



CONFERENCE

HEALTH & EDUCATION IN AFRICA

*Fighting malaria & dysentery in Africa to improve access to
quality basic education:
pathways to a sustainable grassroots approach*

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European Parliament

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REPORT



Participation

- 145 registrations
- About 100 participants

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Opening

Mrs. Véronique De Keyser, Member of the European Parliament and member of the Human Rights and Development Commissions of the European Parliament, opened the conference organized on the occasion of the International Day of the African Child by stating that it is fully justified to tackle jointly the subject of health and education on this day since a majority of malaria victims in Africa are children. She also reiterated the European Parliament's dedication to achieve the Millennium Development Goals with a special focus on children and mothers in their fight against poverty and for a better health. If the European Parliament supports multilateral initiatives such as the World Fund against Malaria, Tuberculosis and HIV/AIDS, it also calls for an increased commitment of the European Commission to support endogenous and sustainable forms of social and health assistance in developing countries based on own resources. Taking into account endogenous resources can be done by following some well-marked roads, but also by opting for more creative, innovative – and at times, hazardous – paths. The road chosen by IDAY and IFBV comes within such innovative strategies that seek ways to fight malaria others than the classic ones. In this regard, Mrs De Keyser congratulated the organisers of this event for exposing the hidden costs of diseases like malaria and dysentery on education in Africa and for examining alternative treatment approaches that may lead the way to new perspectives beyond those recommended by the pharmaceutical industry.

This introduction was followed by the reading of the **Message of Yaguine & Fodé** by **Mrs Marième Diop**, a Senegalese student who had represented the African youth during the June 16 commemorations at the European Parliament in 2007. With one minute of silence, the participants honoured the two Guinean boys and all those children and youngsters who, like them, failed to make their dream come true due to Europe and Africa's failure to respect their rights.

The hidden burden of malaria: learning troubles linked to the disease

Speaker: **Dr Josselin Thuilliez**, CES-TEAM, University Paris 1 Panthéon-Sorbonne & CNRS

In this first session, the impact of malaria on education was examined by **Dr Josselin Thuilliez**, researcher at the Paris 1 University and author of a thesis on the impact of malaria on children's health and education in Mali. He first recalled the health "cost" of malaria: more than 1 million dead in the world per year, 46 millions of life years lost, 500 million of clinical cases, etc. With 90% of these cases, Africa is the worst hit continent: there, malaria represents the equivalent of 3 tsunamis per year in terms of deaths; the disease is the first cause of mortality for children under 5 years of age in Sub-Saharan Africa. Yet only 35% of the infected persons are properly treated. In addition to the human cost of malaria, a large number of economists estimate that it significantly impacts economic growth (by up to -0,3% GDP/head). Dr Thuilliez further insisted that the asymptomatic¹ forms of malaria being frequent, the health, social and economic impact of malaria is probably largely underestimated.

In general, the impact of malaria on education remains poorly quantified. There are four ways to analyse it with more or less well controlled medical evidence:

- 1) *Neurologic malaria*. The impact on children's physical and neurological development is well established: it is a severe form usually provoking neurological comas. Roughly, neurological malaria affects about 10% of the children aged 0-15 who develop a normal malaria; 70% survive, but 30% of these 70% keep long-term knowledge after-effects – sometimes semi-paralysis that can prevent them from even attending school.
- 2) *Malaria for pregnant women*. The impact is intuitive but little known. Malaria is the first cause of premature births in Africa (about 30%). When improperly taken care of, these have important effects on the child's growth pattern, his physical and knowledge capabilities and hence on his education.

¹ Presence of parasites in the blood without observed clinical symptoms (fever, headaches ...).

- 3) *Clinical malaria*. The most frequent form affecting African children. It shows through classical symptoms (fever, etc) with direct consequences on education: absenteeism, diminished attention abilities and school performance, etc.
- 4) *Asymptomatic malaria*. This form has hidden effects: one does not see the impact of the parasite and does not know the impact on the cognitive capabilities of the children.

Very few studies on the 3rd et 4th forms of malaria exist, except for a few in Sri Lanka, Kenya and The Gambia. Nor has any study been ever carried out over time, e.g. over 1 or 2 years. However, research on the evolution of the disease in countries where eradication campaigns were conducted found – not only in poor countries, but also USA, Italy, Brazil, Paraguay, Sri Lanka – that literacy was achieved more rapidly. Hence, **historical evidence suggests that malaria has an impact, whether hidden or not, on education.**

In addition, when overlapping education indicators and malaria prevalence maps, one observes that:

- At international and community levels, the hardest hit countries have illiteracy levels higher than 11%, primary completion rates of less than 40%, and repeaters' rates significantly higher than in countries without malaria;
- **At the community level, the hidden impact of asymptomatic malaria is felt on the children's school results.** One can indeed note that this form of malaria impacts on school performance, psychological and knowledge capabilities of the children – this impact being less than that of symptomatic malaria. The impact increases as the parasite charge rises.
- **Clinical malaria is the first cause of school absenteeism among children.** As for the impact of asymptomatic malaria on absenteeism, it is difficult to confirm without conducting daily measurements on the children.

