

# NATURAL PRODUCTS RESEARCH NETWORKS IN SUB-SAHARAN AFRICA

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Networking is a means of calibrating the quality of work that a group of people is undertaking; fostering international collaboration, pooling of available resources to provide quality training and research in various scientific disciplines and ensuring rapid worldwide dissemination of research information. Several networks involved in research and development of medicinal plants exist in the various sub-regions of the African Region. However, this paper discusses only six such networks of African researchers which share certain common characteristics. These networks aim to foster research on natural products and their sustainable use in human health, and the dissemination of information on research into natural products among others. They also aim to enhance research training capabilities of institutions through national and Regional activities; promote collaboration and research partnerships and mentoring of young researchers in the advancement of natural products research and support the principles of biodiversity conservation. However, these networks have many challenges, mostly financial. A suggestion has been made for the African Network of Drug and Diagnostics Innovation to consider the involvement of other existing networks in its structure for synergizing the efforts to create health products.

## RÉSUMÉ

Le réseautage est un moyen de vérifier la qualité du travail qu'un groupe de personnes est en train d'entreprendre, de favoriser la collaboration internationale, de mettre en commun des ressources disponibles pour fournir une formation et une recherche de qualité dans diverses disciplines scientifiques. Il permet aussi d'assurer la diffusion rapide dans le monde entier d'informations issues de la recherche. Plusieurs réseaux impliqués dans la recherche et le développement des plantes médicinales existent dans les différentes sous-régions de la Région africaine. Cependant, cet article ne traite que de six de ces réseaux de chercheurs africains qui partagent certaines caractéristiques humaines communes. Ces réseaux visent à favoriser la recherche sur les produits naturels et leur utilisation durable pour la santé de l'homme ainsi que la diffusion

## SUMÁRIO

O Networking (criação de redes) constitui um meio de calibrar a qualidade do trabalho que um grupo de pessoas está a realizar, fomentando a colaboração internacional, o agrupamento dos recursos disponíveis para proporcionar formação de qualidade e a pesquisa em várias disciplinas científicas, assegurando a rápida disseminação mundial da informação de investigação. Existem várias redes envolvidas na pesquisa e desenvolvimento de plantas medicinais nas várias sub-regiões da Região Africana. Contudo, este documento discute apenas seis dessas redes de investigadores africanos que partilham certas características comuns. Estas redes visam fomentar a pesquisa de produtos naturais e a sua utilização sustentada em saúde humana, além da disseminação da informação

d'informations, notamment sur la recherche de produits naturels. Ils tendent également à renforcer les capacités de formation pour la recherche des institutions par le biais d'activités nationales et régionales, de promouvoir des partenariats de collaboration, de recherche et de tutorat de jeunes chercheurs dans l'avancement de la recherche sur des produits naturels et de soutenir les principes de la conservation de la biodiversité. Toutefois, ces réseaux ont de nombreux défis à relever, surtout d'ordre financier. Une suggestion a été faite au Réseau africain pour l'innovation dans le domaine de médicaments et des produits diagnostiques (ANDI) d'envisager la participation d'autres réseaux existants dans sa structure afin d'obtenir une synergie d'efforts pour créer des produits médicaux.

sobre a pesquisa de produtos naturais, entre outros. Têm também como objectivo melhorar as capacidades das instituições em termos da formação em pesquisa, além das actividades regionais; promover a colaboração e parcerias de investigação e orientação de jovens investigadores no avanço da pesquisa de produtos naturais no apoio de princípios de conservação de biodiversidade. No entanto, estas redes enfrentam muitos desafios, maioritariamente financeiros. Foi apresentada uma sugestão à Rede Africana de Inovação Medicamentosa e de Diagnóstico no sentido de considerar o envolvimento de outras redes existentes na sua estrutura, com o intuito de criar sinergias a partir dos esforços de criação de produtos de saúde.

**Networking may be regarded as a means of calibrating the quality of work that a group of people are undertaking. It is also a means of fostering international collaboration and pooling of available resources to provide quality training and research in various scientific disciplines as well as ensuring rapid worldwide dissemination of research information.**

Networking among African researchers, who work under extremely difficult conditions, is no different. When work is done in isolation, irrespective of the brilliance of the personnel involved and the use of state-of-the-art equipment, it may be difficult to evaluate the quality of work done in terms of the extent to which the work done meets the aspirations or objectives of those doing the work (fitness for purpose), as well as the usefulness or relevance of the work being done to the society or community at large (fitness of purpose). Therefore, when networks are formed in spite of the challenges, they ought to be supported to make them sustainable.

