



L'importance des analyses biologiques et sociologiques dans le domaine de la santé

Quelques pistes de solutions basées sur notre richesse traditionnelle

Pr. Léopold Gustave LEHMAN

Immuno-parasitologue

Université de Douala / Santec Afrique Centrale

www.ured-douala.com

PLAN

INTRODUCTION

1. Contexte épidémiologique

- Paludisme, problème majeur de santé publique en Afrique
- Connaissances sur le parasite, le vecteur, le traitement, les mesures de préventions

2. Résultats disponibles à base de nos traditions et recherches actuelles

3. Proposition de l'approche DTB pour l'élimination du paludisme

4. Quelques pistes de solutions basées sur nos richesses traditionnelles

CONCLUSION

1. Contexte épidémiologique

Santé en RFA = **Prévention** + Traitement

Santé au Cameroun = Prévention + Traitement

Hôpitaux = peu accessibles

Laboratoire = tabou

Manques: RH/Equipements/Finances

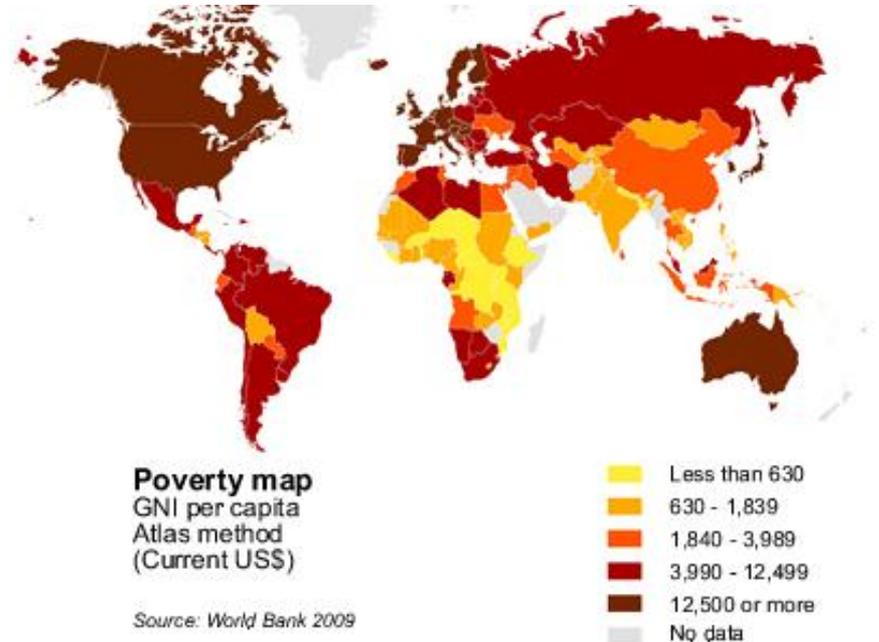
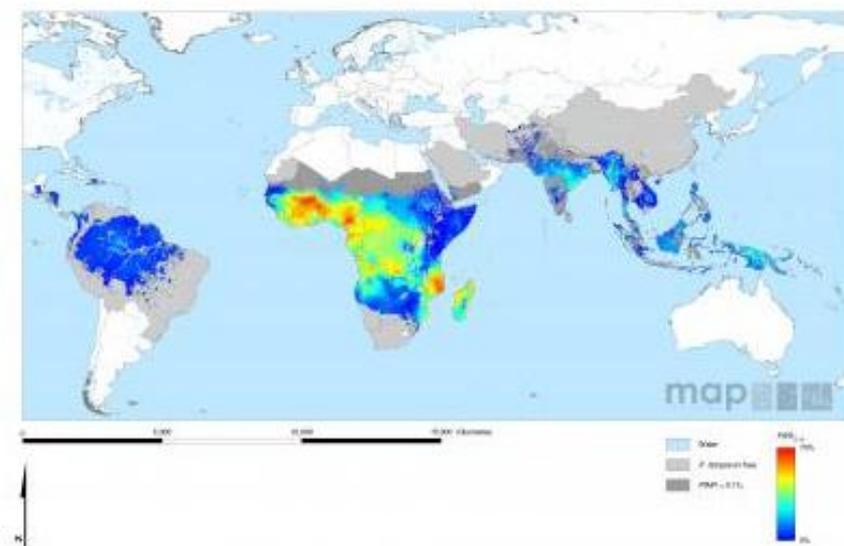
Contexte épidémiologique

- Monde (OMS, 2012)
 - 14 médecins /10 000 habitants
 - 28 infirmières et sages-femmes/10 000 habitants
 - 30 lits d'hôpitaux/10 000 habitants
- Afrique (OMS, 2012)
 - 02 médecins/10 000 habitants
 - 09 infirmières et sages-femmes/10 000 habitants
- Cameroun (Minsante, 2010)
 - 01 médecins/10 000 habitants
 - 03 infirmières et sages-femmes/10 000 habitants
 - 13 lits d'hôpitaux/10 000 habitants