Dr Thuilliez **concluded to a hidden effect of malaria, particularly in its asymptomatic form, on the children because of its impact on cognitive capabilities and the psychological condition of those affected.** This conclusion requires further confirming studies, but it opens reflection on several issues:

- What impact could these results have on treating asymptomatic malaria in the framework of the eradication of malaria? This concerns the concentration of the parasite reservoirs, since asymptomatic cases, by definition, do not generate treatment of the persons affected.
- Do the benefits of asymptomatic infection (reinforcement of the individuals' immunity) exceed the long term costs (knowledge and neurological negative effects)? This question has a direct incidence on the choice of control policies of endemic and epidemic diseases.
- Changing the social perception of the disease would open new perspectives in terms of prevention. The effects of malaria are rarely mentioned in speeches on education and health at the village level.
- **Schools are a promising dissemination channel for fighting malaria,** especially in isolated areas where teachers may be the only literate persons in a village.

During the discussion, participants stressed the important role of **prevention** as well as the early identification methods, in particular to avoid that simple malaria develops into a neurological form that is often deadly for the children. As an example, **the case of the Kenyan schools was mentioned to illustrate the positive impact on education of malaria prevention.** The use of *Artemisia annua* tea in some schools to fight malaria from June 2010 to February 2011 has resulted in the sharp drop in absenteeism and the improvement of academic results. Dr Thuilliez underscored the need to systematically measure these elements in order to establish scientifically the impact of fighting malaria on education. As to the link between poverty and malaria, a correlation can be established a macro level, but the relation is not clear at community level where other factors like mothers' education level, promiscuity (number of persons per room) or the use of bed-nets seem more relevant than wealth – mosquitoes bite indistinctively.

The medical challenge: fighting malaria with *Artemisia annua* under various forms – tea, capsules, extracts?

Moderator: **Pr Joëlle Quetin-Leclercq**, Dean of SSS/FASB – Faculty of Pharmacy and Biomedical Science UCL-Brussels

Panel: **Dr Pierre Lutgen**, IFBV & Belherb; **Pr Jonas Kouamouo**, University of the Mountains; **Dr Merlin Willcox**, Research Initiative for Traditional Antimalarial Methods (RITAM)

Pr Joëlle Quetin-Leclercq, dean of the Faculty of Pharmacy and Biomedical Science of UCL-Brussels, introduced the subject by raising the issue of **resistances of the parasite to medical treatments**. Numerous researches cover this topic. *Artemisia annua*, a plant used in traditional Chinese medicine, appears today as one of the most promising solutions thanks to the artemisinin molecule it contains, a substance that is generally considered as the most efficient one to fight malaria – although not necessarily the only one, and the way it acts remains partly unknown. The chemical specifications of artemisinin (low solubility, rapidly active) render its administration difficult and entail risks of relapse and resistance, therefore recommended usually combine it with other elements (Artemisinin Combined Therapy, ACT) to ensure continuity in the treatment and the quasi eradication of the parasite.

The question is whether to **use the plant directly in its natural form as a tea**, as it has been for thousand years in China, instead of extracting its presumably active molecules. As Pr Quetin-Leclercq recalled, the plant has shown to be effective despite some reservations as to the changing content of artemisinin in different varieties of *Artemisia annua*. Still, several studies demonstrated that **other components in the plant act synergistically with artemisinin**, thus confirming that it is not the only active molecule. These other components could allow for lower artemisinin content in the tea to achieve the same efficiency as when the molecule is taken in isolation. Several recent scientific publications indicate that malaria could be treated with lesser artemisinin doses in the tea than those recommended in medical treatments. In addition, since the tea is **a natural poly-treatment due to its combination of various molecules**, it could represent a lesser risk of developing resistance – albeit not necessarily nil.

The way the plant is administrated can influence the efficacy of the treatment. Use of standardized extracts of the dried plant, capsules or doses could allow to better control the chemical content of the treatment as well as facilitate administration. In the meantime, **additional research is required** to determine the chemical composition of the plant and the synergetic activity of its components besides artemisinin.

Dr Pierre Lutgen insisted on **the limits observed with the « classical » treatments of malaria**, starting with the problems of resistance to the ACT: many pills sold on the market show resistances rates of up to 70%, without mentioning the perverse effects often observed. These resistances are confirmed by dozens of scientific reports. One also observes that ACTs are no longer efficient in a number of countries. The World Health Organisation (WHO) admits that only 3% of the African population have access to these treatments, which very likely excludes the poorest and most vulnerable people. As to the bed-nets coverage is at best 35%. Indoor fumigation (with or without DDT) covers only 10% of the houses, while this very method was the one that was used in Europe, Russia and elsewhere to eradicate malaria after the Second World War. In Dr Lutgen's eyes, these observations call for **greater interest in exploring alternatives to efficiently fight malaria in Africa**. Among them, the *Artemisia annua* plant whose tea shows efficiency results beyond 90% without resistances nor secondary effects for 2000 years², and whose low cost and easy local access (if cultivated by the population) are all answers to the limits of the other "classical" approaches.

