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Editorial

In search of Congolese genius.

Who hasn't marveled at the genius of Albert Einstein, Leonardo da Vinci, Antoine Lavoisier, Isaac Newton or Stephen Hawking? But what about Arthur Zhang, Trevor Lloyd Wadley or George Pratley? It's true that the former are better known than the latter, but they were all remarkable. Few people remember, for example, that George Pratley, an African, made a significant contribution to man's first step on the moon by developing a glue that enabled the crew of Apollo XI in 1969 to glue their shuttles back together and return to earth.

These minds, or rather geniuses, have left their mark on science and history, contributing to the resolution of many of humanity's problems, or at least to their understanding. Although rare, such talents still exist.

Yet the explosion of their genius is not supernatural. Convinced that such rare pearls without mother-of-pearl - Congolese inventors and researchers of all kinds - could also be found somewhere in our country, hidden away in villages, towns or abroad, the Ministry of Scientific Research and Technological Innovation set out to find them. A conclave to identify them couldn't have come at a better time to offer them the opportunity to showcase their knowledge in the field of science and technology for the country's development. Addressing them without preconceived ideas is a hallmark of scientific objectivity in the sector.

Such objectivity is also a hallmark of Science and Technological Inno-



Prof. NGELINKOTO MPIA Patience
CEO of the WERC

vation Bulletin and Congolese researchers. They don't go into it with a tunnel vision that would imprison them in a narrow field of vision, but with an open, objective mind. For them, there is no such thing as scientific solipsism, which would restrict truth in the sense of knowledge in line with reality or objectivity. They are convinced that it is worthwhile to take a clear scientific interest in facts, objects or phenomena that affect mankind, and whose first impression is one of evidence or uncertainty, depending on the angle of observation.

Yesterday, it was the kidnapping phenomenon, the outcome of which we had hoped would be promising, but already seems to be on the horizon. Today, as for many years, the health consequences of cell phones, much more insidious but just as devastating, are no less interesting to the

curious eyes of scientists.

In this field, as in others in the fast-changing world of digital technology and scientific advances, the rumors that spread through the airwaves, symbolically or literally, are not always unfounded, and the apparent certainties are not always irrefutable. So it's best to approach them objectively, with "feet on the ground", a ground of conformity with proven scientific realities.

The real earth, our planet, which is less symbolic, also requires us to take a look at it from time to time. This is why this issue considers the importance of trees and the sustainable management of soil fertility through agroforestry. It's also the importance of revisiting the linguistic history of certain Congolese peoples whose cultural contacts have left their mark through labial-vowel consonants, or examining the human health virtues of oil derived from the larva of *Rhynchophorus phoenicis*, commonly known as Mpose. So many curiosities from a Congolese genius who may be more modest, but is just as important to discover



Activities of the Minister of SRTI

Pre-conclave: a success for Minister Gilbert KABANDA

The pre-conclave launched by Gilbert KABANDA, Minister of Scientific Research and Technological Innovation, is attracting an enthusiastic response from inventors and innovators, who turn up every day to present their masterpieces. More than 100 innovations and inventions have already been registered, and without false modesty, most researchers agree that the head of SRTI was right to organize this event in Kinshasa. The DRC has no shortage of geniuses capable of providing answers to the potential concerns of the Congolese people.