**Carences en RH &
Mat pour la santé**

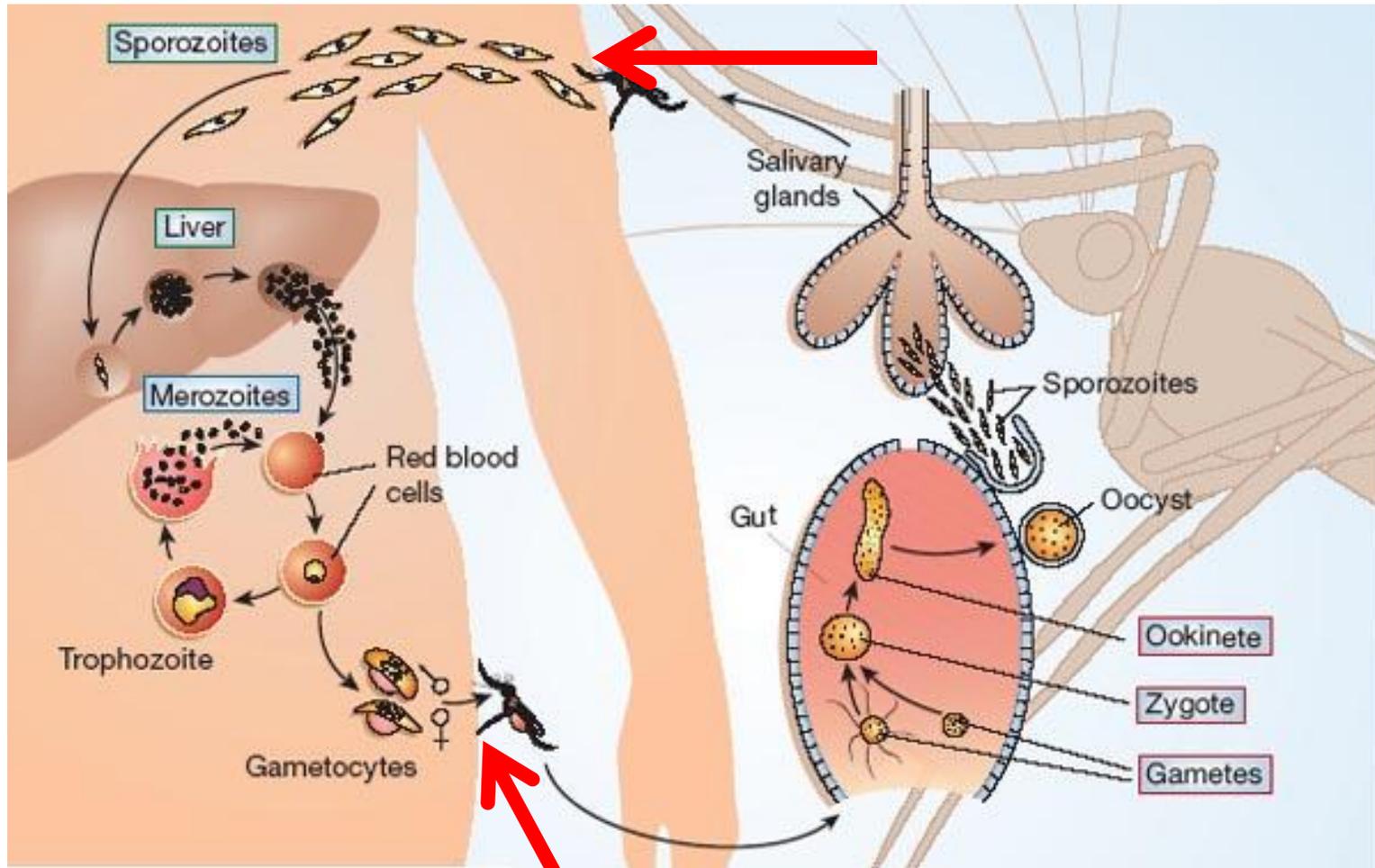
Le Paludisme, problème majeur de santé publique en Afrique

Global Levels of *P. falciparum* Malaria



Caption: This map shows global *P. falciparum* malaria parasite prevalence -- the percentage of children infected with *P. falciparum* malaria. In low areas (blue) we might see one or two infected children out of every 100, whilst in high areas (red) it might be more than 50. This demonstrates how entrenched the disease remains throughout much of west and central Africa and parts of Southeast Asia.

Cycle de développement du paludisme



2. Résultats disponibles

2.1 - Etude de l'épidémiologie du paludisme dans les communautés et entreprises

Nouvelles techniques de diagnostic parasitologique



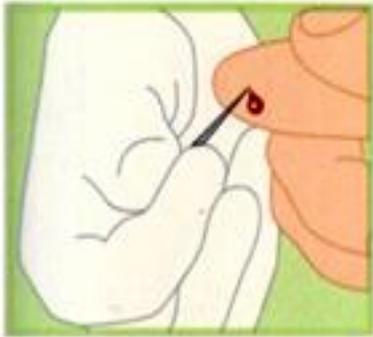
- Prélèvements
 - Analyse des échantillons
- 3 microscopistes 300 tests/en 8 heures

1min 36s / Test

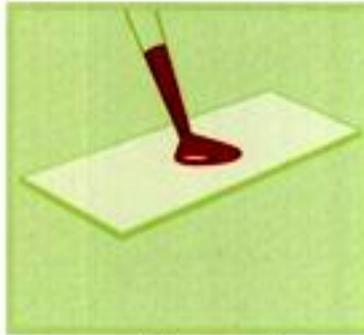
- Production des résultats
- Rédaction des rapports