² See on the subject a whole series of studies including: a study conducted by the University of the Mountains in Cameroon indicating the absence of late therapeutic failure (no relapse), contrary to the use of artemisinin (12% of relapse); a study in Mozambique with hybrid tea; *in vitro* results obtained with tea by Pr Ousmane Sarr in Senegal which

Ongoing research must be continued to determine rigorously what are the active components in the tea and how they operate. One observes for instance that the tea of Luxemburg origin, which is very poor in artemisinin, has a stronger immuno-stimulating impact than the one from Cameroon, which has higher contents of artemisinin. This scientific result remains unexplained but it would indicate, as suggested earlier by Pr Quetin-Leclercq, that the other elements are also active. Artemisinin plays a key role as peroxide burning the plasmodium in the blood, but there is presumably enough of it in all teas whatever the content. To be noted that the stems, which the Chinese used as well, contain highly active components but low levels of artemisinin. Finally, the tea and the artesunate³ have a gametocytocide effects that ACTs lacks. The *Artemisia annua* tea kills the gametocytes after 5 days, which means that malaria cannot be transmitted from human beings back to mosquitoes thus making it possible to end the transmission cycle. **All these observations open the door to a change in strategy.** The WHO for instance recognizes that in cases of serious malaria outbreak, it would be better to use artesunate in *monotherapy* to save the lives of children in coma. In this case, it would be advisable to use instead extracts of the *Artemisia annua* plant that would also contain other active ingredients.

Dr Lutgen stressed that the goal of IFBV and IDAY is not to supply *Artemisia annua* tea to Africa as it would simply be a repetition of the current dependency on outside medication. The aim is to **encourage local production of the plant and the tea in Africa by the population for immediate access** and thus **avoid counterfeits**. Plantations exist today in about 12 African countries⁴.

Dr Jonas Kouamouo, researcher at the University of the Mountains, explained that in Cameroon like in many African countries, malaria is a major public health problem representing 35-40% of medical consultations. ACTs are the privileged method upon recommendation of the WHO. But, as exposed earlier, they have serious shortcomings because of their high cost and counterfeits. In Cameroon, *Artemisia annua* cultivation was launched about 5 years ago with two possible outcomes: utilisation as a basis for the production of antimalarial products by the pharmaceutical industry (ACT); or direct use as tea or in other forms by the population. Researchers of the University of the Mountains have undertaken to **study the quality** of the ACTs distributed in the country, in particular the artesunate, and that of the *Artemisia annua* plants cultivated in the West of the country, and to compare the effects of the ACTs and the tea in the fight against malaria.

Concerning pharmaceutical treatments, this research has revealed that the quality of the products available in pharmacies or on the market (e.g. on the street) varies enormously, with contents often badly proportioned. This means that numerous counterfeits are available on the market, which facilitates appearance of resistances. Controlling the quality of the products, albeit indispensable, remains difficult.

Researchers studied the botanical and biochemical characteristics of *Artemisia annua*. For the crop, it appears that *Artemisia annua* grows well in Cameroon where it is well distributed in the Western part of the country. Ideal growing conditions are: altitude, ferrallitic soils, temperature between 15-25°C. As to the plant content, analyzes show **the heterogeneity of the components of teas coming from various origins**⁵. In particular, it appears that artemisinin concentrations are generally higher in tropical zones than in temperate areas.

Comparison of the therapeutic effects of artemisinin-based medication with those of the Cameroones *Artemisia annua* tea using WHO validation criteria reveals a drop in parasitemia and temperature after 2-3 days in all protocols. These drops, however, are lesser with artesunate alone than with the *Artemisia annua*

confirm its efficacy; report by Dr Martin Wilcox; conclusive tests conducted in Indian villages; empiric results in Kenya and elsewhere; ongoing clinical tests in Colombia, Benin and Brazil.

³ Artemisinin component soluble in water giving perparations that can be injected in het bloodstream.

⁴ African farmers launched large scale production of *Artemisia annua* encouraged by pharmaceutical companies for the extraction of artemisinin for sale of medication. The sharp fall in prices is a disaster for these farmers who leave their fields unharvested..

⁵ The average content of artemisinin in plants harvested in Cameroon is 11,1 mg/kg, (ranging from 0,4 to 19,2 mg/kg), a much higher content than that found in the Luxembourg tea. Concentrations of scopoletin represent about 1/5 of the artemisinin content in all samples analyzed. Very high contents of camphor were also observed in most samples from Cameroon, higher than in those from Luxembourg.

tea. Furthermore, analysis of sample treatments containing a combination of artesunate-amodiaquin reveals a late failure rate of 14,5%. A relapse of parasitemia is also observed in samples treated with *Artemisia annua* tea at D-7 and D-14 when stopping treatment at D-5. But no failure is observed with teas taken over 7 days, demonstrating the need to complete the treatment over 7 days.