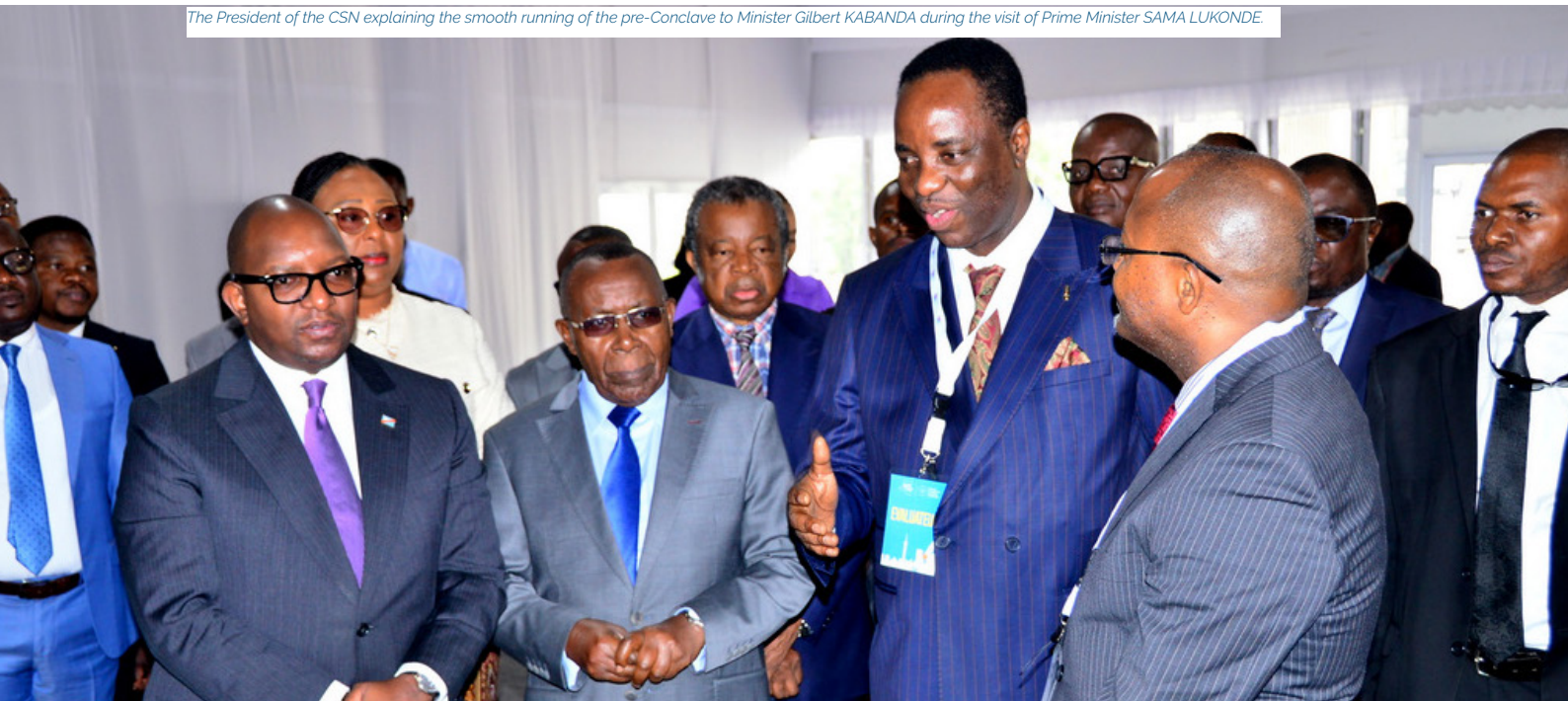
At this stage, a number of VIPs came to see what was going on in the marquee erected at the People's Palace in Lingwala. He noted the presence of the President of the Senate, Professor Modeste BAHATI LUKWEBO, the First Vice-President of the National Assembly, Professor André MBATA, Prime Minister Jean Michel SAMA LUKONDE and the list goes on. As things stand today, the pre-conclave, a laudable initiative by Minister Gilbert KABANDA, has won the day.

Professor MPIANA TSHIMANKINDA Pius, President of the National Scientific Council and Chairman of the conclave's scientific commission, has explained why the conclave is being held.

BELESI Consort and MAZONO Christian/NSC

Photo report on the Pre-Conclave of Congolese Scientific Genius

The President of the CSN explaining the smooth running of the pre-Conclave to Minister Gilbert KABANDA during the visit of Prime Minister SAMA LUKONDE.





Minister Gilbert KABANDA reports on pre-conclave proceedings



Prof. TSHIMPI presents some files to Minister Gilbert KABANDA

Troposphere VI is presented to the President of the SENATE



Engineer KEKA's Troposphere-6 made in DRC is erected in front of the marquee at the Palais du Peuple.



Minister Gilbert KABANDA reassures himself that the work is proceeding smoothly



A round-table discussion where evaluators exchange views with each other

Taking the floor, AEC General Commissioner Prof. Steve MUANZA tells his colleagues



The President of the Senate, Prof. Modeste BAHATI LUKWEGO congratulating Minister Gilbert KABANDA

NSC President Prof. MPIANA TSHIMANKIDA Plus receives the First Vice-President of the National Assembly, Prof. André MBATA at the Pre-Conclave



Engineer KEKA's Troposphere-6 made in DRC is erected in front of the marquee at the Palais du Peuple.



A vehicle made in the DRC is presented to the President of the Senate, Prof. Modeste BAHATI



Minister Gilbert KABANDA surrounded by some members of commissions and evaluators of the conclave





Family photo with Prime Minister Jean Michel SAMA LUKONDE

Egyptian government donates equipment to OVG/Goma

On August 2, 2023, the Egyptian government presented a gift of volcanic equipment and instruments to the Minister of Scientific Research and Technological Innovation, Gilbert KABANDA, in Kinshasa.