Rapid Diagnostic Tests with CyScope fluorescence microscope

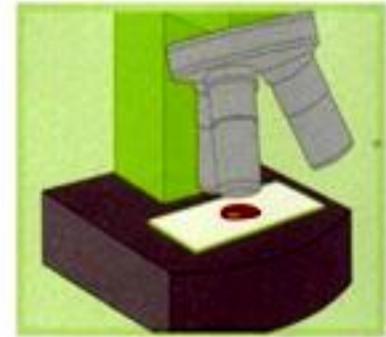
FOR MALARIA AND NTDs



Step 1
Sample **BLOOD**
STOOL
URINES



Step 2
Deposit on slide and
cover with coverslip



Step 3
Observe under
microscope

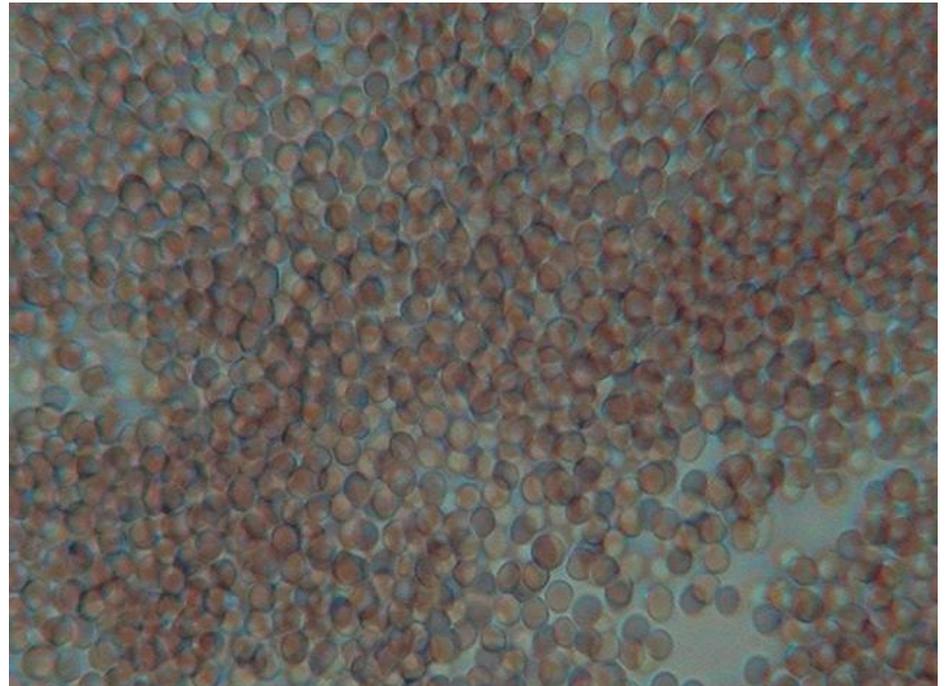
Malaria parasites and RBC under CyScope

UV light



Parasites (small bright spots) and white blood cells (larges bright spots); under UV light

white light



Red blood cells obtained after switching on the white light

Diagnostic de masse

Prévalence
Jusqu'à 80%
Dans les écoles





Prévalence
Env 30%
Dans les communautés





Prévalence
Env 20% en Entreprise



2. Résultats disponibles

2.2 – Amélioration des techniques
d'extraction de principes actifs des
plantes

Journée de l'excellence scientifique de la FS – UD 18/06/15



EFFICIENCY OF MICROWAVE TECHNOLOGY IN THE EXTRACTION OF TOTAL PHENOLICS COMPOUNDS FROM *Ximenesia americana* ROOTS
 Kenmogne^{1,2}, S. B., Vandamides J. C., ³ Dongmo A., Tchatchouang⁴, J. B., Agnassoum⁵ N.
¹University of Chemistry, Faculty of Science, P.O. Box 24151, University of Douala, Cameroon
²Laboratory of Biology, Faculty of Science, P.O. Box 24151, University of Douala, Cameroon
³Laboratory of Applied Chemistry, P.O. Box 653, ENIG, Nkongsamba, Cameroon
⁴ICMPC/Pharmaceutical/2000/2012

BACKGROUND
 In Cameroon, the plant kingdom represents an almost inexhaustible source of biologically active compounds. The problem of reliable extraction technology has made drugs very expensive. Traditional extraction methods used in Cameroon the pressing, distillation, isothermal extraction are both time consuming and wasteful in terms of the required solvent. Nowadays microwave heating source has demonstrated to be an alternative energy not only in house use but also in research work. This source of energy is rather clean, energy saving, faster and has a better yield. Until now, the extraction of *Ximenesia americana* active compounds with microwave assisted extraction method has not been reported.

RESEARCH PURPOSE
MAIN OBJECTIVE:
 To evaluate the efficiency of household microwaves in the extraction of total phenolics from the roots matrix of *Ximenesia americana*.

OBJECTIVES
 To evaluate microwave assisted extraction with different solvents and extraction times. To study the effect of some parameters on the extraction of total polyphenolics.