Dr Kouamouo concluded that **treatment of malaria with *Artemisia annua* tea during 7 days is at least equally effective as with ACTs, and possibly more.** He therefore recommended **encouraging the growing of the plant by farmers for direct use as a tea.**

Clinical researcher at the University of Oxford, coordinator of the Research Initiative for Traditional Antimalarial Medicine (RITAM), **Dr Merlin Wilcox** works since 1997 on medical plants used against malaria, including *Artemisia annua*. His intervention focused on a few points raised by preceding presentations.

1. Children:

All clinical tests have so far been carried out on adults. It is a fact worth noting because malaria is so endemic in Africa that after a certain age, people develop partial immunity (symptoms of flue remain) resulting in few deaths of individuals above 5 years of age. On the contrary, serious malaria affects children aged less than 5 in zones of high malaria prevalence in Africa.

A retrospective study of pharmaco-vigilance published in the *Malaria Journal* which evaluated Anamed⁶ programmes indicates that some of the persons interviewed find the tea less effective on children because they have lower immunity.

2. Adverse effects:

No medication has zero adverse effects. There are indeed less such effects with natural tea but it has drawbacks with respect to administration (sour taste, oral absorption of capsules difficult for children, especially in serious malaria outbreaks ...). Dr Wilcox thus recommended to use suppositories, artesunate injections in monotherapy to start with. When the patient becomes conscious again and is capable of swallowing, then another oral polytherapy treatment can be applied.

3. Clearance of the parasitemia:

The importance / usefulness of eliminating the parasite is debatable: the first presentation of the day suggested that it may be important because of the effects on asymptomatic carriers. But it also questioned the benefits of a full elimination of the parasites compared to the sanitary risks it entails. The elimination of parasites is not necessarily useful or recommended in the context of high transmission rates of malaria as it is the case in most of Africa. Several studies conducted in the framework of vaccines trials find that patients indeed have no malaria during the 4-6 weeks that follow the elimination of the parasites. However, after 6 weeks, they show more severe clinical malaria than patients whose parasites were not totally eradicated. This can presumably be explained by the immunity level maintained in the presence of a few parasites and that is lost when the parasite are totally eliminated. When a mosquito stings such a patient, he/she has a greater chance to develop clinical malaria.

4. Prevention:

Dr Wilcox called for prudence with preventive treatment of malaria by daily intake of *Artemisia annua* tea. Artemisinin absorbed through the intake of one cup of tea remains in the blood for about 2-3 hours. If it really is the major element to fight malaria, one should drink 4-5 cups a day to maintain protection. There has been so far no clinical trial on preventive treatment of malaria with *Artemisia annua* (even if interesting yet unpublished results seem to have been found in Kenya). According to Dr Wilcox, it would be preferable to take proven antimalarial medication like Malarone rather than the tea to prevent malaria, especially for Europeans who have no immunity and carry a higher risk to develop serious forms of malaria.

In conclusion, far from being negative about treatment of malaria with medical herbs, Dr Wilcox underlines that **plants certainly have a role to play** – not only *Artemisia annua* but also others that grow well in dry zones like the Sahel and have interesting anti-malaria effects – in particular in response to the problems of

⁶ German organisation working with *Artemisia annua*.

availability and of accessibility posed by ACTs. Studying these plants is crucial. At this stage however, he considered that **only for patients older than 5 has the efficiency of the plants been demonstrated**. ACTs should therefore be reserved to patients with low immunity e.g. children below 5. At any rate, **more research is required**, including on combination of *Artemisia annua* with other medical plants. The Chinese indeed never used this plant alone, and synergetic effects have for instance been observed with curcumin. This might lead to combined herbal treatments also efficient on children.

The ensuing debate showed that the doubts expressed about the efficiency of the tea⁷ stem rather from an **imperative of prudence and realism** with regards to the various antimalarial treatments, and from the will to advocate for the best adapted solution. Nevertheless, some participants expressed concern as of proposals that could lead to a two-speed health system in which the poor should content themselves with *Artemisia annua* tea treatment whose effects have not yet been all mastered, while those with adequate means could benefit from treatments recommended by medical authorities.

The agricultural Challenge: *Artemisia annua* growing by local populations and in schools

Moderator: **Pr Guy Mergeai**, Agricultural Faculty of the University of Liège – Gembloux

Panels: **Dr Tobias Arudo**, CABURAP, Kenyatta University, IDAY-Kenya; **Geert Flamang**, Foundation Maisha & Belherb; **Pr Jonas Kouamouo**, University of the Mountains (Cameroon).

Pr Guy Mergeai from the Agricultural Faculty of the University of Liège in Gembloux explained that *Artemisia annua* belongs to a plant family comprising about 200 species, many of which with medical properties. This species has its origins in the Central Asian steppes and spreads in cold temperate zones. It was recently introduced in tropical zones following the discovery of the effects of artemisinin against malaria. Hybrid varieties with high artemisinin contents have been developed and cultivated in Southern countries, mainly as a cash crop. Hybrid seed are expensive for commercial enterprises as well as for associations that use the crop directly to produce tea.