The WHO Regional Strategy on promoting the role of traditional medicine in health systems adopted by the fiftieth session of WHO Regional Committee for Africa in Ouagadougou in 2000 (1), underscored the importance of partnerships and networking and called upon the Ministers of Health to promote contact with other ministries, professional associations, consumer groups, non-governmental

organizations, associations of TM practitioners, regional and interregional working groups on TM and training institutions in both private and public sectors to optimise the use of TM. The Ministries of Health were also urged to facilitate effective collaboration between traditional and conventional health practitioners (1).

Several networks involved in research and development of medicinal plants exist in the various sub-regions of the African Region, but for the purpose of this paper only five which share certain common characteristics, will be discussed. All these networks aim to foster research on natural products and their sustainable use in human health and agriculture, and the dissemination of information on research into natural products. They also aim to enhance research training capabilities of institutions through national and regional activities; promote collaboration and research partnerships and mentoring of young researchers in the advancement of natural products research and support the principles of biodiversity conservation.

## NAPRECA

NAPRECA, the Natural Products Research Network for East and Central Africa, was conceived by East and Central African scientists who attended the 14<sup>th</sup> International Symposium on the Chemistry of Natural Products in 1984 in Poland. Its establishment was borne from the realization that Africa was rich in biodiversity, but poor in research and development in natural products. NAPRECA became a fully-fledged network and started operating in earnest in 1988 when in 1987 it became affiliated to UNESCO as one of UNESCO's network programmes. A NAPRECA Coordinating Board had its first meeting in Addis Ababa on 24<sup>th</sup> March 1988 (2,3).

The main objective of NAPRECA is to initiate, develop and promote research in the area of natural products in the countries in Central and Eastern Africa sub-region and to coordinate and maintain inter- and intra-regional links among different research groups (4). The countries in this Network are Botswana, Cameroon, Democratic Republic

of Congo, Ethiopia, Kenya, Madagascar, Rwanda, South Africa, Sudan and Uganda.

The activities of the Network include biannual Natural Products Symposia and workshops designed to expose young scientists in the natural products research area to the state-of-the-art techniques and to maintain vitality in the Network's activities in the various member countries (5) (NAPRECA, 2009). Reports of scientific development are also made during these workshops which are very well attended not only by natural products research scientists from the two regions, but also by scientists from other African countries and from other continents.

In addition to UNESCO the International Foundation for Science (IFS) (6) provides funding for NAPRECA, especially, funding for specific projects. NAPRECA also receives financial support from the International Programme in the Chemical Sciences (IPICS) of Uppsala University's International Science Programme (ISP), as well as from the Organization for the Prohibition of Chemical Weapons (OPCW). The International Educational Exchange Programme (DAAD) of Germany provides scholarships for students to undertake postgraduate degree programmes in the universities belonging to this Network (7).

The NAPRECA headquarters is located in the country of residence of the Executive Secretary and the Assistant Secretary/Treasurer for the duration of their term of office. The headquarters rotates among the member countries within the Network. Currently, it is located in Nairobi, Kenya. Local branches of NAPRECA are found in the countries in the Network.

## NABSA

Founded in 1992, the Network for Analytical and Bioassay Services (NABSA) is a network of laboratories in the Chemistry Departments of three East African Universities, namely, Addis Ababa University in Ethiopia, University of Nairobi in Kenya and University of Botswana located in Gaborone, Botswana. The purpose was to find ways of assisting scientists working in isolation and in various institutions in Africa who were constrained because of inadequate facilities and less enabling environments. The International Organization for Chemistry in Development (IOCD) encouraged the creation of NABSA (8).

NABSA was created to encourage phytochemical research underpinned with bioassay of natural products, by pooling existing analytical facilities in African research laboratories. Its

objective is to "promote closer cooperation among African scientists and institutions in order to reduce undue dependence on the North and to enhance the growth of science in Africa by mutual assistance, sharing and effective utilization of available facilities in the continent."