C This seismic and infra-sound equipment and instruments will enable us to monitor volcanic activity at OVG/Goma.

For Egyptian diplomat Hesham ELMEKWAD, this equipment is of great importance in the perception of volcanic eruption prevention.

«Our visit to the Minister was a courtesy visit which enabled us to discuss all the possibilities for cooperation between the two countries, particularly in the field of Scientific Research», said the Egyptian Ambassador.

The head of SRTI welcomed this friendly and fraternal gesture from Egyptian President EL SISI.

Let's note that DRC has historically enjoyed good relations with Egypt.

SRTI Minister's communication unit





Family photo with the President of the Republic Felix Antoine TSHISEKEDI

OPENING OF THE CONGOLESE SCIENTIFIC GENIUS CONCLAVE

F. TSHISEKEDI and G. KABANDA save Scientific Research and Technological Innovation

Scientific research in the Congo is unanimously supported at the highest level of government. Everyone is on the same wavelength in their efforts to restore this important sector of national life to its former glory. The Conclave of Congolese Scientific Genius, the 1st of its kind in this country, a useful project conceived and implemented by a Congolese, Dr. Gilbert KABANDA, is a great opportunity to give the Ministry of Scientific Research and Technological Innovation back its rightful place. The poor relation it was yesterday will be a bad and distant memory behind it.

On a recent visit to the Chapiteau where the Conclave is being held, the Prime Minister, Head of Government, left no doubt that he would provide all the necessary financial resources to boost Scientific Research and Technological Innovation in the DRC. Jean Michel SAMA LUKONDE didn't beat about the bush, addressing a multitude of Congolese inventors, innovators and researchers who were delighted and applauding the future.

On this day, which will remain engraved in the memory of those concerned, the Head of Government gave a clear answer to a just and praiseworthy demand. Minister Gilbert KABANDA is thus one of the major stakes of this Conclave, already a winning bet for the Patron of Scientific Research and Technological Innovation.

And as if that wasn't enough, the President of the Republic, Head of State Félix Antoine TSHISEKEDI, echoed the same sentiment, and went even further in concrete terms in his opening speech to the Conclave of Congolese Scientific Genius.

On Saturday August 19, 2023, from the podium of the Conclave, the big

day could not go unnoticed as it was broadcast live on RTNC, Radio and Television, the state-owned media, relayed by almost all private media as well as social networks, the Head of State, President of the Republic took the full measure of this grandiose event.

The President of the Republic did not mince his words. For him, this is the very first time in the history of the DRC to see the cream of its scientific intelligence united around a noble ideal



An innovative woman presented the French President with a prototype electric car.

Communication Unit of the Minister of SRTI

A computer innovation made in the DRC was presented to the President of the Republic, Felix TSHISEKEDI. The latter was accompanied by several members of the government and the President of the National Scientific Council, Prof. Pius MPIANA TSHIMANKINDA.





The Head of State aboard the very first electric vehicle made in DRC.

F. TSHISEKEDI opens the proceedings of the Conclave of Congolese Scientific Genius



The Head of State delivering his speech.

The President of the Republic, Félix Antoine TSHISEKEDI, opened the proceedings of the Conclave of Congolese Scientific Genius on Saturday August 19, 2023 at the Chapiteau of Palais du Peuple before members of the government, Congolese scientists and others.

In his address, he instructed the Government to work diligently to ensure that the sectoral ministries concerned by economically usable innovations and inventions make the appropriate arrangements for their budgeting in the 2024 Finance Act without delay.

The President of the Republic invited the Ministry of Scientific Research and Technological Innovation to provide the State, without delay, with a Research and Technological Innovation Policy, as well as the strategic axes for its application. It is urgent, he said.

"The government will take all necessary steps to ensure that the National Fund for Scientific Research and Technological Innovation, which has already been set up, receives budgetary appropriations commensurate with the national ambition in the 2024 Finance Act. This conclave represents a second trophy, this time scientific and technological, in which young people have competed on an equal footing with their elders, after the fine gift offered to the Nation by Congolese youth in the sporting and cultural fields at the 9th Francophonie Games", added the President of the Republic.

He also congratulated SRTI Patron Gilbert KABANDA for his dynamism, the National Scientific Council and all

Congolese researchers.

After his speech, the President of the Republic toured the stands and chatted with the exhibitors. He marveled at the display of the fruits of research by innovators and researchers.