Despite the medical characteristics of *Artemisia annua*, this crop did not spread naturally on a large scale in Africa partly because of its biological characteristics. It is well adapted to other climatic conditions. *Artemisia annua* was successfully grown in Kenya, Cameroon and Tanzania at higher altitudes. **Hence, developing the crop at lower altitudes remains an agricultural challenge.**

A good example of successful growing of *Artemisia annua* to fight malaria was given by **Dr Tobias Arudo**, sociologist and lecturer at Kenyatta University in Nairobi. He explained the programme launched in 2010 in Kenya at the initiative of IDAY **to fight malaria at community level, in particular in schools with the view of improving access to school and quality of education**. Launched in 2 pilot schools in May 2010, the programme spread rapidly; about 70 schools and institutions are currently participating in 6 provinces of Kenya, left alone associations, schools, unions, local authorities who have been informed and trained on the growing and medical use of the crop through seminars and field visits of the team responsible for the project. Among the positive results obtained, Dr Arudo mentioned in particular the **therapeutic effects** (reduction of malaria cases, but also typhus, diminished menorrhoea for teenage girls) and **their direct incidence on education** (less absenteeism of students and teachers, sharp drop in health expenditures in schools making funds available for

⁷ In particular, the parasite resurgence during J15 & J28 could be explained by the failure of the treatment with *Artemisia annua* as well as by chronic asymptomatic malaria parasitism – especially in Africa; which is an area of high transmission. In the cases of *Artemisia annua*, it seems that recrudescence of the disease is not due to some resistance, but the length of the effectiveness of artemisinin – a few hours in the blood – compared to the cycle of the parasite that lasts several days.

education expenses). He also talked about **the preventive use of the plant**, not only through the repulsive effect on mosquitoes observed in cultivation areas, but also with the development of intermittent preventive treatment: tea intake during 7 consecutive days followed by one-month break, then a new intake for 7 days, etc.

From an agricultural perspective, secondary level pupils responsible for testing the crop have demonstrated a remarkable creativity and have developed **various growing techniques to overcome the problems related to climate, soil, insects and to facilitate the reproduction of the plant** (for instance, vegetative reproduction)⁸. Dr Arudo illustrated a whole series of approaches used for the crop and its reproduction. Trials conducted with primary schools have been less successful due to a lack of command of the required growing techniques. Some regions are also less favourable to the culture, for instance along the coast because of water salinity. One way to overcome these agricultural difficulties would be for well-suited areas to supply the tea to the less crop-friendly ones. This implies **a conditioning, marketing and distribution system of the tea that remains to be defined**.

In general, Dr Arudo underlined that the expansion of the crop and the use of *Artemisia annua* tea in Kenya is for the moment slowed down because of the lack of resources to meet a rapidly growing demand. Furthermore, **a systematic follow-up of the effects of the Kenya tea on health and education must be established**, including through **proper biomedical research**. He concluded by insisting on **the advantage of conducting this project through youngsters and schools**, not only because of the impact on education, but also to harness the extraordinary innovation spirit of these youngsters and their dynamism and capacity to disseminate the information in their families. IDAY Clubs have been created in Kenya: they gather students involved in the development of the crop and who are committed to act as ambassadors towards other youngsters and the whole community.

Mr Geert Flamang, a member of the Rotary and engineer by training, described the cultivation of *Artemisia annua* and use of its tea in Katanga (DRC) since 2007. The crop launched near Lubumbashi was always successful probably due to favourable altitude, climate and irrigation conditions. He presented a series of recommendations on the growing and drying methods, specifying that one plant of *Artemisia annua* can produce 75gr of tea, hence 750kg/hectare if adequate distance between the plants is maintain so that they can grow properly. This figure does not include the equivalent production of stems, which seem to have healing effects on gout, psoriasis, arthritis, cancer, as well as possibly malaria.

Mr Flamang explained that marketing efforts to cover growing and conditioning expenses have failed, not because of the price (2\$ per small bag of 100gr, which can treat 3 sick people and seems an affordable price for local population) but because of authorization⁹ issues.

⁸ Note that the seeds used are of Kenyan origin and they had adapted to local climatic conditions for about 10 years.

⁹ In DRC, only Anamed has a license to market the tea produced with its own hybrid seeds and this tea is recognised as a medication.

Adoption & appropriation of tea and derived products (capsules, extracts, syrups, etc) of *Artemisia annua* for the local population: local adoption and marketing challenges

Moderator: **Viviane Funga Mambimbi Tshela**

Panel: **Dr Yves Saint-Hillier**, ACP-Paludisme; **Dr Tobias Arudo**, CABURAP, Kenyatta University, IDAY-Kenya; **Sarah Laurent** and **Marc Wagner**, IFBV; **Hannelore Klages**, Anamed

Various **examples of local production and medical use of the plant** were given during this session. Several conditioning and distribution approaches were discussed with the aim of facilitating its adoption and dissemination among the local population.

Mrs Viviane Funga, a Rotarian of Congolese origin, explained her experience of growing *Artemisia annua* in the Lower-Congo province of DRC, the difficulties encountered and how they were overcome. Successful trials now allow for seed to be distributed to the neighbouring communities.