The laboratories in this network are equipped with the necessary scientific equipment for isolation of pure compounds, structural elucidation and profiling and fingerprinting of extracts. They include chromatographic systems for HPLC and MPLC, preparative HPTLC and GC, all types of spectroscopic equipment, including NMR (300 and 600 MHz) and MS (low resolution EI, CI, ESI). Scanning and Transmission electron microscopes are found at the University of Botswana in Gaborone.

Some of the analytical services provided are not found in most of the laboratories on the African Region and the continent. These include spectral services which utilises NMR (one and two dimensional; proton and carbon), MS and CD linked directly to the chromatographic separation systems.

NABSA also provides for short-term research visits. Research scientists from various countries on the continent can also access these services by sending samples

for analysis after prior approval of the Coordinator. Raw NMR spectral data generated at the laboratories is uploaded on an ftp server set up for the purpose. Scientists at the University of Dschang in Cameroon and the University of Dar es Salaam in Tanzania with more remote NMR workstations can access the data directly through the Internet. Scientists without remote workstations receive hardcopies of processed data by courier.



NABSA also has CD-ROM-based library search on natural products literature.

The bioassay services offered are rather general and include anti-feedant, larvicidal and brine shrimp assays.

NABSA is able to provide these services because of its adequately resourced laboratories. The International Foundation for Science (IFS) works with NABSA to provide proper maintenance and functioning of these pieces of scientific equipment.

## WANNPRES

The success of NAPRECA led to an attempt to create a similar network in the West African sub-region, with the name Natural Products Network for West Africa (NAPRWA), also with UNESCO

support. However, the attempt was not successful and a West African regional network for research into natural products could not materialize until 2002, during a conference held in Burkina Faso at which participants made presentations, which highlighted issues such as National Policy on scientific research in member states, ongoing research and areas of specialisation as well as strengths and weakness of their research projects.

This network, which was named the Western Africa Network of Natural Products Research Scientists (WANNPRES)<sup>(9)</sup> was initiated by the then West Africa Regional Secretariat of the Committee on Science and Technology in Developing Countries (COSTED), an erstwhile regional body of the International Council for Science (ICSU), the world-wide body

for the voice of science based in Paris. Its overall objective is to help improve infrastructure and communication among scientists in the sub-region to enable them carry out research for the development of natural products, and to work towards the establishment of Centres of Excellence.

Like many similar research networks, the conference at which WANNPRES was established, ended with participants making several recommendations, notable among which were:

- Strengthening of the capacities of Units/Departments in the universities and research institutions with potential for use by all members of the Network
- The need for both electronic and physical networking to upgrade and use the facilities at members' sites in a communal manner.

- Development of strong links between organic chemists and other natural products research scientists to ensure a multidisciplinary and holistic approach to the study of natural products
- Identification of sources of scholarship for young scientists in the sub-region to enable them work on natural products
- Benefit-sharing agreements with herbalists to enhance free flow of information
- Researchers to be conscious of sustainable use of biodiversity
- The need to engage in relevant pre-clinical studies to ensure safety and efficacy of natural products of medicinal value
- Lobbying government and policy makers to overcome some of the difficulties encountered by natural products research scientists
- Consideration of natural products other than those of medicinal value, such as nutraceuticals from our indigenous foods
- The Network to consider setting up standards based on good laboratory practices (GLP) for mutual acceptance of data generated in the various laboratories within the Network

During the meeting to formally establish WANNPRES priority areas (in terms of diseases) for

which medicinal plant research would focus were identified to be: Malaria and other parasitic diseases, HIV/AIDS, and Maternal and Child Health diseases, especially malnutrition.

The focus of research could vary in each country. However, the emphasis is on finding the scientific basis for the cure of medicinal plants and their products; be they crude extracts, fractions of these extracts or the pure compounds isolated from them. Validation of the medicinal effects of herbs to corroborate the claims of herbalists forms a large part of the research agenda of WANNPRES. Characterization of isolated chemical compounds is an important component of the research but it is not the flagship project of the Network.