MATERIALS & METHODS
 The roots of *Ximenesia americana* were dried and powdered. The extraction was carried out using different solvents (Hexane, Ethyl acetate, Methanol) and extraction times (15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, 285, 300, 315, 330, 345, 360, 375, 390, 405, 420, 435, 450, 465, 480, 495, 510, 525, 540, 555, 570, 585, 600, 615, 630, 645, 660, 675, 690, 705, 720, 735, 750, 765, 780, 795, 810, 825, 840, 855, 870, 885, 900, 915, 930, 945, 960, 975, 990, 1005, 1020, 1035, 1050, 1065, 1080, 1095, 1110, 1125, 1140, 1155, 1170, 1185, 1200, 1215, 1230, 1245, 1260, 1275, 1290, 1305, 1320, 1335, 1350, 1365, 1380, 1395, 1410, 1425, 1440, 1455, 1470, 1485, 1500, 1515, 1530, 1545, 1560, 1575, 1590, 1605, 1620, 1635, 1650, 1665, 1680, 1695, 1710, 1725, 1740, 1755, 1770, 1785, 1800, 1815, 1830, 1845, 1860, 1875, 1890, 1905, 1920, 1935, 1950, 1965, 1980, 1995, 2010, 2025, 2040, 2055, 2070, 2085, 2100, 2115, 2130, 2145, 2160, 2175, 2190, 2205, 2220, 2235, 2250, 2265, 2280, 2295, 2310, 2325, 2340, 2355, 2370, 2385, 2400, 2415, 2430, 2445, 2460, 2475, 2490, 2505, 2520, 2535, 2550, 2565, 2580, 2595, 2610, 2625, 2640, 2655, 2670, 2685, 2700, 2715, 2730, 2745, 2760, 2775, 2790, 2805, 2820, 2835, 2850, 2865, 2880, 2895, 2910, 2925, 2940, 2955, 2970, 2985, 3000, 3015, 3030, 3045, 3060, 3075, 3090, 3105, 3120, 3135, 3150, 3165, 3180, 3195, 3210, 3225, 3240, 3255, 3270, 3285, 3300, 3315, 3330, 3345, 3360, 3375, 3390, 3405, 3420, 3435, 3450, 3465, 3480, 3495, 3510, 3525, 3540, 3555, 3570, 3585, 3600, 3615, 3630, 3645, 3660, 3675, 3690, 3705, 3720, 3735, 3750, 3765, 3780, 3795, 3810, 3825, 3840, 3855, 3870, 3885, 3900, 3915, 3930, 3945, 3960, 3975, 3990, 4005, 4020, 4035, 4050, 4065, 4080, 4095, 4110, 4125, 4140, 4155, 4170, 4185, 4200, 4215, 4230, 4245, 4260, 4275, 4290, 4305, 4320, 4335, 4350, 4365, 4380, 4395, 4410, 4425, 4440, 4455, 4470, 4485, 4500, 4515, 4530, 4545, 4560, 4575, 4590, 4605, 4620, 4635, 4650, 4665, 4680, 4695, 4710, 4725, 4740, 4755, 4770, 4785, 4800, 4815, 4830, 4845, 4860, 4875, 4890, 4905, 4920, 4935, 4950, 4965, 4980, 4995, 5010, 5025, 5040, 5055, 5070, 5085, 5100, 5115, 5130, 5145, 5160, 5175, 5190, 5205, 5220, 5235, 5250, 5265, 5280, 5295, 5310, 5325, 5340, 5355, 5370, 5385, 5400, 5415, 5430, 5445, 5460, 5475, 5490, 5505, 5520, 5535, 5550, 5565, 5580, 5595, 5610, 5625, 5640, 5655, 5670, 5685, 5700, 5715, 5730, 5745, 5760, 5775, 5790, 5805, 5820, 5835, 5850, 5865, 5880, 5895, 5910, 5925, 5940, 5955, 5970, 5985, 6000, 6015, 6030, 6045, 6060, 6075, 6090, 6105, 6120, 6135, 6150, 6165, 6180, 6195, 6210, 6225, 6240, 6255, 6270, 6285, 6300, 6315, 6330, 6345, 6360, 6375, 6390, 6405, 6420, 6435, 6450, 6465, 6480, 6495, 6510, 6525, 6540, 6555, 6570, 6585, 6600, 6615, 6630, 6645, 6660, 6675, 6690, 6705, 6720, 6735, 6750, 6765, 6780, 6795, 6810, 6825, 6840, 6855, 6870, 6885, 6900, 6915, 6930, 6945, 6960, 6975, 6990, 7005, 7020, 7035, 7050, 7065, 7080, 7095, 7110, 7125, 7140, 7155, 7170, 7185, 7200, 7215, 7230, 7245, 7260, 7275, 7290, 7305, 7320, 7335, 7350, 7365, 7380, 7395, 7410, 7425, 7440, 7455, 7470, 7485, 7500, 7515, 7530, 7545, 7560, 7575, 7590, 7605, 7620, 7635, 7650, 7665, 7680, 7695, 7710, 7725, 7740, 7755, 7770, 7785, 7800, 7815, 7830, 7845, 7860, 7875, 7890, 7905, 7920, 7935, 7950, 7965, 7980, 7995, 8010, 8025, 8040, 8055, 8070, 8085, 8100, 8115, 8130, 8145, 8160, 8175, 8190, 8205, 8220, 8235, 8250, 8265, 8280, 8295, 8310, 8325, 8340, 8355, 8370, 8385, 8400, 8415, 8430, 8445, 8460, 8475, 8490, 8505, 8520, 8535, 8550, 8565, 8580, 8595, 8610, 8625, 8640, 8655, 8670, 8685, 8700, 8715, 8730, 8745, 8760, 8775, 8790, 8805, 8820, 8835, 8850, 8865, 8880, 8895, 8910, 8925, 8940, 8955, 8970, 8985, 9000, 9015, 9030, 9045, 9060, 9075, 9090, 9105, 9120, 9135, 9150, 9165, 9180, 9195, 9210, 9225, 9240, 9255, 9270, 9285, 9300, 9315, 9330, 9345, 9360, 9375, 9390, 9405, 9420, 9435, 9450, 9465, 9480, 9495, 9510, 9525, 9540, 9555, 9570, 9585, 9600, 9615, 9630, 9645, 9660, 