COLONIAL GENIUS REPLACED BY A CONGOLESE GENIUS

According to Gilbert KABANDA KURHENZA, Minister of Scientific Research and Technological Innovation, the aim of this Conclave is twofold: firstly, to show the Congolese people and their leaders that the colonial genius that left 63 years ago has gradually been replaced by a Congolese genius.

Secondly, we need to make the Republic's governing bodies understand that the Congolese scientific and technological elite has the intellectual capacity and the will to take charge of the country's socio-economic development in a sovereign manner.

Scientists greatly appreciated this meeting, which highlighted the promotion of Scientific Research and Technological Innovation.

Christian MAZONO and Consort BELESI/NSC

Hélène BAKU TAMBA reveals the health benefits of *Rhynchophorus phoenicis* (Mpose) oil

The Head of Research at the National Pedagogical University (NPU), Ms Hélène BAKU TAMBA, revealed in her study in Kinshasa that *Rhynchophorus phoenicis* (Mpose) oil has virtues for human health.

According to the author, the oil extracted from *Rhynchophorus phoenicis* larvae is, according to the Agronomic laboratories UMR-IATE, CIRAD in France, NPU Biology and Chemistry Laboratories in DR Congo :

Cholesterol-free

High blood cholesterol levels lead to cardiovascular problems and atherosclerosis (artery disease), associated with arteriosclerosis (progressive hardening of the arteries);

Made up of insulin

A product that helps diabetics maintain normal blood sugar levels;

Digestible and highly stable when cooked

with a shelf life of around 144 weeks;

Rich in Vitamins (FAO, 2013)

- A (β -carotene), whose roles include: good growth, night vision (formation of rhodopsin, the retinal purple pigment needed for night vision), skin health, resistance to infection, antioxidant. Its deficiency leads to xerophthalmia (dryness and atrophy of the conjunctiva, resulting in reduced or lost vision), night blindness and skin lesions (burns, ulcers, etc.);
- E has the following roles: good muscular and nervous condition, antioxidant, acts on spermatogenesis (indicated for male sterility and impotence) and on estrogen and corpus luteum (indicated for recurrent abortion and threatened abortion). Its deficiency leads to intestinal disorders;
- B1, which plays a role in the nervous and cardiac systems. Its deficiency leads to beriberi (nerve damage, oedema);
- B12, an anti-anemia agent that acts on hematopoiesis (red blood cell formation). Its deficiency leads to anemia and neurological disorders;

Rich in trace elements (Iron and Zinc)

- Iron is a constituent of hemoglobin, through which it transports oxygen in the blood. Its deficiency leads to anemia and paleness;
- Zinc is found in large quantities in the islets of the pancreas and in male sexual organs. Zinc deficiency

can lead to severe anemia, enlarged liver and spleen, delayed growth, bone and sexual maturation (hypogonadism = insufficient secretion from the genital glands), skin lesions, diarrhea, loss of appetite and increased susceptibility to infection due to immune system deficiencies.

Rich in macroelements

Calcium, Magnesium, Potassium and Sodium: this oil is ideally suited as a nutritional supplement in the human diet. It can play an essential role in human protein synthesis, tooth development, enzymatic activity and regulation of the body's acid-base balance.

Composed of the enzymes Glucosidase and α -galactosidase :

these enzymes have multiple potential applications. They play a role in Oleochemistry: cosmetics (baby milk, etc.), pharmaceutical products or additives;

Therapeutic

Combats diabetes, encephalopathy, constipation and salmonellosis.

Currently, with the Coronavirus pandemic, sufferers present acute respiratory problems (dyspnea, shortness of breath, etc.), their blood tends to coagulate and they often die of asphyxia. Regular consumption of *Rhynchophorus* oil (Mpose) has an impact on the health of Covid-19 sufferers in particular, and everyone in general, because: the Iron it contains facilitates the transport of Oxygen in the blood; Zinc, vitamins A and E help resist infections while strengthening the immune system; in addition, the latter two vitamins act as antioxidants that protect white blood cells (which destroy microbes) from oxidation and increase their mobility.

These characteristics make *Rhynchophorus* larvae oil not only a food product, but also a candidate for industrial and pharmaceutical applications. It can be used for :

- in the food industry (tomato sauce, cookies, pastries, chocolate, etc.);
- Oleochemicals: cosmetics (baby milk, etc.), pharmaceutical products and additives,
- in therapeutics: combating many related pathologies, notably dia-

betes, encephalopathy, constipa-



tion, salmonellosis, cardiovascular disorders, anemia, neurological disorders, vision problems, stunted growth, infections, scabies, male sterility and impotence, recurrent abortions and the threat of abortions, insufficient secretions from the genital glands, immune system deficiencies, etc.; mitigating the effects of COVID-19, and helping to solve the problem of food insecurity.