An important activity that was agreed upon was the biennial scientific meetings, during which papers of research results would be presented, peer reviewed and published as WANNPRES Proceedings. Subsequent to the establishment of the Network, Scientific Meetings have been held every two years; 2004, 2006, 2008 and the fourth is to be held this year 2010 in Burkina Faso, where the rotating Executive Committee is currently located.

The proceedings of the first Scientific Meeting held in 2004 was published in the

*African Journal of Traditional, Complementary and Alternative Medicines*, an online journal (10). However, publication of proceedings of subsequent scientific meetings has not been possible owing to a number of constraints.

WANNPRES is run by an Executive Committee, whose members must come from the same country. The location of the Executive Committee changes every four years and this committee is responsible for organising the Scientific Meetings. Country Coordinators are responsible for the in-country activities of WANNPRES.

Unlike some other networks, WANNPRES does not enjoy a regular source of support from donor agencies and organisations. However, the Scientific Meetings have received funding from International Foundation for Science (IFS) (for grantees who are making presentations), from WHO Regional Office for Africa. Some support has also been received from the Organisation for the Prohibition of Chemical Weapons (OPCW) and the Academy of Sciences for the Developing World (TWAS) and recently the West African Health Organisation. Ministries, departments and agencies of governments in the countries hosting the scientific meetings also offer support.

## AAMPS

At a Medicinal Plants Forum for Commonwealth Africa held in Cape Town in 2000, the lack of suitable technical specifications and quality control standards for African medicinal plants and herbal medicines was identified as a major constraint and a significant barrier to regional and international trade. It was also recognized as an important barrier to integrating traditional medicine into African public health services (11).

In an attempt to overcome this challenge, a two-phased project to prepare 50 herbal product profiles/standards for key African Medicinal Plants was proposed. These product profiles included most of the important African plants presently traded as well as others considered to be of sustainable long term importance. The criteria used for inclusion were the following:

- Scientifically well investigated species;
- Species which required further investigation, but are well integrated in traditional medicine, yet largely unknown outside Africa.
- Plant species which already are commercially successful and are only locally used and traded.

Information normally contained in drug monographs with data usually found in medicinal plant trade specifications and quality control sheets were some of the materials used to start the project from the Department of Phytomedicine, University of Pretoria, in association with other medicinal plant specialists from Africa and Europe. A meeting to review progress on the first 23 herbal profiles was organised at Centurion Lake in South Africa in May 2005. Twenty seven experts invited to the meeting, unanimously agreed to the establishment of the African Association of Medicinal Plant Standards (AAMPS) by signing a declaration as Founding Members (12).

In the declaration, the Founding Members had a major objective of improving the health, welfare and livelihood of the people's of Africa by, among others:

- developing quality control and quality assurance standards for African medicinal plants and herbal medicines to support the African herbal industry and regulatory authorities.
- offering membership of the newly formed association to any individual or organisations dedicated to the establishment of such standards and to the creation of an African Herbal Pharmacopoeia

- preparing and publishing an African Herbal Pharmacopoeia based upon 50 herbal profiles and promoting its use nationally and internationally
- helping to obtain international validation for these herbal standards and the subsequent herbal pharmacopoeia and to lobby health authorities throughout Africa to use such standards as the basis for licensing safe and effective herbal medicines in Africa
- promoting capacity building in Africa for the establishment of regional training centres for certification, compliance and quality control of herbal medicines.
- promoting the safe, sustainable national and international trade in the fifty profiled African medicinal plants

AAMPS aims to support the production, processing and trade of African medicinal plant species from Sub-Sahara Africa. AAMPS, registered in Mauritius, is dedicated to the development of quality control and quality assurance standards for African medicinal plants and herbal products (13).

One major aspect of the work of AAMPS is the quality control/quality assurance of medicinal plants. Therefore, suitable methods for this have been

investigated and the outcome is the identification of a set of uniform methods which are relatively easy to apply and replicate, such as: 1) Macroscopic, microscopic and organoleptic properties of the plant, 2) Thin Layer Chromatography (TLC) and 3) infrared scan.

Where active and/or marker compounds cannot easily be identified with these methods, more specific, identification methods are used. In order to conduct the testing AAMPS establishes Reference laboratories in countries in Sub-Saharan Africa to be part of these testing procedures, a process that should also aid certification in the country when this is required.