9675, 9690, 9705, 9720, 9735, 9750, 9765, 9780, 9795, 9810, 9825, 9840, 9855, 9870, 9885, 9900, 9915, 9930, 9945, 9960, 9975, 9990, 10005, 10020, 10035, 10050, 10065, 10080, 10095, 10110, 10125, 10140, 10155, 10170, 10185, 10200, 10215, 10230, 10245, 10260, 10275, 10290, 10305, 10320, 10335, 10350, 10365, 10380, 10395, 10410, 10425, 10440, 10455, 10470, 10485, 10500, 10515, 10530, 10545, 10560, 10575, 10590, 10605, 10620, 10635, 10650, 10665, 10680, 10695, 10710, 10725, 10740, 10755, 10770, 10785, 10800, 10815, 10830, 10845, 10860, 10875, 10890, 10905, 10920, 10935, 10950, 10965, 10980, 10995, 11010, 11025, 11040, 11055, 11070, 11085, 11100, 11115, 11130, 11145, 11160, 11175, 11190, 11205, 11220, 11235, 11250, 11265, 11280, 11295, 11310, 11325, 11340, 11355, 11370, 11385, 11400, 11415, 11430, 11445, 11460, 11475, 11490, 11505, 11520, 11535, 11550, 11565, 11580, 11595, 11610, 11625, 11640, 11655, 11670, 11685, 11700, 11715, 11730, 11745, 11760, 11775, 11790, 11805, 11820, 11835, 11850, 11865, 11880, 11895, 11910, 11925, 11940, 11955, 11970, 11985, 12000, 12015, 12030, 12045, 12060, 12075, 12090, 12105, 12120, 12135, 12150, 12165, 12180, 12195, 12210, 12225, 12240, 12255, 12270, 12285, 12300, 12315, 12330, 12345, 12360, 12375, 12390, 12405, 12420, 12435, 12450, 12465, 12480, 12495, 12510, 12525, 12540, 12555, 12570, 12585, 12600, 12615, 12630, 12645, 12660, 12675, 12690, 12705, 12720, 12735, 12750, 12765, 12780, 12795, 12810, 12825, 12840, 12855, 12870, 12885, 12900, 12915, 12930, 12945, 12960, 12975, 12990, 13005, 13020, 13035, 13050, 13065, 13080, 13095, 13110, 13125, 13140, 13155, 13170, 13185, 13200, 13215, 13230, 13245, 13260, 13275, 13290, 13305, 13320, 13335, 13350, 13365, 13380, 13395, 13410, 13425, 13440, 13455, 13470, 13485, 13500, 13515, 13530, 13545, 13560, 13575, 13590, 13605, 13620, 13635, 13650, 13665, 13680, 13695, 13710, 13725, 13740, 13755, 13770, 13785, 13800, 13815, 13830, 13845, 13860, 13875, 13890, 13905, 13920, 13935, 13950, 13965, 13980, 13995, 14010, 14025, 14040, 14055, 14070, 14085, 14100, 14115, 14130, 14145, 14160, 14175, 14190, 14205, 14220, 14235, 14250, 14265, 14280, 14295, 14310, 14325, 14340, 14355, 14370, 14385, 14400, 14415, 14430, 14445, 14460, 14475, 14490, 14505, 14520, 14535, 14550, 14565, 14580, 14595, 14610, 14625, 14640, 14655, 14670, 14685, 14700, 14715, 14730, 14745, 14760, 14775, 14790, 14805, 14820, 14835, 14850, 14865, 14880, 14895, 14910, 14925, 14940, 14955, 14970, 14985, 15000, 15015, 15030, 15045, 15060, 15075, 15090, 15105, 15120, 15135, 15150, 15165, 15180, 15195, 15210, 15225, 15240, 15255, 15270, 15285, 15300, 15315, 15330, 15345, 15360, 15375, 15390, 15405, 15420, 15435, 15450, 15465, 15480, 15495, 15510, 15525, 15540, 15555, 15570, 15585, 15600, 15615, 15630, 15645, 15660, 15675, 15690, 15705, 15720, 15735, 15750, 15765, 15780, 15795, 15810, 15825, 15840, 15855, 15870, 15885, 15900, 15915, 15930, 15945, 15960, 15975, 15990, 16005, 16020, 16035, 16050, 16065, 16080, 16095, 16110, 16125, 16140, 16155, 16170, 16185, 16200, 16215, 16230, 16245, 16260, 16275, 16290, 16305, 16320, 16335, 16350, 16365, 16380, 16395, 16410, 16425, 16440, 16455, 16470, 16485, 16500, 16515, 16530, 16545, 16560, 16575, 16590, 16605, 16620, 16635, 16650, 16665, 16680, 16695, 16710, 16725, 16740, 16755, 16770, 16785, 16800, 16815, 16830, 16845, 16860, 16875, 16890, 16905, 16920, 16935, 16950, 16965, 16980, 16995, 17010, 17025, 17040, 17055, 17070, 17085, 17100, 17115, 17130, 17145, 17160, 17175, 17190, 17205, 17220, 17235, 17250, 17265, 17280, 17295, 17310, 17325, 17340, 17355, 17370, 17385, 17400, 17415, 17430, 17445, 17460, 17475, 17490, 17505, 17520, 17535, 17550, 17565, 17580, 17595, 17610, 17625, 17640, 17655, 17670, 17685, 17700, 17715, 17730, 17745, 17760, 17775, 17790, 17805, 17820, 17835, 17850, 17865, 17880, 17895, 17910, 17925, 17940, 17955, 17970, 17985, 18000, 18015, 18030, 18045, 18060, 18075, 18090, 18105, 18120, 18135, 18150, 18165, 18180, 18195, 