Let's signal that Ms. Hélène BAKU TAMBA is Senior Lecturer of the Biology Department and Secretary for Research in the Medical Biology Department at the National Pedagogic University - Kinshasa, DRC.

Hélène BAKU TAMBA, Senior Lecturer at NPU



Kopa wa Kopa David: Labial-velar consonants in Mokpá, nya and Metóko languages: an indicator of historical contacts with other languages from the Lower Lualaba region of the DRC

Researcher Kopa wa Kopa David has published an extract from his study in Kisangani on lip-vowel consonants in the Mokpá, nya and Metóko languages: an indicator of historical contacts with other languages from the Lower Lualaba region of the DRC.

Researcher Kopa wa Kopa David has published an extract of his study in Kisangani on labial-velar consonants in Mokpá, nya and Metóko languages: an indicator of historical contacts with other languages from the Lower Lualaba region of the DRC.

The Lower Lualaba region is located in the south from the city of Kisangani in northeastern DRC.

It is an area characterized by increasing linguistic diversity.

When we look at the linguistic map of the DRC, language contact in the northeastern part is exceptionally marked by the presence, at the same time, three language families.

From a phylogenetic point of view, these include Ubangian, Central Sudanese and Bantu languages,

which are obviously in the majority.

According to linguistic and historical hypotheses, the arrival of the languages of various Bantu subgroups and their speakers to this region, from different directions, corresponds to a reunion marked by shared memories of a former neighborhood.

Moreover, NAYWEL ENZIEM points out that, on their arrival, the Bantu, Sudanese and Nilotic layers were successively superimposed on the hunter-gatherer peoples.

First occupants of the region. It's certain that the latter had their own languages, which were probably assimilated into the Bantu with contact, whose cultural influence would be dominant.

Contact between hunter-gatherer peoples and other savannah peoples

would be consolidated by reciprocal interests, with the former possessing forestry know-how and the latter iron. Indeed, in linguistic terms, these human, linguistic and cultural contacts have largely favored language transfers.

Certainly, this region is an appendage of the crossroads zone known as the "Macro-Sudan belt" or the Sudanic" zone.

The most relevant feature in these language transfers are the labial-vowel consonants (kp, gb, ngb) which, in principle, would come from non-Bantu languages. This appears to be true, as these consonants do not exist in the Proto-Bantu lexicon. They are present in the Mokpá, nya and Metóko languages, whereas the other Lega languages, although forming the same subgroup with the aforementioned languages,

do not possess these consonants. In this respect, the incorporation of labial-vowel consonants into the phonological system of mokpá, nya and metóko, would probably date back contact with the languages of different families and subgroups spoken in the lower reaches of the Lualaba.

This study provides the first linguistic evidence of the turbulent history of the communities in this region.

Let's note that Mr. Kopa wa Kopa David is a researcher at the Research Center for African Languages and Cultures in Kisangani, and a doctoral student at the University of Kisangani in the DRC and the Brussels Free University in Belgium.

*Kopa wa Kopa David
RCALC/Kisangani*

School discipline report card: a national education turnaround



Teaching at primary, secondary and technical levels cannot serenely take place outside an appropriate safe framework, the school, for both Pupil and Teacher, where discipline is the order of the day. It serves to impose models of physical and moral behavior, in order to ensure the socialization of individuals, combat any marginalization and ensure the continuation of the values and educational aims of the society to which it belongs. The very complexity of the fields of influence of discipline, decided us to broaden the research to the concept of school discipline, as it is "the set of practical procedures intended to ensure the good order of exercises of all kinds of which school life is composed". But what about those in schools in the Democratic Republic of the Congo?

Observation

Discipline is "a set of rules and influences by means of which minds can be governed and characters formed". The terms govern and form indicate the dual action exerted by discipline on the individual. The former refers to an intellectual action, while the latter evokes more of a moral action, encountered more particularly in master-disciple relationships. In both cases, the rules established have the function of adapting the individual to society, i.e. "making the social state".