AAMPS' major task is the formulation of standards for commercially important African medicinal plant species. However,

by integrating these standards in national regulatory systems, the objective of integrating herbal medicine into the health delivery system of a nation is achieved. In addition, by producing quality medicinal plants for trade, there is value addition to local products and therefore advantage to local business.

Regional experts for the relevant medicinal plant species from the continent of Africa were involved in the work of AAMPS. The profile produced for each plant was peer-reviewed by experts with relevant scientific and/or commercial background. Authors and reviewers were from the following countries: Belgium, Botswana, Burkina Faso, Canada, Ethiopia, Germany, Ghana, Madagascar, Mali, Mauritius, Namibia, Nigeria, South Africa, UK, and from the two commercial organizations, PhytoTrade

and ASNAAP (Agribusiness in Sustainable Natural African Plant Products).

For the dissemination of information contained in the work of AAMPS, there is an online presentation, the African Medicinal Plant Standards Database, which is to be constantly updated and this is available to AAMPS members only. The accessibility of the AAMPS database to the members, some of whom are medicinal plant researchers, makes it a viable network for medicinal plant research. When Reference laboratories have been established in a number of countries in Africa, an excellent network in quality assurance for researchers in medicinal plants would result.

AAMPS received funding from the Centre for the Development of Enterprise (CDE) – an EU donor organization for the promotion of trade with African, Caribbean and Pacific (ACP) countries - in collaboration with the Technical Centre for Agriculture and Rural Co-operation (CTA). Some of the members of AAMPS make handsome personal contributions to the project.

The AAMPS organisational structure is such that there are two units; one responsible for the trade aspects of its work, the other for the scientific aspect.



## WAHO COMMITTEE OF TRADITIONAL MEDICINE EXPERTS

When WANNPRES was established in 2002, there was a list of organizations and institutions that the new network was advised to have a relationship with. One such organization was the West African Health Organisation (WAHO). WAHO later organized a consultative meeting in November 2008 in Ouagadougou, Burkina Faso, which reviewed research data on West African medicinal plants and one of the outcomes of the meeting was the establishment of an *ad hoc* Committee of Experts on Traditional Medicine (14).

In March 2009, a meeting of the *ad hoc* Committee of Experts was held in Accra, Ghana, to consider the process of developing a West African Herbal Pharmacopoeia proposed by WAHO. A format for presenting the monographs for the pharmacopoeia was agreed upon and additionally, a list of 57 medicinal plants common to the countries of ECOWAS, was prepared on the basis of an agreed criteria, including medicinal plants commonly used in the sub-region, priority diseases common

in the sub-region and availability of scientific studies(15). Another paper in this special issue focuses on the Pharmacopoeia.

The main objective of establishing the Traditional Medicine Expert Committee is primarily to promote WAHO's traditional medicine agenda that aims at ensuring the institutionalization of traditional medicine in the health systems of Member States. However, it also promotes traditional medicine research expertise in the sub-region because of the way it operates.

Medicinal plant databases, journals, existing national and regional pharmacopoeias, were used to compile a draft of all the monographs based on the agreed format and these were sent to the traditional medicine experts for editing. The Traditional Medicine Experts Committee has been meeting, together with other experts in the field to review and finalize the monographs in preparation for the production of the West African Herbal Pharmacopoeia. The data collected on the medicinal plants showed up gaps and methods were proposed to fill the gaps.

The process of producing these monographs makes the Traditional Medicine Expert Committee a kind of network. The Experts come from different countries, with different

expertise, which is shared thereby improving not only each other's research effort, but also making use of research results. In the discussions during the meetings, different experts stress different aspects of medicinal plant research and in the end there is a consensus as to what is essential in the health aspects of medicinal plant research. This is an excellent mode of networking for a more effective outcome of research.

Pharmacopoeias exist, some national (e.g. Ghana (16) and Nigeria (17)) and others regional or even continental (e.g., the African Pharmacopoeia (18-19)). However, the pharmacopoeia under production is health-focused and therefore data on some sections in the monographs of the selected plants would be critical and could not be compromised: safety data; ethno-medical uses; test for identity and quality; pharmacological or clinical data. Selected plants without adequate information on these sections will not be considered for inclusion in the pharmacopoeia. The data collected so far has shown that there is very little information on safety studies and therefore a decision has been taken to commission a laboratory or laboratories to carry out toxicity studies to supply the necessary information for all plants considered for inclusion, which did not have safety data.