Another experience of using *Artemisia annua* against malaria in Mali was presented by **Pr Yves Saint-Hillier**, a retired teacher in nephrology member of the association ACP-Paludisme (France). He confirmed the agricultural difficulties of starting plantations, but also the challenges related to distribution of the tea mainly because of the reluctance of babies and toddlers towards its bitter taste. This is why the Pr Saint-Hillier thought of producing capsules with the plant, which he first tested on himself then in Mali in 2011. The initial trials conducted with the capsules proved conclusive for adults as well as for children and babies. It is even with the latter that the results were most revealing. Small capsules used as suppositories brought about a rapid normalisation, within 24 hours, of conscious, fever and tonus; after 48 hours, they were considered cured. A preventive treatment protocol is being tested, similar to that in Kenya (1 capsule per day for 6 days in the month, during 3 consecutive months in the rainy season). Another preventive protocol is being envisaged for prevention of malaria transmission during pregnancy¹⁰.

Mrs Sarah Laurent, President of IFBV, presented the history of the NGO which fights for the rights of the minorities since 30 years. Its approach is based on the concept of “economic and ecologic techniques to save lives”. Over the years, the NGO found that tropical diseases are a major problem for the youth in the Southern countries, hence its growing involvement focused on fighting malaria and dysentery with *Artemisia annua* tea.

A specialist in communication and publicity, **Mr Marc Wagner** became interested in the issue of the local availability and distribution of medical plants like *Artemisia annua* and their administration as derived products. He exposed ideas for a strategy designed to simultaneously tackle: the fight of tropical and dysenteric diseases; the distribution of means to cultivate on their own medical plants; and the creation of commercial outlets for the growers, salesmen and third services (conditioning, etc.). **Such a strategy is necessary as soon as marketing is envisaged**, not only to guarantee financial viability but also to ensure that access and quality standards are respected. This would also help prevent the emergence of monopolies and only-for-profit commercial practices. Marketing of these products would also allow the creation of quality label of the products put on the market.

Mrs Monika Hauschild, President of the French branch of the association Espérance En Casamance, presented the work and results of Dr Momodou Darboe, researcher at the National Agricultural Institute (NARI) in the Gambia, on *Artemisia annua* on his behalf¹¹. Since 2007, Dr Darboe has been **promoting *Artemisia annua* in Gambian urban communities and schools** to improve health conditions, reduce school absenteeism and

¹⁰ These 2 protocols already exist under a similar form for Sulfadoxine-Pyrimethamine (SP).

¹¹ Dr Darboe was impeached due to visa refusal.

create income opportunities for the poor. **Malaria treatment with the tea over 7 days succeeded in 98% of the cases.** The demand from schools and women associations is very strong and NARI plans to grow 2 hectares. To accelerate dissemination of the crop, Dr Darboe supplies young plants to avoid failures at the reproduction stage through seeds. This has worked well since 2 years, even when sold at a low price to cover costs. As a matter of fact, Dr Darboe and another Gambian agronomist distributed young plants during a *Artemisia annua* training seminar organised in Casamance in April 2011.

Mme Hannelore Klages presented the activities of Anamed to disseminate *Artemisia annua* among the population in Burundi. She stressed that ***Artemisia annua* remains the most efficient treatment of malaria while resistance to ACT is constantly growing.** Mrs Klages revealed that *Artemisia annua* contains 245 substances of which at least 10 are active against malaria. The plant would have multiple medical uses, including against AIDS, especially in combination with moringa (reduction of pain). Among her activities, Mrs Klages is planning the launching of a school garden in Bujumbura as well as a mobile bus to inform remote villages about the plant's use in local languages.

The main challenge is to **ensure that prescriptions are well applied**, even among people with limited access to information (absence of doctors, illiteracy...). To facilitate the autonomous use of the tea without reduction of efficacy, Mrs Klages suggested using **simple packaging adapted to the prescribed doses**, such as for instance a combined package of 21 tea bags or capsules of 5 gr for curative treatment (3 doses/day over 7 days).

These concrete implementation measures were followed by a **debate on the successful implantation of the crop and the appropriation of the plant by the local population.** Indeed, some proposals aiming at disseminating the plant on a large scale could challenge one of the main goals of this approach – ensuring accessibility to all – and thus reiterate the shortcomings of pharmaceutical treatments (cost, limited availability). The participants also wondered about the reasons for the slow dissemination of malaria treatment with *Artemisia annua* in Africa. Reasons could be: the limited availability of adapted planting material (hybrid seeds) and the limited information on the plant, the cultivation and treatment methods; the obstruction by African authorities for well-understood reasons, although their support is indispensable to spread more rapidly on a large scale the use of the plant; possible doubts among the African population from whom it is asked to operate a 180°C turn around compared with the recommendations made to them over the last 50 years, e.g. getting back to traditional herbal-based healing methods instead of using pharmaceutical products. But, as demonstrated in Kenya, **working through schools and pupils allows a rapid and large-scale dissemination** through the pupils' families. Schools can act as reproduction and distribution centres. They can also serve to better monitor agricultural and medical practices. One should also **use the radio** for wide transmission, which is densely distributed and listened to among the rural population.