The rules used to lead, direct, govern aim to maintain order. They construct reference examples, models and establish prescriptions, ordinances by virtue of law, custom and usage. It thus has a socializing role, since these rules that "govern, form, shape" appear to be indispensable to the social adaptation of the individual as well as to the cohesion of the society that enacts them. Along with education, of which it is a tool, it is part of the history of mankind, since it defines the procedures that enable

individuals to pass from the stage of childhood to that of adulthood, from the state of nature to the social state.

In the Democratic Republic of the Congo, the current state of the Congolese education system does not yet include any standards for the administration of discipline in schools, nor for the triple objective of "motivation, dissuasion and sanction" that schools must achieve for pupils. This is all the more true given that the States Parties, including the Democratic Republic of Congo, which have ratified the Convention on the Rights of the Child of November 20, 1989, are obliged under article 28.2 to take all appropriate measures to ensure that school discipline is administered in a manner consistent with the child's human dignity.

Like education, of which it is a tool, indiscipline is a violation of the texts governing a school's internal regulations. It is characterized by disorder, an unhealthy atmosphere unfavorable to conducive work, voluntary lateness of pupils, conspicuous absences from classes, voluntary

refusal to participate in homework and tests, writing on walls, use of cell phones in classrooms, aggression of all kinds, early departure on vacations with modules for throwing firecrackers, physical aggression against people, bullying, truancy, lateness to school, consumption of narcotics, discourteous language, sexual harassment or frolic, theft, riots, school fires, gassing of learners and many other anti-social vices.

The slackening of school discipline over the past decades has led to the emergence of anti-values in all their forms, deteriorating the Congolese education system through a vertiginous rise in indiscipline and incivism in schools and society.

This phenomenon has become global and then decried also in the Democratic Republic of Congo, by Framework Law N°14/004 of February 11, 2014, which speaks of the reform of relating to disciplinary procedures and internal regulations. The variability of punitive practices within schools, the often rapid recourse to exclusion, disciplinary councils have

not given the expected results despite the presence of supervisors and educators better equipped in the approach of psychology, we unfortunately note the degradation of the Congolese school environment leading to a high failure rate and massive expulsions.

In keeping with the saying that "choices have consequences", non-compliance or non-practice of discipline should lead to corrective measures, hence the urgent need for the country to equip itself with a pedagogical tool capable of achieving such an objective.

The Planned Excellent Discipline Bulletin (School Discipline Bulletin) is that tool.

The importance of the School Discipline Bulletin

To put an end to the scourge of indiscipline, as well as the anti-values of all kinds that stem from it, and which have overturned all community values, the School Discipline Bulletin is presented as a pedagogical therapy that materializes the Head of State's vision of "the fight against anti-values and indiscipline in schools and society".

Unlike the School Report Card in use in the Education System, the School Discipline Report Card is an appropriate and effective pedagogical tool for objectively assessing student conduct in the school environment and in society, in that it is a snapshot at a "T" moment of the student's school situation. It is the main link between school and society. It is a privileged tool for dialogue between the various partners in education, on the one hand, and between them and the student, on the other, thanks to the information it records and communicates.

In this respect, it is the ideal vehicle for stimulating a coordinated diagnostic dialogue between the school and parents, with a view to effectively reframing any behavioral deviation on the part of the pupil.

To this end, the School Discipline Report Card definitively solves the problem of random and arbitrary grading of conduct through several sub-criteria and in a quantified way with a weighting attached to each sub-criterion.

The School Discipline Bulletin also helps to curb the behavior of certain schools that don't respect the school calendar, since it makes it possible to check the effectiveness of the number of days classes are held, one of the essential parameters of the school program. The School Discipline Bulletin thus makes it possible to :

- to Pupils to be aware of their conduct at school in order to improve;
- to schools to have, on the one hand, a standard serving as a reference for the administration of discipline, and on the other hand, to achieve the triple objective of "motivation, dissuasion and sanction" for pupils;
- to parents to be aware not only of their children's behavior, but also to engage in a coordinated diagnostic dialogue with the school and the learner, with a view to effectively reframing any behavioral deviation on the part of the pupil;
- To the Ministry of Primary, Secondary and Technical Education to have a pedagogical tool to combat anti-values and indiscipline from an early age in schools and society;
- to the Congolese State to have, on the one hand, a national reserve of an educational and commercial nature to raise funds for the self-management of Primary, Secondary and Technical Education, and on the other hand, a pedagogical tool that also complements the objectives of the Coordination for the change of mentality (CCM) and the Agency for the prevention and fight against corruption (APFC) in school environments in order to transform Congolese society to one based on moral values.