18210, 18225, 18240, 18255, 18270, 18285, 18300, 18315, 18330, 18345, 18360, 18375, 18390, 18405, 18420, 18435, 18450, 18465, 18480, 18495, 18510, 18525, 18540, 18555, 18570, 18585, 18600, 18615, 18630, 18645, 18660, 18675, 18690, 18705, 18720, 18735, 18750, 18765, 18780, 18795, 18810, 18825, 18840, 18855, 18870, 18885, 18900, 18915, 18930, 18945, 18960, 18975, 18990, 19005, 19020, 19035, 19050, 19065, 19080, 19095, 19110, 19125, 19140, 19155, 19170, 19185, 19200, 19215, 19230, 19245, 19260, 19275, 19290, 19305, 19320, 19335, 19350, 19365, 19380, 19395, 19410, 19425, 19440, 19455, 19470, 19485, 19500, 19515, 19530, 19545, 19560, 19575, 19590, 19605, 19620, 19635, 19650, 19665, 19680, 19695, 19710, 19725, 19740, 19755, 19770, 19785, 19800, 19815, 19830, 19845, 19860, 19875, 19890, 19905, 19920, 19935, 19950, 19965, 19980, 19995, 20010, 20025, 20040, 20055, 20070, 20085, 20100, 20115, 20130, 20145, 20160, 20175, 20190, 20205, 20220, 20235, 20250, 20265, 20280, 20295, 20310, 20325, 20340, 20355, 20370, 20385, 20400, 20415, 20430, 20445, 20460, 20475, 20490, 20505, 20520, 20535, 20550, 20565, 20580, 20595, 20610, 20625, 20640, 20655, 20670, 20685, 20700, 20715, 20730, 20745, 20760, 20775, 20790, 20805, 20820, 20835, 20850, 20865, 20880, 20895, 20910, 20925, 20940, 20955, 20970, 20985, 21000, 21015, 21030, 21045, 21060, 21075, 21090, 21105, 21120, 21135, 21150, 21165, 21180, 21195, 21210, 21225, 21240, 21255, 21270, 21285, 21300, 21315, 21330, 21345, 21360, 21375, 21390, 21405, 21420, 21435, 21450, 21465, 21480, 21495, 21510, 21525, 21540, 21555, 21570, 21585, 21600, 21615, 21630, 21645, 21660, 21675, 21690, 21705, 21720, 21735, 21750, 21765, 21780, 21795, 21810, 21825, 21840, 21855, 21870, 21885, 21900, 21915, 21930, 21945, 21960, 21975, 21990, 22005, 22020, 22035, 22050, 22065, 22080, 22095, 22110, 22125, 22140, 22155, 22170, 22185, 22200, 22215, 22230, 22245, 22260, 22275, 22290, 22305, 22320, 22335, 22350, 22365, 22380, 22395, 22410, 22425, 22440, 22455, 22470, 22485, 22500, 22515, 22530, 22545, 22560, 22575, 22590, 22605, 22620, 22635, 22650, 22665, 22680, 22695, 22710, 22725, 22740, 22755, 22770, 22785, 22800, 22815, 22830, 22845, 22860, 22875, 22890, 22905, 22920, 22935, 22950, 22965, 22980, 22995, 23010, 23025, 23040, 23055, 23070, 23085, 23100, 23115, 23130, 23145, 23160, 23175, 23190, 23205, 23220, 23235, 23250, 23265, 23280, 23295, 23310, 23325, 23340, 23355, 23370, 23385, 23400, 23415, 23430, 23445, 23460, 23475, 23490, 23505, 23520, 23535, 23550, 23565, 23580, 23595, 23610, 23625, 23640, 23655, 23670, 23685, 23700, 23715, 23730, 23745, 23760, 23775, 23790, 23805, 23820, 23835, 23850, 23865, 23880, 23895, 23910, 23925, 23940, 23955, 23970, 23985, 24000, 24015, 24030, 24045, 24060, 24075, 24090, 24105, 24120, 24135, 24150, 24165, 24180, 24195, 24210, 24225, 24240, 24255, 24270, 24285, 24300, 24315, 24330, 24345, 24360, 24375, 24390, 24405, 24420, 24435, 24450, 24465, 24480, 24495, 24510, 24525, 24540, 24555, 24570, 24585, 24600, 24615, 24630, 24645, 24660, 24675, 24690, 24705, 24720, 24735, 24750, 24765, 24780, 24795, 24810, 24825, 24840, 24855, 24870, 24885, 24900, 24915, 24930, 24945, 24960, 24975, 24990, 25005, 25020, 25035, 25050, 25065, 25080, 25095, 25110, 25125, 25140, 25155, 25170, 25185, 25200, 25215, 25230, 25245, 25260, 25275, 25290, 25305, 25320, 25335, 25350, 25365, 25380, 25395, 25410, 25425, 25440, 25455, 25470, 25485, 25500, 25515, 25530, 25545, 25560, 25575, 25590, 25605, 25620, 25635, 25650, 25665, 25680, 25695, 25710, 25725, 25740, 25755, 25770, 25785, 25800, 25815, 25830, 25845, 25860, 25875, 25890, 25905, 25920, 25935, 25950, 25965, 25980, 25995, 26010, 26025, 26040, 26055, 26070, 26085, 26100, 26115, 26130, 26145, 26160, 26175, 26190, 26205, 26220, 26235, 26250, 26265, 26280, 26295, 26310, 26325, 26340, 26355, 26370, 26385, 26400, 26415, 26430, 26445, 26460, 26475, 26490, 26505, 26520, 26535, 26550, 26565, 26580, 26595, 26610, 26625, 26640, 26655, 26670,