Fighting diseases linked to contaminated water (*SODIS, Artemisia annua, moringa*)

Moderator: **Dr Pierre Lutgen**, IFBV & Belherb

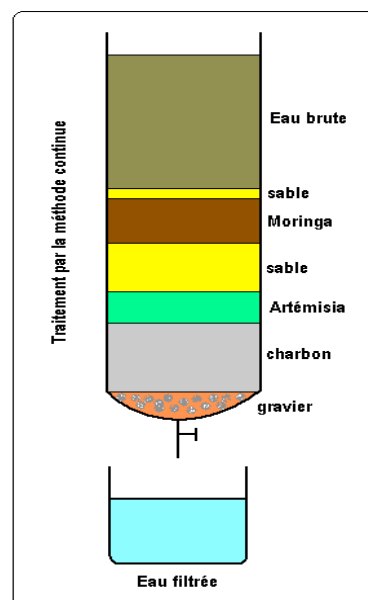
Panel: **Dr Olga Blanche Biteman**, Laboratory of Hydrosiences Lavoisier in Bangui; **Dr Iván Darío Vélez B MD PhD**, PECET, University of Antioquia in Colombia

The last session was devoted to **water treatment techniques**, a critical issue in developing countries where a large part of the population uses rainwater or water from rivers that is not always potable.

Dr Pierre Lutgen presented the results obtained in Dakar by Dr Ousmane Sarr about the effects of some plants on water quality. They confirm in particular that *Artemisia annua* tea makes water potable. Further research is needed to explain the phenomenon, but the observation is unambiguous: bacteria are killed by the tea. The SODIS method also sterilizes water by exposing it in plastic bottles to the X-Rays of the sun.

Four universities have demonstrated this strong sterilising power of *Artemisia annua* tea. **Dr Olga Biteman** presented the results of research conducted in her university on the potability of domestic waters. The challenge is huge in so far that, for instance, access to drinking water is limited to 29% of the population in Bangui. Research concerns both *Moringa olifera* for water clarification and *Artemisia annua* for its disinfection (5 gr of leaves for 250 ml of water). Moringa produces clear decanted water after 30 min and a partial disinfection as some bacteria are carried away during decantation. Filtration with organic carbon also filters out organic parts and gives clear water. *Artemisia annua* has also an efficient bacteria killing effect, but not for all bacteria. Hence the interest of combining several techniques – moringa, *Artemisia annua*, exposition to light, carbon filtration – to achieve more satisfying filtration and disinfection levels. This operation can be realised with simple materiel as illustrated in the drawing.

The current goal is to put these research findings in practice in the field.



To conclude, **Dr Ivan Velez**, a teacher and researcher from Colombia, confirmed that nowadays the problems encountered in the fight against diseases like malaria, dengue, cholera, yellow fever and leishmaniosis are mostly the scarcity and the high cost of treatments, making them inaccessible to a majority of poor people.

Dr Velez demanded that development and distribution of medication be organised outside intellectual property rights or profit-making considerations. He stressed the role of civil society to get governments to adopt appropriate measures and the importance of the dialogue between them and the authorities. More support must be given to NGOs that explore alternative approaches to fight these diseases at minimum cost. In particular, one should urgently review the traditional medical techniques and integrate them in modern medicine.

CONCLUSIONS

Chaired by **Mr Charles Goerens**, Member of the European Parliament and Vice-President of the Delegation to the Joint Parliamentary Assembly ACP-EU.

Mediator: **Jean-Jacques Schul**, IDAY-International.

Panel: mediators of previous sessions.

The hidden and obvious effects of malaria on education must lead to a better acknowledgment of health issues by all stakeholders in the education sector. It is of paramount importance to adopt a holistic approach in which health issues are taken into account when it comes to improving access, retention and quality of education. Awareness must be raised at community level on the links and reciprocal effects between health and education.

1. Pharmaceutical treatments of diseases like malaria and dysentery pose serious accessibility and efficacy problems. Hence, **research on alternative treatments must be intensified to obtain solid scientific evidence**. Simultaneously, combined use of various approaches is recommended to raise the chances of success. Led by medical, social, and agricultural specialists, research must as much as possible be conducted in relation with the African authorities. It must be relayed by the African – and European – civil society when it comes to disseminating the information and conducting advocacy and awareness raising at all levels, but also implementing the results in the field.
2. **Mr Goerens** stressed in his closing remarks the importance of civil society mobilisation to move out of beaten track and explore alternative approaches to fight malaria and other tropical diseases. This dynamic is needed to avoid single-mindedness and accompany the authorities in the search for solution. In this regard, the conclusions of this day ought to be communicated to the national, regional and multilateral authorities (including the WHO and the Global Fund against Tuberculosis, Malaria and HIV/AIDS) so that ideas can be exchanged.

