhakul, K., Kanokmedhakul, S. and Phatchana, R. (2005). Biological activity of Anthraquinones and Triterpenoids from *Prismatomeris fragrans*. *Journal of Ethnopharmacology* 100, 284–288.

Khalid, S. A., Friedrichsen, G. M., Christensen, S. B., El Tahir, A. and Satti, G. M. (2007). Isolation and characterization of pristimerin as the antiplasmodial and antileishmanial agent of *Maytenus senegalensis* (Lam.) Exell. *Archive for Organic Chemistry* 9, 129–134.

Kumar, S., Misra, N., Raj, K., Srivastava, K. and Puri, S. K. (2008). Novel class of hybrid natural products derived from lupeol as antimalarial agents. *Natural Product Research* 22, 305–319.

Leite, J. P. V., Oliveira, A. B., Lombardi, J. A., Filho, J. D. S. and Chiari, E. (2006). Trypanocidal activity of triterpenes from *Arrabidaea triplinervia* and derivatives. *Biological and Pharmaceutical Bulletin* 29, 2307–2309.

López, D., Cherigo, L., Spadafora, C., Loza-Mejía, M. A. and Martínez-Luis, S. (2015). Phytochemical composition, antiparasitic and *α*–glucosidase inhibition activities from *Pelliciera rhizophorae*. *Chemistry Central Journal* 9, 1–11.

Mandal, D., Panda, N., Kumar, S., Banerjee, S., Mandal, N. B. and Sahu, N. P. (2006). A triterpenoid saponin possessing antileishmanial activity from the leaves of *Careya arborea*. *Phytochemistry* 67, 183–190.

Moulisha, B., Bikash, M. N., Partha, P., Kumar, G. A., Sukdeb, B. and Kanti, H. P. (2009). *In vitro* anti-leishmanial and anti-tumour activities of a pentacyclic triterpenoid compound isolated from the fruits of *Dregea volubilis* Benth Asclepiadaceae. *Tropical Journal of Pharmaceutical Research* 8, 127–131.

Moulisha, B., Kumar, G. A. and Kanti, H. P. (2010). Anti-leishmanial and anti-cancer activities of a pentacyclic triterpenoid isolated from the leaves of *Terminalia arjuna* Combretaceae. *Tropical Journal of Pharmaceutical Research* 9, 135–140.

Peixoto, J. A., Andrade e Silva, M. L., Crotti, A. E., Cassio Sola Veneziani, R., Gimenez, V. M., Januario, A. H., Groppo, M., Magalhães, L. G., dos Santos, F. F., Albuquerque, S., Filho, A. A. D. and Cunha, W. R. (2011). Antileishmanial activity of the hydroalcoholic extract of *Miconia langsdorffii*, isolated compounds, and semi-synthetic derivatives. *Molecules* 16, 1825–1833.

Sauvain, M., Kunesch, N., Poisson, J., Gantier, J., Gayral, P. and Dedet, J. (1996). Isolation of Leishmanicidal triterpenes and lignans from the Amazonian Liana *Doliocarpus dentatus* (Dilleniaceae). *Phytotherapy Research* 10, 1–4.

Sousa, M. C., Varandas, R., Santos, R. C., Santos-Rosa, M., Alves, V. and Salvador, J. A. (2014). Antileishmanial activity of semisynthetic lupane triterpenoids betulin and betulinic acid derivatives: synergistic effects with miltefosine. *PLoS ONE* 9, e89939.

Szakiel, A., Ruszkowski, D., Grudniak, A., Kurek, A., Wolska, K. I., Doligalska, M. and Janiszowska, W. (2008). Antibacterial and antiparasitic activity of oleanolic acid and its glycosides isolated from marigold (Calendula officinalis). Planta Medica 74, 1709–1715.

Takahashi, M., Fuchino, H., Sekita, S. and Satake, M. (2004). *In vitro* leishmanicidal activity of some scarce natural products. *Phytotherapy Research* 18, 573.

van Baren, C., Anao, I., Di Leo Lira, P., Debenedetti, S., Houghton, P., Croft, S. and Martino, V. (2006). Triterpenic acids and flavonoids from *Satureja parvifolia*. Evaluation of their antiprotozoal activity. *Zeitschrift Fur Naturforschung C* 61, 189–192.

Wert, L., Alakurtti, S., Corral, M. J., Sánchez-Fortún, S., Yli-Kauhaluoma, J. and Alunda, J. M. (2011). Toxicity of betulin derivatives and *in vitro* effect on promastigotes and amastigotes of *Leishmania infantum* and *L. donovani*. *Journal of Antibiotics* 64, 475–481.

Ziegler, H. L., Stærk, D., Christensen, J., Hviid, L., Hägerstrand, H. and Jaroszewski, J. W. (2002). *In vitro* Plasmodium falciparum drug sensitivity assay: inhibition of parasite growth by incorporation of stomatocytogenic amphiphiles into the erythrocyte membrane. *Antimicrobial Agents and Chemotherapy* 46, 1441–1446.