Amélioration des techniques d'extraction de principes actifs des plantes

PHENOLICS COMPOUNDS FROM *Ximenia americana* ROOTS

Keamogne^{1*} S. B., Vardamides J. C.,² dongmo A.,³ Tchatchueng³ J. B. Ngassoum³ M.

¹Laboratory of Chemistry, Faculty of Science, P.O. Box 24157, University of Douala, Cameroon

²Laboratory of Biology, Faculty of Science, P.O. Box 24157, University of Douala, Cameroon

³Laboratory of Applied Chemistry, P.O.Box 455 ENSAI Ngassoundé, Cameroon

keamogneadoc@yahoo.fr

BACKGROUND

In Cameroon, the plant kingdom represents an almost inexhaustible source of biologically active compounds. The problem of reliable extraction technology has made drugs very expensive. Traditional extraction methods used in Cameroon like pressing, distillation, isothermal extraction are both time consuming and wasteful in terms of the required solvent.

Nowadays microwave heating source has demonstrated to be an alternative energy not only in house use but also in research work¹⁻². This source of energy is rather clean, energy saving, faster and has a better yield. Until now, the extraction of *Ximenia americana* active compounds with microwave assisted extraction method has not been reported.

RESEARCH PURPOSE

MAIN OBJECTIVE:

Evaluate the efficiency of household microwaves

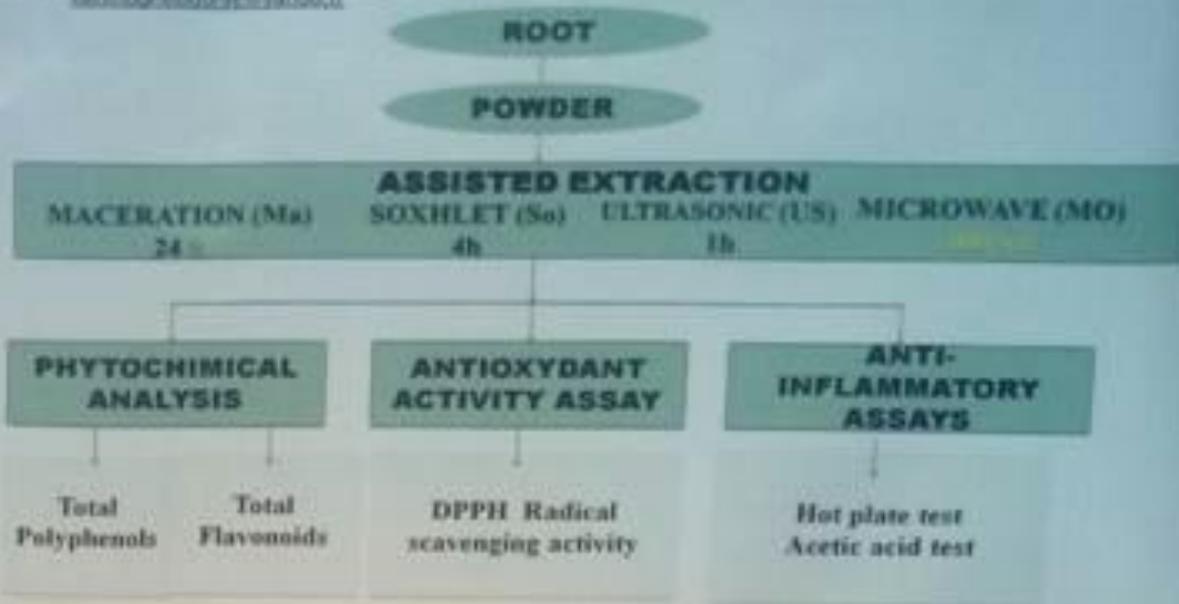


Fig.3-Sample treatment and Extraction Methodology

RESULTS & DISCUSSION

Table 1-Yield and phytochemical composition

Résultats disponibles

ENVIRONNEMENTAL: 224 Plantes médicinales à effets antimalariques identifiées (Zofou D)

++ Répulsifs : Huile d'amande de noix de palme

++ Larvicides : noix de coco

SOCIOLOGIQUE: CAP en rapport avec prévention et traitement



Gnetum spp



**Richesses naturelles
disponibles**



Irvingia gabonensis



Carica papaya

Cymbopogon citratus (Citronnelle)