As such, it consists of six bulletins (from first primary to fourth grade at high school), one for each grade (elementary, middle and final), each of which has four distinct parts: firstly, the header (school details, school year, class, pupil identity); secondly, the number of days the school was open (per period, per

term and/or per semester and per year); thirdly, the body (the Spirit of Excellence and disciplinary actions to be reprimanded); and fourthly, the footer (overall assessment, objective conduct, student's orientation wishes, signatures of the student's supervisor, head teacher, class teacher and/or head of discipline, school seal). In this way, it gives everyone a clear, general idea of the student's behavioral progress at school on a single page.

In the light of the above, it is more than obvious that the Democratic Republic of Congo is in dire need of an appropriate and effective educational tool to combat anti-values in schools and society from an early age.

We therefore suggest that the Excellent and Planned Discipline Bulletin (School Discipline Bulletin) be included in the National Primary, Secondary and Technical Education Program in the Democratic Republic of the Congo by the competent authority.

Let's note that STIB has returned to the said bulletin, given the importance of this pedagogical tool.

Mitterrand LILINGA

Sustainable land fertility management in the DRC: a contribution from agroforestry research in North Kivu

The population of the Democratic Republic of Congo exceeds 100 million. Meanwhile, access to agricultural resources is not assured, not least because of the negative environmental impacts of unsuitable farming techniques practiced by local populations.

Soil degradation in these environments is due to steep slopes, aggressive climatic conditions and slash-and-burn cultivation techniques. These agroforestry techniques are practiced without protecting environmental resources such as water, soil nutrients and space. If nothing is done, the economic and environmental impacts will be deplorable in the near future. One solution is to choose the right plants to replenish degraded soils and fertilize them.

Researchers Germain Mbura Kikandi and Sylvain Muhindo Balengeke from INERA's Walikale station have been working on this issue. The agricultural engineers carried out a study on the composition and structure of woody plants in agroforestry systems and the related soil chemical properties in the Albertine Rift, notably in the territories of Lubero, Masisi, Nyiragongo, Rutshuru and Walikale in the province of North Kivu, one of the most agricultural provinces of the Democratic Republic of Congo, with 75% of its population working in agriculture.

In this province, researchers have identified agroforestry systems capable of conserving soils and improving their productive capacity over a long period while meeting other human needs for natural resources (energy wood, stakes, timber, etc.).



Forest destruction by slash-and-burn agriculture

The Albertine Rift region in general, and the territories of Lubero, Masisi, Nyiragongo and Rutshuru in



View of an agroforestry system with trees scattered throughout the field. Here a coffee field

North Kivu province, in particular, have undergone numerous changes in land use, with major loss of forest cover and degradation of natural resources linked to population growth. The latter is at the root of strong pressure on forests for the exploitation of fuelwood, the expansion of pastures and industrial perennial crops such as coffee and cinchona.

The people of this area are aware of the precariousness of their living conditions and are keen to solve the thorny problem of loss of soil fertility and plant cover. They resort to agroforestry using several complex and variable systems. However, they do so on a routine basis. They need to be enlightened, supported and trained.

The researchers identified 8 systems: trees in perennial crops, alley cropping, improved fallows, trees in pastures, trees on boundaries (hedges), trees in fields, hut gardens and taungya. They believe that the use of these systems can contribute to improving the living conditions of local populations, and to the sustainable management of natural resources such as soils and forests.

With regard to the composition of these systems, the researchers used a determinant called the Shannon index, which ranges from 0 to 3.5, to objectify diversity. The "hut garden" and "trees in the field" agroforestry systems were found to be more diverse, with

indices of 2.993 and 2.65 respectively. The most abundant, dominant and



Field collection of dendrometric data

best-represented tree species in basal area are: *Grevillea robusta*, *Persea americana*, *Erythrina abyssinica*, *Cupressus lusitanica*, *Calliandra calothyrsus*, *Eucalyptus citriodora*, *Eucalyptus maidenii*, *Acacia mearnsii*, *Leucaena leucocephala* and *Senna spectabilis*. The Proteaceae, Fabaceae, Lauraceae, Myrtaceae, Cupressaceae, Moraceae, Bignoniaceae, Anacardiaceae, Araliaceae and Casuarinaceae families are the best represented.

Finally, with regard to the contributions of agroforestry systems on soils, analysis of variance revealed that there was no significant difference in the way

these systems improved the various parameters. This shows that, under the ecological conditions of this environment, no agroforestry system improves the edaphic parameters under study better than the others. However, the carbon-nitrogen (C/N) ratio tipped the balance slightly in favor of the system with trees scattered throughout the field.