WAHO is a specialized agency of the Economic Community of West African States (ECOWAS) with the mandate of implementing high impact health interventions in the 15 ECOWAS Member States. The WAHO traditional medicine programme, like all the other priority orientations of the Organisation, therefore derives its main source of funding from ECOWAS. In addition, the World Health Organization, Regional Office for Africa, and PROMETRA International, a non-governmental organisation with the general objective of promoting TM and forging links between cultures across the world, are partners with WAHO in developing the West African Herbal Pharmacopoeia.

## ANDI

The first meeting of the African Network of Drug and Diagnostics Innovation (ANDI), at which the network was launched, took place in Abuja Nigeria in October 2008 (20). Following the launch meeting, a Task Force was constituted to oversee the development of a business plan defining the roadmap for the implementation of the Network's activities. The membership of the Task Force included researchers, ambassadors, pharmaceutical companies, bank executives, university dons

as well as a representative of Africans in the Diaspora and of the European Union. The WHO Secretariat represented by the WHO Regional Offices for Africa, for East Mediterranean and the Special Programme on Tropical Disease Research (TDR) are also members of the Task Force. The Business Plan (2010–2015) was formally launched and unanimously endorsed at the 2nd ANDI Stakeholders Meeting in October, 2009 in Cape Town, South Africa (21). The ANDI Task Force is to meet to begin implementation, including the establishment of a Board and identification of projects to be supported. A third stakeholders' meeting is planned to formally launch the organization in October 2010.

ANDI was set up to address the problem of less spending on health product discovery and development in Africa by increasing and strengthening networks throughout Africa that would build capacity from early drug discovery and development right through to manufacturing. There was a felt need for African-based solutions to African problems, with the involvement of African-based institutions and researchers capable of identifying the priorities and doing the work.

The network would focus on research for new drugs

and diagnostic tools for the diseases and health problems most affecting Africa. Most African-based researchers hardly communicate with their colleagues due in large part to the lack of financial and organizational support to link researchers throughout the continent. ANDI would strengthen these intra-continental links, providing funding for networked collaborative research across countries, as well as supporting IT infrastructure and the negotiation and management of intellectual property rights, including patents.

In 2008 an agreed part of the Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property (GSPOA) was adopted through a World Health Assembly Resolution WHA 61.12 (22); whereas the budget and indicators for monitoring progress was adopted in 2009 by Resolution WHA 62.1623. For the implementation of this strategy, it has been realized that Africa possesses a unique knowledge base and resources that could be better harnessed and applied to overcome the challenges resulting from the high disease burden, leading to economic development and poverty alleviation. ANDI has received recognition by the World Health Assembly (WHA62.16) as a unique organization able to contribute to the implementation of GSPOA in Africa.

The African Development Bank and WHO support the network. Support is also being sought from several African governments through their Ministries of Health, Science and Technology, Africans in the Diaspora, international organisations such as UNESCO, WIPO, WTO, the World Bank and development agencies for ANDI's development.

The organizational structure is still unfolding. However, ANDI is expected to have an African Innovation Fund, an ANDI Board and Scientific and Technical Advisory Committee (STAC).



## CONCLUSION: A WEB?

There are other networks not discussed in this article, which deal with research and development of medicinal plants in Africa. An example is the network for Southern African Plant Resources Exploration (SAPRE), which was established in 1996 on the initiative of the Commonwealth Science Council for the documentation and sustainable exploitation of plant resources through a collaborative effort between scientists and institutions in Southern Africa.

As unique or useful as each network may be, it may be more

worthwhile for collaborative links to be established among them for reasons already mentioned.

NAPRECA, which preceded all these networks, has been very successful probably because of the support it received and continues to receive from organisations outside the African continent. Such support is also forthcoming probably because of the nature of the major activity in the network, which is specific to the development of chemistry in the universities in the sub-region, something the donors can relate to. One can regard the establishment of NABSA as a logical extension of NAPRECA, because the absence of needed pieces of equipment for R&D together with their maintenance is the base of medicinal plant research.