Antiparasitaire et répulsif de moustiques

Elaeis guineensis

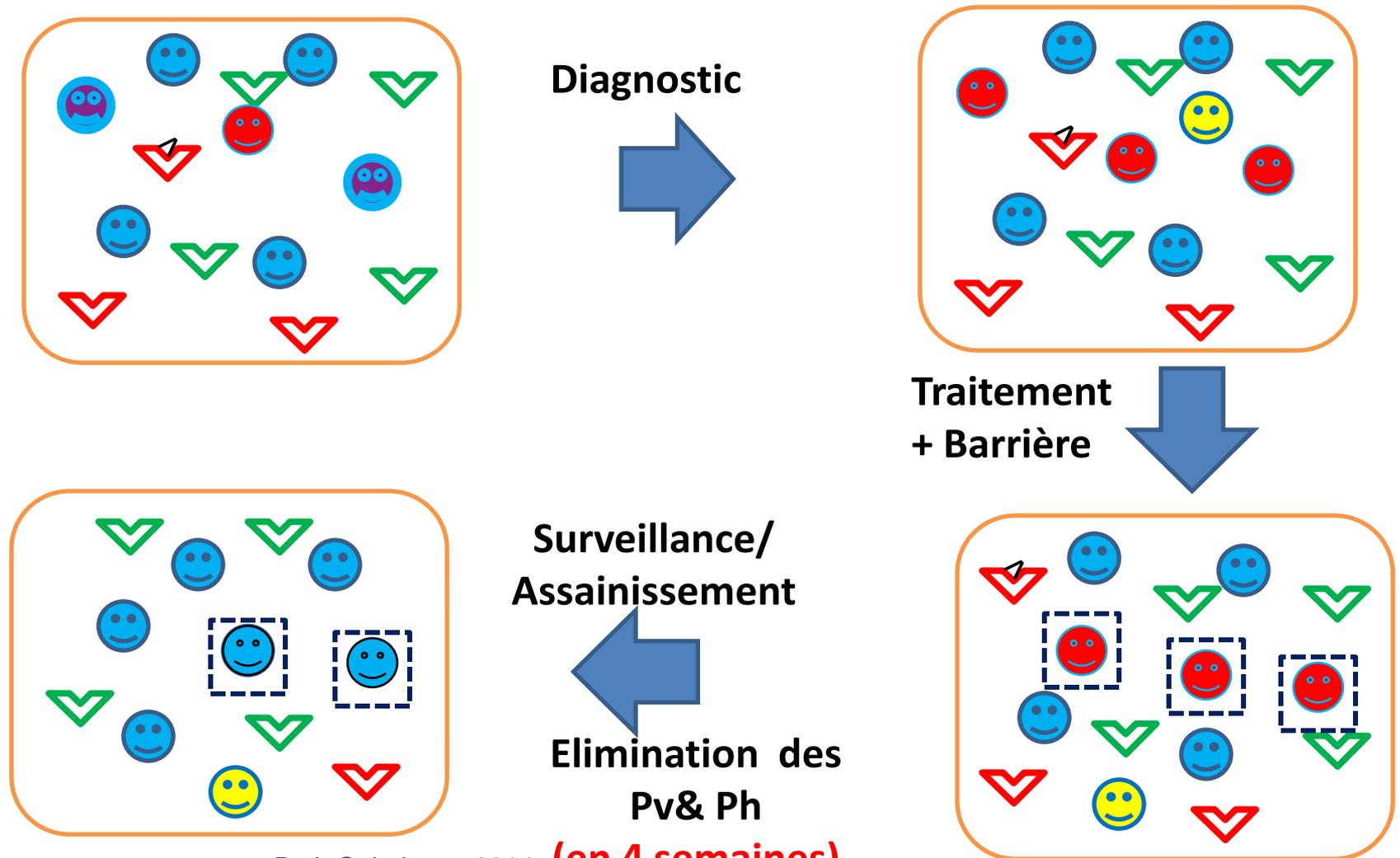


Amande de noix de palme
Huile utilisée comme lotion
dermatologique : répulsif



L'élimination du paludisme est
actuellement possible en Afrique
subsaharienne

3. Proposition de l'approche DTB pour l'élimination du paludisme



Pr. L.G. Lehman 2014 (en 4 semaines)

4. Quelques pistes de solutions basées sur nos richesses traditionnelles

Identifier les substances naturelles médicinales, insecticides, larvicides et répulsives

(Historique: Indications, posologies, effets secondaires)

Améliorer les processus de récolte, extraction, production, utilisation, conservation

- Partie (racine, tige, écorce, feuille, graines, fleur, fruit, noyau...)
- Période (diurne, nocturne, saisonnière...)

D



T + B

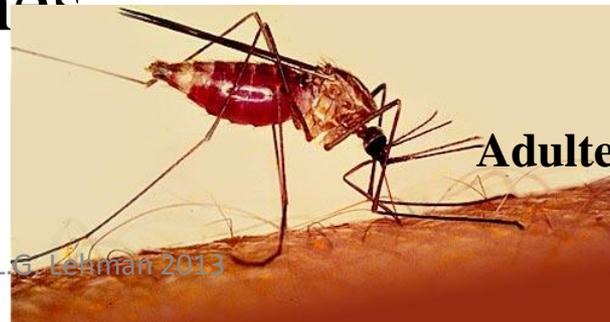
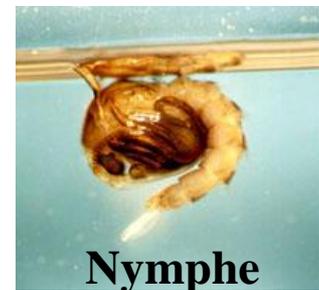
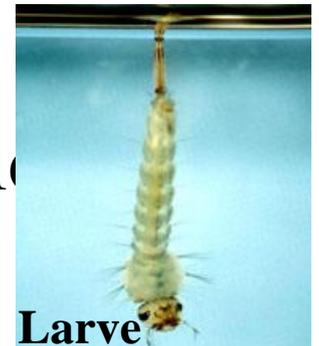
Éliminer les moustiques en stades aquatiques et après leur repas sanguins

Anophèle femelle: hématoophage

Anophèle male: nutrition végétale

4 stades de vie:

- Œuf : éclosions 2 à 3 jrs en climat tropical
- Larve: 5 jrs minimum
- Nymphe: 2 à 3jrs
- Adulte: 3 à 6 semaines



Etudes des CAP traditionnelles et actuelles



Malade hospitalisés sans moustiquaire

CONCLUSION

**Les pré-requis naturels et technologiques
pour l'élimination du paludisme sont
disponibles**

L'approche doit être pluridisciplinaire, synchronisée et basée
sur nos richesses intellectuelles et matérielles

MERCI

www.ured-douala.com