In Europe, it is precisely associations like the ones that organised this conference that **bridge the gap between European public authorities and the African civil society**. As to Africa, the responsibility of the States – a goal justifying the EU's growing use of budgetary financing – implies that **African governments accept the counter-power of civil society and especially of local organisations**. In countries where the task exceeds the capacity of the State, local authorities and associations have a role to play to build efficient and democratic local governance. The African civil society must be involved at the forefront by engaging both in the field and in advocacy for the development of efficient treatments accessible to all.

3. **The therapeutic effect of *Artemisia annua* against malaria is observed empirically and several studies seem to confirm this efficacy** otherwise demonstrated by its use in traditional medicine. Studies like those conducted in Cameroon show that **treatment with the *Artemisia annua* tea is at least as efficient as the classic medical treatments (ACT) if not more**. At least 245 active substances have been identified, including artemisinin whose antimalaria capacity have been proven, justifying its marketing as a pure molecule. Several studies, however, including a series of *in vitro* and *in vivo* tests, indicate that **the artemisinin content is not a determinant factor regarding malaria treatment**: there is a real synergetic effect among the molecules present in the plant, the other substances helping the artemisinin to play its role efficiently (solubility, etc). ***Artemisia annua* therefore constitutes a natural polytherapy**, possibly transformable in various forms (tea, capsules, lotions) to facilitate control of doses and administration. **The curative treatment requires daily intakes of 1 litre of fresh tea (10 gr of tea) during 7 days to avoid relapse**. The plant seems to offer other medical proprieties (antimicrobial, anti-inflammation, etc) in addition to its effect on malaria.

It is furthermore not excluded that the plant could have **preventive effects** against malaria, be it in terms of immunity or transmission of the disease by the mosquito. Repulsive effects against the mosquito have for instance be observed in Kenya and intermittent preventive treatment (IPT) trials with the plant have

shown concluding empirical results. Finally, the gametocyte properties of the *Artemisia annua* tea stop the transmission cycle of malaria between man and mosquito. It is, however, not yet demonstrated that the preventive method does not entail a risk of developing resistances. Also, the issue of eliminating the parasites remains considering the advantages and risks of the various approaches. Some believe that it is not useful to treat parasites at the asymptomatic stage with patients that have immunity against malaria and live in infested areas, even if the hidden burden of this form of malaria on education is real.

All these indications of interesting efficacy at various levels need to be confirmed: only a limited number of studies have been published in scientific journals with review committees and hence scientifically validated to transform these signs into scientific certainty. **Doubts about the way the plant operates and the efficacy of its various components** explain the WHO reluctance against treatment with the tea.

4. **Growing *Artemisia annua* in Africa is possible but delicate in so far that the plant is better adapted to temperate climates.** Tropical zones in higher altitudes present more favourable ecological conditions but in all instances, growing the plant requires vegetative material adapted to local ecological conditions. Two reproduction methods are possible for the dissemination of *Artemisia annua* in Africa: either the “**assisted**” method (Anamed) providing assurances as to the plantation material distributed (hybrid seed) and growing techniques used; or the “**self-propagation**” method with varieties adapted to local conditions combined with grassroots information dissemination and self-experimentation (approach adopted with success in Kenya). One main disadvantage of the first approach is the scarcity of the basic product and the slowing down of dissemination and access. The second method meets the need to develop reproduction techniques adapted to local constraints of the various ecological zones of Sub-Saharan Africa, but also represents a higher risk of failure and subsequent discouragement. Considering the stakes in terms of public health, however, **scientific researchers recommend to base the selection of material on qualitative *in vitro* tests before moving to *in vivo* trials.** Indeed, the adaptation of the plant in a given ecological context does not necessarily mean that it is efficient. As long as the operational mode of the plant is not more closely controlled, it is not guaranteed that all varieties will be equally efficient taking into account the variation in content of the various components of the plant. At the same time, isolated plantations of *Artemisia annua* can be found in many African countries in response to the urge by African families to protect themselves against malaria and other deadly diseases for which they have no access to pharmaceutical medication: the plant seems to be spreading anyway among the population without any kind of planning or control. Hence, the organizers of this meeting are faced with the **dilemma as to whether it is not better to encourage a controlled dissemination of the plant in close collaboration with the scientists or allowing the plant to spread in total anarchy.**
5. Marketing of the various treatment alternatives deserve further examination as long as they do not reduce access for the larger part of the population, which is at the origin of its interest (in addition to the greater efficacy issue). Production of derived products bring solutions in terms of administration and distribution but this must be carried out with prudence and taking into account local constraints.
6. In his conclusions, Mr Goerens also observed with satisfaction that the proposals presented during this conference contradict the idea that development problems can only be solved with astronomical amounts of money and that the validity of solutions is measured against their monetary value. On the contrary, endogenous development – the only sustainable one – generates from almost nothing, at any rate with locally available resources. The approaches examined today come within this perspective and are grounded on the principle of **African development by the Africans.** Africa is rich of a dynamic and creative youth who only asks to show its talents. The responsibility of European actors is to support them in their ambition.



ANNEXES

Annex 1: List of participants p.16

All the presentations are available on www.maladiestropicales.org and www.iday.org or upon demand by email at info@iday.org or ifbv@pt.lu.

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