Promoting this system would help combat soil erosion, create a microcli-

mate that boosts crop yields, acts as a windbreak and limits evapotranspiration.

Increasing food security and environmental sustainability in the DRC's agricultural systems is a necessity. An integrated approach to soil fertility management is needed to maximize crop production while minimizing deg-

radation of soil physical and chemical properties.

The research carried out by MBURA and MUHINDO meets this expectation and is worth its weight in gold.

**BALOGIJE SELENJE Jean-Luc
RCMD/Bunia**

Researcher Cyprien BAMVINGANA talks about the importance of trees

CBRNCE/DRC

Researcher Cyprien BAMVINGANA of the Chemical, Biological, Radiological and Nuclear Center of Excellence (CBRNCE/DRC) told STIB about the values and importance of trees in society.



According to the researcher, trees are living beings that evolve silently alongside us; for this reason, many people don't pay them the attention they deserve. Yet they are so indispensable that no animal, including man, can live without a tree. Trees play several roles:

- During photosynthesis, the tree captures CO₂ from the atmosphere (the most widespread greenhouse gas) and sequesters it in the woody biomass, while releasing into the atmosphere the oxygen needed for respiration; the tree intercepts particulate matter: a healthy tree is capable of removing more than 7,000 dust particles/liter of air. There's no denying that trees are effective air-conditioning and purification devices;

- Trees intercept and store rainwater on the surface of leaves and branches, reducing its descent to the ground and encouraging infiltration, thus reducing runoff and erosion and delaying the formation of peak flows;

- With its trees, the forest is home to 80% of the Earth's biodiversity. It therefore protects diversity and provides a habitat for numerous animal and plant species. It also helps to replenish the water table, with ¾ of accessible drinking water coming from forested watersheds;

- Trees provide a wide variety of products for human consumption, including timber, poles, fibers, fruits and medicines. All these tree products are marketed and generate income. In addition, non-timber forest products such as caterpillars, mushrooms and honey are marketed and provide a source of income for humans. Wood harvested from trees for export is also a source of income for a country. Similarly, wood used in the pulp and paper industry is marketed and constitutes a source of income. Products from trees are marketed and constitute a source of income;

- Trees reduce solar radiation, break wind speed and regulate ambient temperature and humidity conditions. Trees provide effective protection for roads, factories and industrial plants, private homes and residential areas. The presence of wooded areas in urban settings remains an important social, developmental and environmental asset;

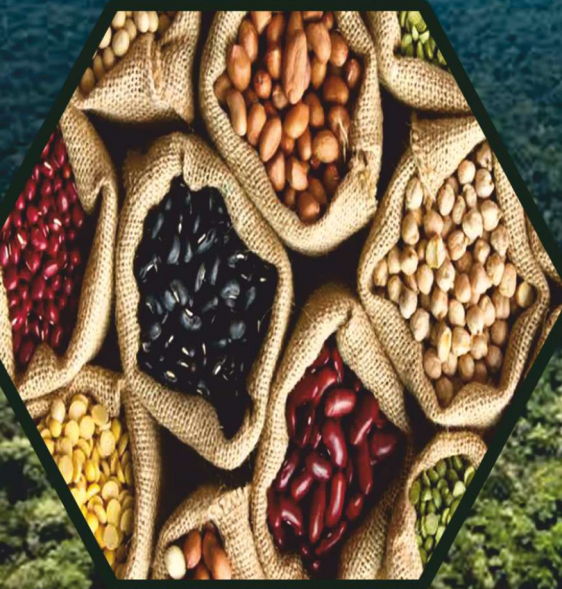
- Trees can be a source of ornament for a town or city, a space for recreation, a leisure area, a playground for children. Trees can create a sense of cultural identity, and ornamental trees can reflect a desire to recreate a familiar atmosphere;

- Today, the tree is of cultural importance. The tree is a place of palaver in our

villages, and the wise also gather under the tree for celebrations. Palm leaves, for example, are presented in front of plots as a sign of mourning or celebration. Roses are a sign of joy, to name but a few. Trees are also ritual initiation sites for certain peoples.

From these different roles, it's easy to understand that cutting down trees or deforestation has a number of consequences, including climate change, the aggravation of certain diseases, the reduction of water resources and the loss of biodiversity.

Cyprien BAMVINGANA KHUTU /CBRNCE/DRC



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4. approving the budgets of the Research Institutes and Centers and submitting them to the Minister for Scientific Research for approval
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