Chemistry is only a part of the focus of activities for the West African analogous organisation, WANNPRES. Although much younger than NAPRECA, the focus on efficacy of the herbal preparations through research on pharmacological and, sometimes, clinical data makes it a natural complement to NAPRECA. According to information available, NABSA carries out bioassays. But these are generalized bioassays as mentioned above to evaluate possible biological activities of isolated compounds. More specific assays, relating to diseases especially diseases prevalent in the region, are carried out in the laboratories of researchers in the WANNPRES network. These bio-assays would be more beneficial if used in the efforts of the researchers within the NAPRECA network

to establish the efficacy of the isolated compounds in some specific diseases. Otherwise there would be research yielding a huge library of isolated chemical compounds of known structure but with very little development from them. Worse still, a pharmaceutical company could get interested in a compound and could decide to develop it into the kind of medicament that it is familiar with in a manner that brings very little reward to the researchers and the source country. NAPRECA and WANNPRES must collaborate more closely and effectively.

That the advancement of chemistry as a subject in the universities in the Eastern and Central African countries is due to NAPRECA and NABSA cannot be denied. The same advancement can be achieved in countries in the West African sub-region through networks if the same support from organisations outside the continent would come to the sub-region. Just as a better development of isolated chemical compounds can be achieved through better collaboration between NAPRECA and WANNPRES, advancement of chemistry as a subject in the universities is possible with the same collaboration between the two networks, which could lead to support from the same or similar organisations that support NAPRECA and NABSA.

NAPRECA and WANNPRES can therefore collaborate for a win-win situation where isolated compounds may be tested using a wide range of bioassays; and chemical compounds from fractions which are known to have medicinal value may be isolated and characterized.

Researchers of medicinal plant research must not be forced to choose between safety, efficacy and quality studies or structural elucidation of chemical compounds isolated from medicinal plants. We need both and we should do both.

AAMPS focuses on standards, another critical factor in the development of medicinal plants. The fine work done by AAMPS is necessary to enhance the work of any network on medicinal plant research. However, the work that the WAHO Traditional Medicine Experts Committee is involved in cannot be complete without excellent work on the identification and quality of the medicinal plants in the monographs making up the pharmacopoeia. There is every reason for this Committee to establish a relationship with AAMPS so that the laboratory that was responsible for the quality control/quality assurance aspects of AAMPS work could carry out some aspects of the identification/quality of the monographs for the West African

Herbal Pharmacopoeia. The data provided by the WAHO TM Expert Committee can also be beneficial to AAMPS. Some of the sections in the WAHO monographs cover safety data, therapeutic indications and therapeutic actions. Such information would be important in the selection of medicinal plants to trade in.

One of WANNPRES' recommendations at its establishment was the setting up of standards based on Good Laboratory Practice (GLP). AAMPS has done this and therefore WANNPRES should benefit from the work of AAMPS through collaboration. The synergy existing between the activities of WANNPRES and the WAHO Traditional Medicine Expert Committee is obvious.

As indicated above, strong networks already exist in Africa attracting partnerships from the North and increasing capacity on the continent. There are also examples of university networks with significant presence in Africa (24). However, these networks help build capacity in Africa, although they have many challenges, mostly financial and related sustainability. A suggestion has been made for ANDI to consider the integration/involvement of already existing networks in its structure, and for it to be responsible for coordination and inter-country

and/or inter-sub-regional collaboration. ANDI will then be seen as synergizing existing efforts to create health products.

There are enormous benefits that networking and collaboration in medicinal plant research and development could bring to the poor and deprived populations of the WHO African Region. However, for the populations to benefit from these networks, there is a need for those having common specific health research

interests, to forge relevant partnerships for information sharing, provision of orientation and training and to develop joint collaborative health research projects. It is also imperative to engage the media (e.g. REJOURMETRA, the Réseau des journalistes pour la promotion des médecines traditionnelles – Network of Journalists for the Promotion of Traditional Medicine) to help in the dissemination of new knowledge using the language of the people.

WHO and relevant partners should support the networks on medicinal plants research to realize their objectives.

With all these possible collaborations between the networks, one is working towards an African-wide web (AWW) of medicinal plant research and development and the African Region in particular and the continent in general, would be better for it. 🌐

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